HSP

Science

Assessment Guide

Grade 5

Harcourt
SCHOOL PUBLISHERS

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Overview

In *HSP Science*, the assessment program, like the instruction, is student-oriented. By allowing all learners to show what they know and can do, the program provides you with ongoing information about each student's understanding of science. Equally important, the assessment program offers ample opportunity for students to evaluate their own growth.

The assessment program in *HSP Science* offers the assessment options shown in the chart below. The various options reveal the multidimensional aspect of the program.

<table>
<tr><th colspan="3">Assessment Options</th></tr>
<tr>
<td>Formal Assessment
• Chapter Review and Test Preparation SE
• Chapter Test AG
• Unit Test AG</td>
<td rowspan="3">Ongoing Assessment
• Assess Prior Knowledge—Chapter Opener TE
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<tr>
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<tr>
<td>Online Assessment
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• Item bank from which to build tests</td>
<td>Portfolio Assessment
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• Suggested work samples TE</td>
</tr>
</table>

(Key: SE = Student Edition; TE = Teacher Edition; AG = Assessment Guide)

Assessment Components

Formal Assessment

To help you reinforce and assess mastery of chapter objectives, *HSP Science* includes both reviews and tests. You will find the Chapter Review and Test Preparation in the student book and the Chapter Test and Unit Test in this **Assessment Guide.** Answers to all assessments, including sample responses to constructed-response items, are provided.

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Standardized Test Preparation

Large-scale assessment of science literacy has been mandated by the *No Child Left Behind Act (NCLB)*, the 2001 reauthorization of the Elementary and Secondary Education Act. To help prepare students for district- or state-mandated assessments, *HSP Science* includes items that reflect the format of standardized tests. These items can be found in each Lesson Review and Chapter Review and Test Prep in the **Student Edition.**

Online Assessment

The ability to deliver tests online provides the teacher with increased flexibility in managing classroom assessment. The Chapter Tests and Unit Tests that appear in this **Assessment Guide** can be delivered online. In addition, *Online Assessment* allows you to assemble custom tests from a bank of multiple-choice, short-response, and extended-response items. Multiple-choice items are scored automatically, and a user-friendly interface allows teachers to enter scores for short- and extended-response items. You can also build tests according to state standards. For more information, visit **www.hspscience.com.**

Ongoing Assessment

HSP Science supports ongoing assessment in several ways. Within each lesson in the **Student Edition**, there is a Focus Skill question at the end of each section to help you assess students' immediate recall of information. At the end of each lesson is a Lesson Review to help you evaluate how well students grasped the concepts taught.

The **Teacher Edition** offers a number of informal assessment tools. By using the Assess Prior Knowledge that accompanies each chapter opener, you can gauge students' foundational knowledge. Daily Inquiry Transparencies are designed to reinforce and evaluate students' use of inquiry skills. Questions that address a variety of dimensions—including critical thinking skills, inquiry skills, and use of reading strategies—are strategically placed throughout each lesson. Additional material for reviewing the lesson is provided in **Reading Support and Homework.** Located in this **Assessment Guide** is yet another tool, the Observation Checklist (p. AGxv), on which you can record noteworthy classroom observations.

Performance Assessment

Performance tasks provide evidence of students' ability to use science inquiry skills and critical thinking skills to complete an authentic task. A brief performance task is included as part of the information in the **Teacher Edition** that accompanies each chapter review. A more comprehensive performance task follows each Chapter Test in this **Assessment Guide.** Each includes teacher directions and a scoring rubric. Also in this booklet, you will find the Experiment/Project Evaluation Checklist (p. AGxviii) for evaluating unit inquiries and projects.

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Student Self-Assessment

Students should be challenged to reflect on their work and to monitor and control their own learning. Various checklists are provided for this purpose. An Investigate Self-Assessment accompanies each Investigate in the **Lab Manual** in Grades 3–6. This simple checklist allows students to evaluate their performance, using criteria specific to each activity. Two checklists are located in this **Assessment Guide.** One is the Self-Assessment—Read and Learn (p. AGxvii), which helps students reflect on instruction in a particular lesson or chapter. The other is the Experiment/Project Summary Sheet (p. AGxix), on which students describe and evaluate their own science projects and experiments.

Portfolio Assessment

In *HSP Science*, students may create their own portfolios. The portfolio contains self-selected work samples that the student feels represent increased science literacy. The portfolio may also contain a few required or teacher-selected papers. Support materials are included in this **Assessment Guide** (pp. AGxx–AGxxiv) to assist you and your students in developing portfolios.

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Formal Assessment

Formal assessment is an essential part of any comprehensive assessment program because it provides an objective measure of student achievement. This traditional form of assessment typically consists of reviews and tests that assess how well students understand, communicate, and apply what they have learned.

Formal Assessment in *HSP Science*

Formal assessment in *HSP Science* includes the following tools: Chapter Review and Test Preparation in the **Student Edition** and Chapter and Unit Assessments in this **Assessment Guide.** The purpose of the review is to assess and reinforce not only chapter concepts and inquiry skills but also students' test-taking skills. The purpose of the Chapter and Unit Assessments is, as with other formal assessments, to provide an objective measure of student performance. Answers to chapter reviews, including sample responses to constructed-response items, are located in the **Teacher Edition**, while answers to chapter and unit tests are located in the Answer Key in this booklet.

The chapter and unit tests that appear in this **Assessment Guide** may be delivered electronically by using *Online Assessment*. For more information, visit **www.hspscience.com.**

Types of Review and Test Items

Students can be overwhelmed by the amount of information on a test and uneasy about how to answer different types of test questions. The Chapter Review and Test Preparation is designed to help familiarize students with the various item formats they may encounter: *multiple-choice items* (with a question stem; graph, table, map, diagram, model, or picture; or using qualifiers such as *not*, *least*, and so on), *constructed-response items* (which, depending on grade level, require the student to write a short or an extended answer), and *context-dependent sets*, in which the student is asked to respond to related items.

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Test-Taking Tips

Understandably, students often experience test-related anxiety. Teaching students to apply a number of general test-taking strategies may bolster their confidence and result in improved student performance on formal assessment. As students take a test, they should

- scan the entire test first before answering any questions.
- read the directions slowly and carefully before beginning a section.
- begin with the easiest questions or most familiar material.
- read the question and all answer options before selecting an answer.
- watch out for key words such as *not*, *least*, *best*, *most,* and so on.
- carefully analyze graphs, tables, diagrams, and pictures that accompany items.
- double-check answers to catch and correct errors.
- erase all mistakes completely and write corrections neatly.

Test Preparation

Students perform better on formal assessments when they are well prepared for the testing situation. Here are some things you can do before a test to help your students do their best work.

- Explain the nature of the test to students.
- Suggest that they review the questions at the end of the lessons and the chapter.
- Remind students to get a good night's sleep before the test.
- Discuss why they should eat a balanced meal beforehand.
- Encourage students to relax while they take the test.

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Performance Assessment

Teachers today have come to realize that the multiple-choice format of traditional tests, while useful and efficient, cannot provide a complete picture of students' growth in science. Standardized multiple-choice tests cannot fully reveal how students *think and do things*—an essential aspect of science literacy. Performance assessment can provide this missing information and help balance your assessment program. Well-constructed performance assessments provide a window through which teachers may view students' thought processes.

An important feature of performance assessment is that it involves a hands-on activity in which students solve a situational problem. Students often find performance assessment more enjoyable than traditional paper-and-pencil tests. Another advantage is that it models good instruction: students are assessed as they learn and learn as they are assessed.

Performance Assessment in *HSP Science*

Performance tasks can be found in two locations in *HSP Science*. In the **Teacher Edition**, a brief performance task is part of the information that accompanies each chapter review. In this **Assessment Guide**, a more comprehensive task follows each chapter test. Both types of performance tasks will provide insights into students' ability to apply key science inquiry skills and concepts taught in the chapter. You may use the Experiment/Project Evaluation Checklist (p. AGxviii) to evaluate student performance on these tasks.

Administering Performance Tasks

Unlike traditional assessment tools, performance assessment does not provide standardized directions for its administration or impose specific time limits on students, although a suggested time frame is offered as a guideline. The suggestions that follow may help you define your role in this assessment.

- ***Be prepared.***
  A few days before students begin the task, read the Teacher's Directions and gather the materials needed.

- ***Be clear.***
  Explain the directions for the task; rephrase them as needed. Also, explain how students' performance will be evaluated. Show students the rubric you plan to use, and explain the performance indicators in language your students understand.

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- ***Be encouraging.***
  Your role in administering the assessments should be that of a coach—motivating, guiding, and encouraging students to produce their best work.

- ***Be supportive.***
  You may assist students who need help. The amount of assistance needed will depend on the needs and abilities of individual students.

- ***Be flexible.***
  Not all students need to proceed through the performance task at the same rate and in the same manner. Allow students adequate time to do their best work.

- ***Involve students in evaluation.***
  Invite students to join you as partners in the evaluation process, particularly in development or modification of the rubric.

Rubrics for Assessing Performance

A well-written rubric can help you score students' work accurately and fairly. Moreover, before students begin a task, it gives them a better idea of what qualities their work should exhibit.

Each performance task in the program has its own rubric. The rubric lists performance indicators, which are brief statements of what to look for in assessing the skills and understandings that the task addresses. A sample rubric for a task in this **Assessment Guide** follows.

Scoring Rubric

Performance Indicators

_____ Assembles the kite successfully.

_____ Carries out the experiment daily.

_____ Records results accurately.

_____ Makes an accurate chart and uses it to report the strength of wind observed each day.

Observations and Rubric Score

3 2 1 0

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Scoring a Performance Task

The scoring system used for performance tasks in this **Assessment Guide** is a 4-point scale that is compatible with those used by many state assessment programs. You may wish to modify the rubrics as a 3- or 5-point scale. To determine a student's score on a performance task, review the indicators checked on the rubric and then select the score that best represents the student's overall performance on the task.

4-Point Scale			
Excellent Achievement	Adequate Achievement	Limited Achievement	Little or No Achievement
3	**2**	**1**	**0**

How to Convert a Rubric Score into a Grade

If, for grading purposes, you want to record a letter or numerical grade rather than a holistic score for the student's performance on a task, you can use the following conversion table:

Holistic Score	Letter Grade	Numerical Grade
3	A	90–100
2	B	80–89
1	C	70–79
0	D–F	69 or below

Developing Your Own Rubric

From time to time, you may want to either develop your own rubric or work together with your students to create one. Research has shown that significantly improved performance can result from student participation in the construction of rubrics.

Developing a rubric for a performance task involves three basic steps: (1) Identify the inquiry skills that are taught in the chapter and that students must perform to complete the task successfully, and identify what understanding of content is also required. (2) Determine which skills and understandings are involved in each step. (3) Decide what you will look for to confirm that the student has acquired each skill and understanding you identified.

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Classroom Observation

"Kid watching" is a natural part of teaching and an important part of evaluation. The purpose of classroom observation in assessment is to gather and record information that can lead to improved instruction. In this booklet, you will find an Observation Checklist (p. AGxv) on which you can record noteworthy observations of students' ability to use science inquiry skills.

Using the Observation Checklist

- ***Identify the skills you will observe.***
  Find out which inquiry skills are introduced and reinforced in the chapter.
- ***Focus on only a few students at a time.***
  You will find this more effective than trying to observe the entire class at once.
- ***Look for a pattern.***
  It is important to observe a student's strengths and weaknesses over a period of time to determine whether a pattern exists.
- ***Plan how and when to record observations.***
  Decide whether to

  —record observations immediately on the checklist as you move about the room or

  —make jottings or mental notes of observations and record them later.
- ***Don't agonize over the ratings.***
  Students who stand out as particularly strong will clearly merit a rating of *3* ("Outstanding"). Others may clearly earn a rating of *1* ("Needs Improvement"). This doesn't mean, however, that a *2* ("Satisfactory") is automatically the appropriate rating for the rest of the class. For example, you may not have had sufficient opportunity to observe a student demonstrate certain skills. The checklist cells for these skills should remain blank under the student's name until you have observed him or her perform the skills.

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- ***Review your checklist periodically, and ask yourself questions such as:***

  What are the student's strongest/weakest attributes?

  In what ways has the student shown growth?

  In what areas does the class as a whole show strength/weakness?

  What kinds of activities would encourage growth?

  Do I need to allot more time to classroom observation?

- ***Use the data you collect.***
  Refer to your classroom observation checklists when you plan lessons, form groups, assign grades, and confer with students and family members.

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Date _____

Observation Checklist

Rating Scale	
3 Outstanding	1 Needs Improvement
2 Satisfactory	Not Enough Opportunity to Observe

Names of Students												
Inquiry Skills												
Observe												
Compare												
Classify/Order												
Gather, Record, Display, or Interpret Data												
Use Numbers												
Communicate												
Plan and Conduct Simple Investigations												
Measure												
Predict												
Infer												
Draw Conclusions												
Use Time/Space Relationships												
Hypothesize												
Formulate or Use Models												
Identify and Control Variables												
Experiment												

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Using Student Self-Assessment

Researchers have evidence that self-evaluation and the reflection it involves can have positive effects on students' learning. To achieve these effects, students must be challenged to reflect on their work and to monitor, analyze, and control their own learning—beginning in the earliest grades.

Frequent opportunities for students to evaluate their performance build the skills and confidence they need for effective self-assessment. A trusting relationship between the student and the teacher is also essential. Students must be assured that honest responses can have only a positive effect on the teacher's view of them and that they will not be used to determine grades.

Student Self-Assessment in *HSP Science*

The assessment program offers three self-assessment measures. In Grades 3–6, an Investigate Self-Assessment is part of each Investigate in the **Lab Manual.** This simple checklist allows students to evaluate their performance, using criteria that are specific to each activity. Two checklists are found in this **Assessment Guide.** One is Self-Assessment—Read and Learn: a form that leads students to reflect on and evaluate what they learned from reading at the lesson or chapter level. The second is the Experiment/Project Summary Sheet—a form that helps students describe and evaluate their unit inquiries and projects.

Using Self-Assessment Forms

- ***Explain the directions.***
  Discuss the forms and how to complete them.
- ***Encourage honest responses.***
  Be sure to tell students that there are no "right" responses to the items.
- ***Model the process.***
  One way to foster candid responses is to model the process yourself, including at least one response that is not positive. Discuss reasons for your responses.
- ***Be open to variations in students' responses.***
  Negative responses should not be viewed as indicating weaknesses. Rather, they confirm that you did a good job of communicating the importance of honesty in self-assessment.
- ***Discuss responses with students.***
  You may wish to clarify students' responses in conferences with them and in family conferences. Invite both students and family members to help you plan activities for school and home that will motivate and support students' growth in science.

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Name _____

Date _____

Lesson or Chapter _____

Self-Assessment—Read and Learn

My Thoughts Exactly!

Decide whether you agree or disagree with each statement below. Circle the word that tells what you think. If you are not sure, circle the question mark.

1.	The pictures and captions in the book helped me understand what I was reading.	**Agree**	**?**	**Disagree**
2.	When I didn't understand, I asked questions.	**Agree**	**?**	**Disagree**
3.	I learned a lot from class discussions.	**Agree**	**?**	**Disagree**
4.	I used the Focus Skill questions and the review questions to test my understanding.	**Agree**	**?**	**Disagree**
5.	I understand the new science terms.	**Agree**	**?**	**Disagree**
6.	I have a good understanding of the topic.	**Agree**	**?**	**Disagree**
7.	I think I am doing well in science.	**Agree**	**?**	**Disagree**

Think about what you learned. Then complete each sentence.

8. Three things I learned about the topic are _____

_____

_____.

9. I learned these new science terms: _____

_____

_____

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Experiment/Project Evaluation Checklist

Name _____

Date _____

Experiment/Project Evaluation

Aspects of Science Literacy	Evidence of Growth
1. **Understands science concepts** *(Animals, Plants; Earth's Land, Air, Water; Space; Weather; Matter, Motion, Energy)*	
2. **Uses inquiry skills** *(observes, compares, classifies, gathers/ interprets data, communicates, measures, experiments, infers, predicts, draws conclusions)*	
3. **Thinks critically** *(analyzes, synthesizes, evaluates, applies ideas effectively, solves problems)*	
4. **Displays traits/attitudes of a scientist** *(is curious, questioning, persistent, precise, creative, enthusiastic; uses science materials carefully; is concerned for environment)*	

Summary Evaluation/Teacher Comments: _____

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Name _____

Date _____

Experiment/Project Summary Sheet

You can tell about your science project or experiment by completing the following sentences.

My Experiment/Project

1. My experiment/project was about _____

_____

_____.

2. I worked on this experiment/project with _____

_____

_____.

3. I gathered information from these sources: _____

_____

_____.

4. The most important thing I learned from doing this experiment/project is _____

_____

_____.

5. I think I did a (an) _____ job on my experiment/project because

_____

_____.

6. I'd also like to tell you _____

_____

_____

_____

_____

_____.

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Portfolio Assessment

A portfolio is a showcase for student work, a place where many types of assignments, projects, reports, and writings can be collected. The work samples in the collection provide "snapshots" of the student's efforts over time, and taken together they reveal the student's growth, attitudes, and understanding better than any other type of assessment. However, portfolios are not ends in themselves. Their value comes from creating them, discussing them, and using them to improve learning.

The purpose of using portfolios in science is threefold:

- ***To give the student a voice in the assessment process.***
- ***To foster reflection, self-monitoring, and self-evaluation.***
- ***To provide a comprehensive picture of a student's progress.***

Portfolio Assessment in *HSP Science*

In *HSP Science*, students may assemble portfolio collections of their work. The collection may include a few required papers, such as chapter tests, performance tasks, and Experiment/Project Evaluation forms.

From time to time, consider including other measures (Science Experiences Record, Experiment/Project Summary Sheet, and Self-Assessment—Read and Learn). The Science Experiences Record, for example, can reveal insights about student interests, ideas, and out-of-school experiences (museum visits, nature walks, outside readings, and so on) that otherwise you might not know about. Materials to help you and your students build portfolios and use them for evaluation are included in the pages that follow.

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Using Portfolio Assessment

- ***Explain the portfolio and its use.***
  Describe how people in many fields use portfolios to present samples of their work when they are applying for a job. Tell students that they can create their own portfolio to show what they have learned, what skills they have acquired, and how they think they are doing in science.

- ***Decide what standard pieces should be included.***
  Encourage students to identify a few standard, or "required," work samples that they will include in their portfolios, and discuss reasons for including them. The Student Task sheets for the performance assessments in this **Assessment Guide**, for example, might be a standard sample in the portfolios because they show students' ability to use inquiry skills and critical thinking skills. Together with your class, decide on the required work samples that everyone's portfolio will include.

- ***Discuss student-selected work samples.***
  Point out that the best work to select is not necessarily the longest or the neatest. Rather, it is work the student believes will best demonstrate his or her growth in science understanding and skills.

- ***Establish a basic plan.***
  Decide about how many work samples will be included in the portfolio and when they should be selected. Ask students to list on the Guide to My Science Portfolio (p. AGxxiii) each sample they select and to explain why they selected it.

- ***Tell students how you will evaluate their portfolios.***
  Use a blank Portfolio Evaluation sheet to explain how you will evaluate the contents of a portfolio.

- ***Use the portfolio.***
  Use the portfolio as a handy reference tool in determining students' science grades and in holding conferences with them and family members. You may wish to send the portfolio home for family members to review.

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Science Experiences Record

Name _____

Date _____

My Science Experiences

Date	What I Did	What I Thought or Learned

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Name _____

Date _____

My Science Portfolio

What Is in My Portfolio	Why I Chose It
1.	
2.	
3.	
4.	
5.	
6.	
7.	

I organized my Science Portfolio this way because _____

_____

_____

_____

_____

_____.

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Portfolio Evaluation Checklist

Name _____

Date _____

Portfolio Evaluation

Aspects of Science Literacy	Evidence of Growth
1. **Understands science concepts** *(Animals, Plants; Earth's Land, Air, Water; Space; Weather; Matter, Motion, Energy)*	_____ _____ _____
2. **Uses inquiry skills** *(observes, compares, classifies, gathers/ interprets data, communicates, measures, experiments, infers, predicts, draws conclusions)*	_____ _____ _____
3. **Thinks critically** *(analyzes, synthesizes, evaluates, applies ideas effectively, solves problems)*	_____ _____ _____
4. **Displays traits/attitudes of a scientist** *(is curious, questioning, persistent, precise, creative, enthusiastic; uses science materials carefully; is concerned for environment)*	_____ _____ _____

Summary of Portfolio Assessment

For This Review			Since Last Review		
Excellent	Good	Fair	Improving	About the Same	Not as Good

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Name _____

Date _____

Chapter Assessment

Getting Ready for Science

Vocabulary

Match each term in Column B with its meaning in Column A.

Column A		Column B
____	**1.** A tool that makes objects appear larger	**A.** balance
____	**2.** A tool that measures the amount of matter in an object	**B.** experiment
____	**3.** A procedure that is carried out to gather data about an object or event	**C.** inquiry
____	**4.** An organized way to answer questions by gathering information	**D.** investigation
____	**5.** A procedure that is carried out under controlled conditions to test a hypothesis	**E.** microscope
____	**6.** The general steps scientists follow to test hypotheses	**F.** scientific method

Science Concepts

Write the letter of the best answer.

____ **7.** Which tool led to the discovery of bacteria and other tiny things living in water?

A. forceps **C.** thermometer
B. microscope **D.** spring scale

____ **8.** Blaine wants to measure the mass of a rock sample. Which tool should he use?

F. balance **H.** spring scale
G. measuring cup **J.** tape measure

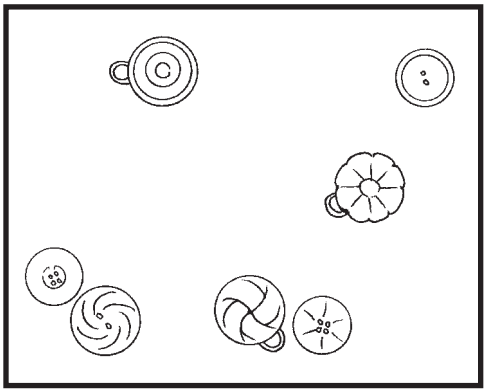
____ **9.** Which science tool does **not** measure anything?

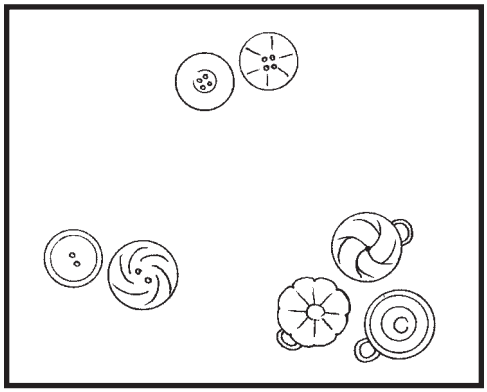
A. balance **C.** forceps
B. dropper **D.** thermometer

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Name _____

___ **10.** The picture shows a group of buttons before and after a student worked with them. What inquiry skill did the student use?





F. classify
G. infer
H. measure
J. predict

___ **11.** Which is an example of an inquiry about dogs?

A. Carla teaches her dog a new trick.
B. Martha goes to the library and reads a funny story about a dog.
C. Judith gives her dog two different foods at once and observes what it does.
D. Tish goes to the animal shelter to ask what dogs are available to adopt.

___ **12.** A paved road runs past one side of Jackson's house, and a dirt road runs past the other side. Many people ride bicycles past his house. Jackson notices that the bicycles on the dirt road have wide tires, and the bicycles on the paved road have narrow tires. Jackson thinks that wide tires must be easier to use on the dirt road. What process did Jackson use to figure this out?

F. classify
G. communicate
H. infer
J. measure

___ **13.** A team of students is building a vehicle for a competition. They do not yet know how they want to build it or what materials they need. What can the team do to save time and money before they start to build their vehicle?

A. interpret data
B. plan and build a model
C. conduct an experiment
D. gather and display data

___ **14.** Which measurement tool would give different results on the International Space Station than on Earth, even when measuring the same object?

F. ruler
G. spring scale
H. tape measure
J. thermometer

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Name _____

___ **15.** Which is usually the first step in the scientific method?

A. conduct an experiment **C.** observe and ask questions

B. form a hypothesis **D.** communicate results

___ **16.** Armin did an experiment to test whether objects dropped from a second-floor window and from a first-floor window hit the ground at the same time. His friend Michelle says Armin's results are wrong. What should they do to settle this disagreement?

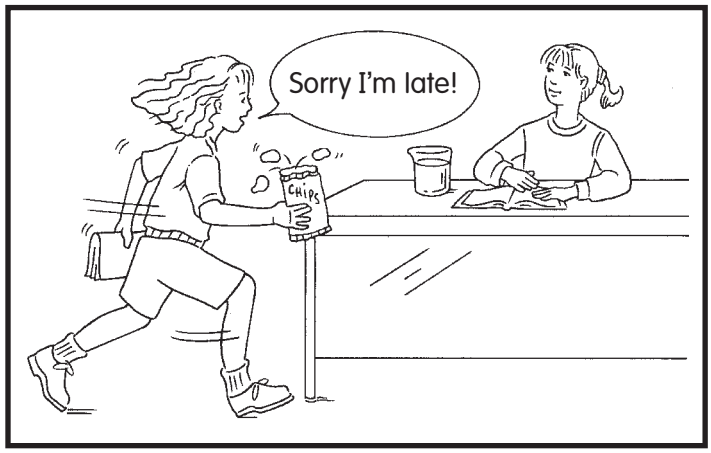
F. Argue about it until one of them gives up.

G. Repeat the experiment and compare the results.

H. Change Armin's hypothesis so it matches the results.

J. Ask their friends to vote on whether the results are right.

___ **17.** The cartoon shows a student coming in for a science experiment. What is the next thing that the student who is talking should do?



A. eat snack, wash hands

B. skip snack, tie back hair

C. eat snack, drink water in beaker

D. skip reading instructions, start experiment

___ **18.** A student does an experiment and discovers that sugar water takes longer to freeze than plain water. What is another question the student could investigate that is based on the results of this experiment?

F. Does sugar water taste better than plain water?

G. Does sugar water evaporate more quickly than plain water?

H. Does sugar water freeze at a lower temperature than plain water?

J. Does water have the same volume before and after sugar is added?

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Name _____

Critical Thinking

19. Juan is planning to study earthworms. Read his plan and answer the question that follows.

Do earthworms like dark or light areas?
by Juan
Hypothesis: Given a choice, a worm will crawl into the light.
Materials: 5 earthworms, damp paper towel, black paper, flashlight
What I plan to do:
1. Make a data table.
2. Place earthworm on paper towel.
3. Hold black paper so it covers half the towel.
4. Shine flashlight on paper so towel is half dark and half light.
5. Observe worm for 3 minutes.
6. Record in data table what worm did.
7. Repeat Steps 2–6 with other 4 worms.
8. Compare results to hypothesis and form conclusion.

Is Juan planning an experiment or a simple investigation? Explain.

_____

_____

_____

20. A student tested the hypothesis that ice melts more slowly in a glass tumbler than it does in a plastic or paper cup. Study the data, and then answer the questions that follow.

Type of Cup	Number of Ice Cubes	Time to Melt (min)
med. paper cup	2	25
sm. plastic cup with lid	3	75
lg. glass tumbler	5	90

Part A List all the variables you can find in this experiment.

_____

_____

Part B Can the student conclude from the data that ice melts more slowly in a glass tumbler than in the other kinds of cups? Explain.

_____

_____

_____

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Name _____

Date _____

Chapter Assessment

Cells to Body Systems

Vocabulary

Match each term in Column B with its meaning in Column A.

Column A

____ **1.** A group of tissues that work together to perform a certain function

____ **2.** The system that turns food into nutrients that body cells need

____ **3.** The heart, blood vessels, and blood

____ **4.** A group of organs and tissues that exchange oxygen and carbon dioxide

____ **5.** The bones that give the body structure

____ **6.** The muscles and tendons that move bones

____ **7.** The system that directs activities of all other body systems

____ **8.** A group of cells that work together to perform a certain function

Column B

A. circulatory system

B. digestive system

C. tissue

D. muscular system

E. nervous system

F. organ

G. respiratory system

H. skeletal system

Science Concepts

Write the letter of the best choice.

____ **9.** What is the basic unit of structure and function of all living things?

A. cell

B. cork

C. organ

D. tissue

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Name _____

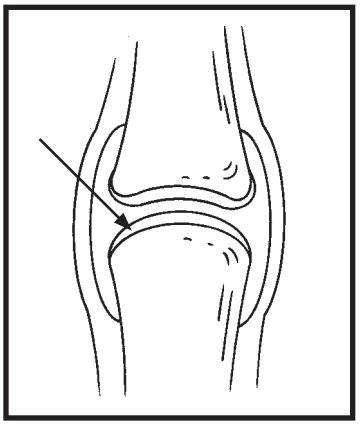
____ **10.** Which organelle directs a cell's activities?
- **F.** cytoplasm
- **G.** mitochondrion
- **H.** nucleus
- **J.** vacuole

____ **11.** Which is found only in plant cells?
- **A.** cell wall
- **B.** chromosomes
- **C.** cytoplasm
- **D.** vacuoles

____ **12.** Which type of tissue forms bones, tendons, and ligaments?
- **F.** connective tissue
- **G.** epithelial tissue
- **H.** muscle tissue
- **J.** nerve tissue

____ **13.** What is the liquid part of blood called?
- **A.** plasma
- **B.** platelets
- **C.** red blood cells
- **D.** white blood cells

Use the diagram to answer Questions 14–15.



____ **14.** What structure is shown in the diagram?
- **F.** joint
- **G.** muscle
- **H.** nerve
- **J.** synapse

____ **15.** What type of tissue does the arrow point to?
- **A.** connective tissue
- **B.** epithelial tissue
- **C.** muscle tissue
- **D.** nerve tissue

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Name _____

____ **16.** Which type of muscle tissue forms the walls of the heart?

F. skeletal muscle
G. voluntary muscle
H. smooth muscle
J. involuntary muscle

Inquiry Skills

17. **Compare** the organelles in a cell to organs in a human body. How are organelles similar to organs?

_____

_____

_____

_____

18. Nick read that the skin is the largest organ of the human body. What could Nick **infer** about the number and kinds of tissues that make up the skin?

_____

_____

_____

_____

_____

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Name _____

Critical Thinking

19. Why are cells specialized to carry out specific functions?

20. Exchange of oxygen and carbon dioxide occurs in the alveoli of the lungs. In certain diseases of the lungs, fluid or other material can build up in the alveoli.

Part A How would the buildup of material inside the alveoli affect lung function?

Part B What symptoms might a person who has this problem exhibit?

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Name _____

Date _____

Performance Assessment

Student Task

Take a Pulse

Materials



clock or watch with second hand

Procedure

1. Ask your partner to sit quietly for 2 minutes.
2. Take your partner's pulse. Do this by putting two fingers on the inside of your partner's wrist.
3. When you feel the pulse, look at the clock and begin counting when the second hand is on 12. Continue counting for 30 seconds. Multiply the number of counts by 2, and write the pulse rate (in beats per minute, or bpm) in the data table below.
4. Ask your partner to jog in place for 2 minutes. When your partner finishes jogging, immediately take your partner's pulse as you did in Steps 2 and 3. Write the pulse rate in the data table.
5. Ask your partner to sit, and take his or her pulse after 2 minutes, after 4 minutes, and after 6 minutes.
6. Write a paragraph that tells about the effects exercise and rest had on pulse rate.

Resting Pulse	Just After Exercise	After 2 Minutes	After 4 Minutes	After 6 Minutes

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Take a Pulse

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, clock or watch with second hand

Time 30 minutes

Suggested Grouping pairs

Inquiry Skills measure, record data, conclude

Preparation Hints Practice taking a pulse at the wrist.

Introduce the Task Tell students that when the heart pumps blood, the blood vessels stretch and contract. The stretching and relaxing of the blood vessels is felt as a pulse. Students can measure the number of heartbeats by taking a pulse. Model the procedure, and guide students in the proper method of taking a wrist pulse.

Promote Discussion Ask students if they could feel the pulse, and then ask them to explain what a pulse is. Direct the discussion toward the facts that exercise caused an increase in the pulse rate and that rest lowered the elevated rate. Ask students to hypothesize how long it would take a pulse to return to its resting rate after exercise.

Scoring Rubric

Performance Indicators

_____ Correctly follows procedure to take a partner's pulse.

_____ Records data in the data table.

_____ Writes a paragraph about the gathered data.

_____ Concludes that exercise elevates a pulse and cessation of activity returns the pulse to its resting rate.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Classifying Living Things

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** An animal with a backbone	**A.** classification
____	**2.** Largest group for classifying living things	**B.** species
____	**3.** Smallest group for classifying living things	**C.** kingdom
____	**4.** Organizing things into groups based on how the things are alike	**D.** vertebrate

Science Concepts

Write the letter of the best choice.

____ **5.** Which of these is a kingdom?

A. fungi **C.** reptiles
B. invertebrates **D.** vertebrates

____ **6.** Which three groups are in the correct order, from largest to smallest?

F. order, class, kingdom **H.** family, genus, species
G. family, phylum, genus **J.** kingdom, species, order

____ **7.** Which two animals are invertebrates?

A. snail and robin **C.** octopus and starfish
B. zebra fish and zebra **D.** angelfish and butterfly

____ **8.** Which is a group of animals with no backbones?

F. fungi **H.** reptiles
G. invertebrates **J.** vertebrates

____ **9.** Which group has the greatest number of animal species?

A. invertebrates **C.** protists
B. mammals **D.** vertebrates

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Name _____

___ **10.** Within a kingdom, what is the largest grouping of organisms?

F. genus
G. order
H. phylum
J. species

___ **11.** Which two living things are most closely related?

A. moth and bird
B. clam and fish
C. ocelot and tiger
D. snake and starfish

___ **12.** What is the main difference between members of the plant kingdom and members of the animal kingdom?

F. Plants have stiff tubes; animals have backbones.
G. Animals have many cells; plants have only one cell.
H. Plants make their own food; animals eat other living things.
J. Animal cells have no nucleus; plants cells have a nucleus.

___ **13.** Which plant does **not** have tubes?

A. apple tree
B. fern
C. moss
D. pine tree

___ **14.** You see flowers and ferns close together in a garden flower bed. How do you know that the flowers and ferns are not part of the same plant?

F. Ferns grow on trees, not in the ground.
G. Flowers grow on trees, not in the ground.
H. Ferns make seeds in cones, not in flowers.
J. Flowers make seeds, but ferns make spores.

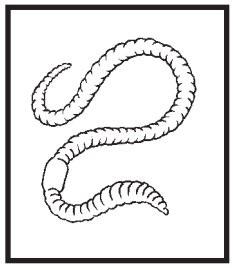
___ **15.** Which two organisms are most closely related?

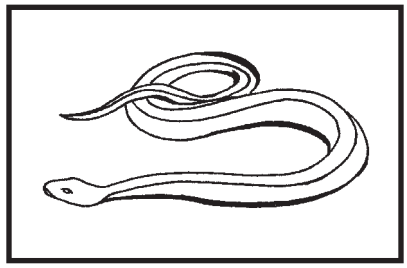
A. *Panthera tigris* and *Felis pardalis*
B. *Canis domesticus* and *Canis lupus*
C. *Felis domesticus* and *Canis domesticus*
D. *Mustelus canis* and *Erythronium dens-canis*

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Name _____

___ **16.** Which statement about these animals is true?





F. Both are invertebrates because neither has legs.
G. The worm is an invertebrate because it has shiny skin.
H. Both are vertebrates because both have a head and a tail.
J. The snake is a vertebrate because it has a flexible backbone.

Inquiry Skills

17. Compare and contrast the wings of a robin and the wings of a dragonfly. **Communicate** using the words *structure* and *function* in your answer.

18. A scientist finds a new life form. The life form is 2 m tall. It makes its own food. It has tubes that carry food and water through it. It reproduces by making seeds. **Classify** this life form as an animal, bacterium, fungus, plant, or protist. Then explain how you classified it.

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Name _____

Critical Thinking

19. Sam collects trading cards of science fiction aliens. The aliens are from several different planets. Each alien has certain special powers. Some aliens eat other aliens, and some aliens run off electricity. Sam's friend asks if he has a certain card to trade. Sam does not know, because his cards are in a big, messy pile. How can Sam make his cards easier to find and trade? Describe at least one way Sam could do this, using the characteristics of the aliens.

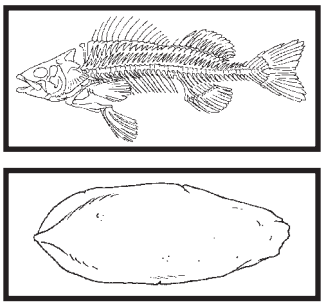
_____

_____

_____

_____

20. The diagrams show structures from inside two different animals, a fish and a cuttlefish. Both animals live in the water. Both structures have a similar function: to support the animal. One of these animals is an invertebrate, the other is a vertebrate.



Part A Which animal is a vertebrate, the fish or the cuttlefish? Explain.

_____

_____

Part B A fish and a cuttlefish both have the word *fish* in their common names. Would a fish and a cuttlefish have the same word in their scientific names? Explain.

_____

_____

_____

_____

_____

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Name _____

Date _____

Performance Assessment

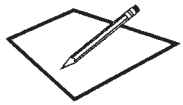
Student Task

Classifying Imaginary Animals

Materials



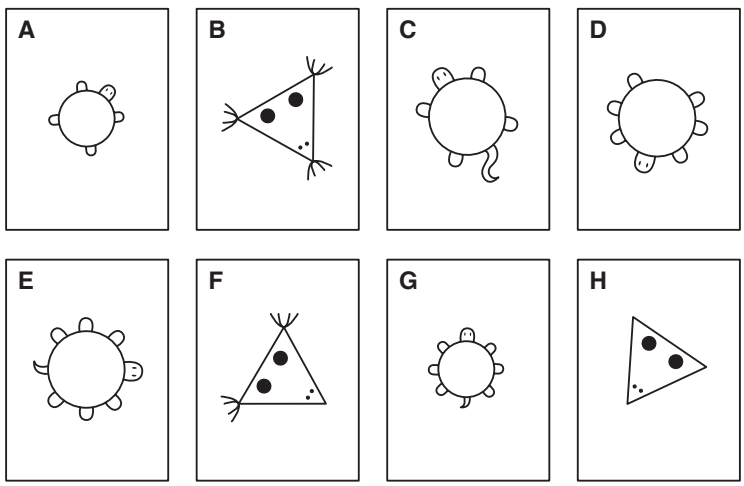
scissors



paper and pencil

Procedure

1. Cut out Cards A–H at the bottom of this page.
2. Each card shows an imaginary organism from the animal kingdom. Classify the animals into "phyla." Give each phylum a name. On a sheet of paper, write the names of your phyla. List the letters of the animals in each phylum.
3. For each phylum, classify the animals into "classes." Name the classes. List the letters of the animals in each class. (You do not have to have the same number of classes in each phylum.)
4. Look at the members of each class. If it makes sense to classify the animals in a class into "orders," do so. Name the orders, and list the letters of the animals in each.
5. For each group you named (phyla, classes, and orders), explain what is alike about the animals in that group.



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Classifying Imaginary Animals

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, scissors, paper and pencil

Time 25 minutes

Suggested Grouping individuals

Inquiry Skills observe, classify

Preparation Hints If desired, make extra copies of the Performance Task sheet for students to cut up.

Introduce the Task Ask students to define the word *classification*. How do scientists decide to place an animal into one group and not another? Make sure students remember that the main point of classification is to group organisms that are all alike in some way. Tell students that they will be classifying some imaginary animals, pictures of which are printed on their Performance Task sheet. It is up to each of them to classify these animals into groups and to explain what the animals in each group have in common.

Promote Discussion After all students have completed the task, ask how they divided the animals into groups, starting with the phylum level. Did everyone classify the animals in the same way? Most students will identify two phyla based on shape (circle or triangle), but there is more than one way to group animals within each phylum (size, number of legs or whiskers, tail or no tail). Help students recognize that there is more than one correct way to classify these imaginary animals.

Scoring Rubric

Performance Indicators

_____ Creates multiple groups at two or more levels of classification, with each group being smaller than the group on the level above.

_____ Gives each group a name, and lists the letters of the animals in it.

_____ Places within each group animals that share a similarity that animals in a different group on the same classification level do not share.

_____ For each group, identifies the similarity that all animals in the group share.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Plant Growth and Reproduction

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A plant that has naked seeds	**A.** vascular tissue
____	**2.** A single reproductive cell that can grow into a new plant	**B.** phloem
____	**3.** Tissue that carries food from a plant's leaves to its cells	**C.** gymnosperm
____	**4.** To sprout	**D.** angiosperm
____	**5.** A material that supports a plant and conducts nutrients	**E.** xylem
____	**6.** Process by which plants make food	**F.** spore
____	**7.** Tissue that carries water and nutrients from the roots to every part of the plant	**G.** photosynthesis
____	**8.** A flowering plant, which has seeds protected by a fruit	**H.** germinate

Science Concepts

Write the letter of the best choice.

____ **9.** How do nutrients move through nonvascular plants?

A. along stems **C.** through leaves

B. from cell to cell **D.** through roots

____ **10.** What must happen to pollen grains for pollination to occur?

F. They must stick to an insect's body.

G. They must get to the stigma of a flower.

H. They must be carried by the wind.

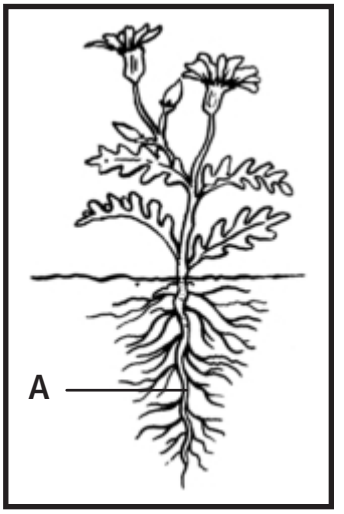
J. They must become nectar.

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Name _____

___ **11.** What is one function of the plant part labeled A?

A. to anchor the plant
B. to make food for the plant
C. to protect the plant from insects
D. to transport food to the leaves



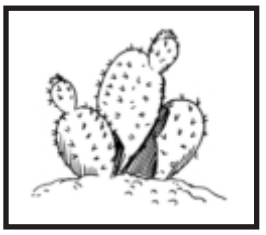
___ **12.** Which statement about vascular plants is **not** true?

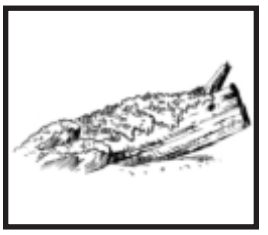
F. They can grow to be quite large.
G. They have tissues that carry water and food.
H. They are much smaller than nonvascular plants.
J. They absorb water and nutrients through root hairs.

___ **13.** Katrina made a list of things that plants need for photosynthesis. Which of these does **not** belong on the list?

A. carbon dioxide
B. oxygen
C. sunlight
D. water

___ **14.** Which picture shows a nonvascular plant?

F.


H.


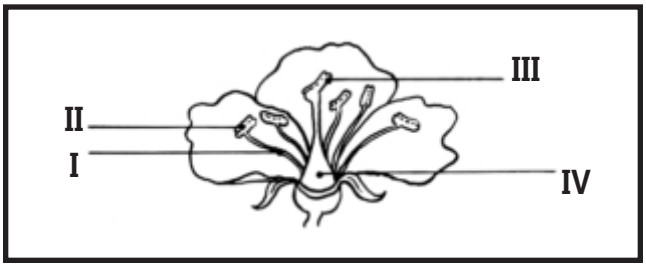
G.


J.


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Name _____

Use the diagram to answer Questions 15 and 16.



___ **15.** On which structure does pollen collect?

A. I **C.** III

B. II **D.** IV

___ **16.** Which part of the plant develops into a fruit?

F. I **H.** III

G. II **J.** IV

Inquiry Skills

17. **Compare** seeds with spores. Tell how they are alike and how they are different.

_____

_____

_____

_____

_____

18. Suppose you planted several flower seeds in a pot. You put the pot in a sunny place. You watered the seeds on the first day. After that, you didn't water them. **Infer** why the seeds never sprouted.

_____

_____

_____

_____

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Name _____

Critical Thinking

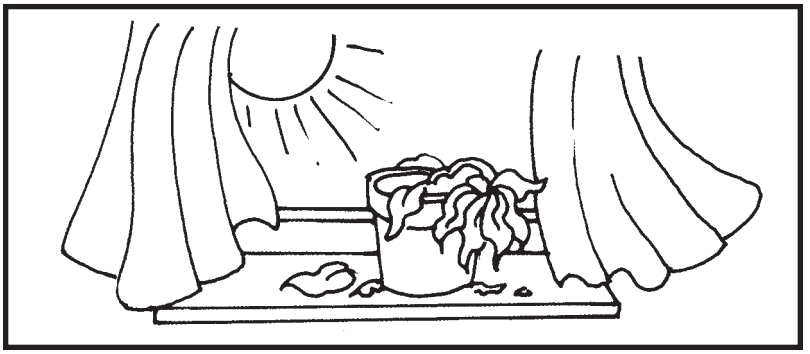
19. Why do flowers produce many more pollen grains than egg cells?

_____

_____

_____

20. Winston and his family went to visit his grandmother for a few days. When they got back, the plant sitting on the kitchen windowsill looked like this.



Part A What was wrong with the plant? How do you know?

_____

_____

Part B What could Winston do to help the plant?

_____

_____

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Name _____

Date _____

Performance Assessment

Student Task

A Plant Diagram

Materials



paper





pencils or markers

Procedure

Suppose that someone has asked you to draw a diagram of a vascular plant for a new science book.

1. To help you plan your diagram, complete this chart.

Plant Part	What It Does
roots	anchor plant, absorb water from soil
stem	
xylem	
phloem	
leaves	

2. Draw a vascular plant. Make sure it has all the parts listed in the chart.
3. Label each part of the plant diagram.
4. Next to each label, write what that plant part does for the plant.
5. Give your diagram a title.

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A Plant Diagram

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, paper, pencils or markers

Time 30 minutes

Suggested Grouping pairs

Inquiry Skills communicate

Preparation Hints If you think students will have difficulty completing the chart individually, you can do this part as a whole-class activity.

Introduce the Task Explain that because charts and diagrams organize information visually, the information presented is easier to understand and remember. Tell students they will use information from the chapter to fill in a chart showing the parts of a vascular plant. Once the chart is filled in, they will draw a diagram of a vascular plant based on the information in the chart.

Promote Discussion Student pairs can share their diagrams with the class. Encourage students to identify the parts of the plant and to explain how each part helps the plant live. When the discussion turns to the leaves, ask students to explain the process of photosynthesis.

Scoring Rubric

Performance Indicators

_____ Completes the chart to accurately explain the functions of the major parts of a vascular plant.

_____ Draws a vascular plant with all its parts.

_____ Correctly labels the diagram of the plant.

_____ Communicates information effectively in a diagram.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Animal Growth and Heredity

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** Factor that contains the DNA code for a trait	**A.** chromosome
____	**2.** All the living and nonliving things that surround and affect an organism	**B.** dominant trait
____	**3.** A behavior that is passed from parents to offspring	**C.** gene
____	**4.** Process by which most cells divide	**D.** inherited trait
____	**5.** Stages that living things pass through as they grow and change	**E.** instinct
____	**6.** Threadlike structure in a cell nucleus	**F.** life cycle
____	**7.** Characteristic passed from parents to offspring	**G.** mitosis
____	**8.** A characteristic that appears even when there is only one factor present for it	**H.** environment

Science Concepts

Write the letter of the best choice.

____ **9.** An egg hatches into a caterpillar, which eats, becomes a pupa, emerges as a moth, and lays eggs. What is this an example of?

A. inherited trait **C.** life cycle
B. learned behavior **D.** mitosis

____ **10.** A frog moves to a nearby pond because its own pond is drying up. What changed for the frog to cause it to move?

F. its chromosomes
G. its environment
H. its inherited traits
J. its instincts

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Name _____

___ **11.** You get a sunburn. A week later, the dead skin peels off. What process formed the new skin underneath the peeling skin?
- **A.** asexual reproduction
- **B.** genetic inheritance
- **C.** meiosis
- **D.** regeneration

___ **12.** What do most body cells make when they go through cell division?
- **F.** gametes
- **G.** exact copies of themselves
- **H.** copies with half the chromosomes
- **J.** whatever kind of cell the body needs

___ **13.** What forms as a result of meiosis?
- **A.** zygotes
- **B.** new body cells for growth
- **C.** cells with identical chromosomes
- **D.** gametes with half the number of chromosomes

___ **14.** An arctic fox has white fur in winter to help it survive. What is this an example of?
- **F.** adaptation
- **G.** instinct
- **H.** mitosis
- **J.** learned behavior

___ **15.** Tippy the cat does many things. Which behavior is an instinct?
- **A.** ringing the doorbell
- **B.** meowing along with the radio
- **C.** sleeping more hours than he's awake
- **D.** running to the kitchen when a can is opened

___ **16.** Adam can roll his tongue. His younger brother Lee cannot. Which statement explains why?
- **F.** Adam can do it because he is older.
- **G.** Adam has a dominant factor for tongue-rolling.
- **H.** Lee can't because he hasn't practiced enough yet.
- **J.** Lee has a dominant and a recessive factor for tongue-rolling.

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Name _____

Inquiry Skills

17. Kelsey's parents both have attached earlobes—a recessive trait. They are expecting a baby boy. What can you **infer** about the likelihood that Kelsey's baby brother will have attached earlobes? Explain the reasons for your inference.

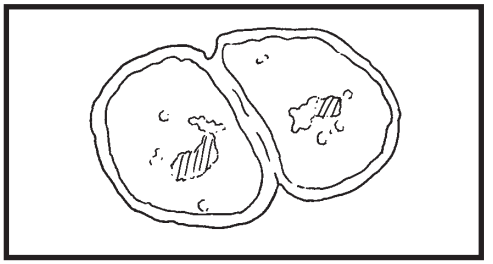
18. You are asked to **observe** a mouse finding its way through a maze to a food treat. The second time the mouse runs the maze, it takes fewer wrong turns than the first time. The third time, it runs straight to the food, with no mistakes. Based on your observations, **infer** why instinct and learning are both needed for the mouse to run the maze.

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Name _____

Critical Thinking

19. The diagram shows a type of bacterium reproducing. Name and describe this kind of reproduction, and tell what process is taking place while it happens.



20. Corn snakes have different skin types, including normal skin and albino skin (little or no coloring). Some people breed corn snakes in captivity. The table shows the results of breeding a normal corn snake and an albino corn snake.

Offspring of Two Corn Snakes

Generation	Total Offspring	Normal	Albino
parents		1	1
first	12	12	0
second	12	9	3

Part A For the second generation, figure out what fraction of the total number of offspring is normal and what fraction is albino.

Part B What kind of trait is albino skin? What kind of trait is normal skin? Explain your answer by using data from Part A.

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Name _____

Date _____

Performance Assessment

Student Task

A New Species

Materials



pencil

You have discovered a new animal species. Some of the animals of this species have a horn, and some do not. You do some test crosses so you can identify which trait is dominant, and you get the following results.

Procedure

Test Cross	Parents	Fraction of Offspring
1		All 
2		$\frac{3}{4}$  $\frac{1}{4}$ 
3		All 

1. The first square below shows the dominant and recessive factors in both parents and their offspring for Test Cross 1. Follow the example to complete squares for Test Crosses 2 and 3. Determine which trait is dominant.

Test Cross 1

	H	H
h	Hh	Hh
h	Hh	Hh

Test Cross 2

Test Cross 3

2. Cross an offspring from Test Cross 1 with one from Test Cross 3. Complete another square.

3. What fraction of the animals in the cross you just did will have horns? Show how you used numbers to find your answer.

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A New Species

Performance Assessment

Teacher's Directions

Materials Performance task sheet, pencil

Time 25–30 minutes

Suggested Grouping individuals or pairs

Inquiry Skills infer, compare, use numbers, predict

Preparation Hints none

Introduce the Task Tell students that they are the first to explore an imaginary island. On that island, they discover a new species. They want to identify traits of the new species as dominant or recessive. To do so, they perform some test crosses.

Promote Discussion When students finish, have them compare their findings. **Is one offspring from each test cross enough to tell whether a characteristic is dominant or recessive?** Conclude with students that many offspring are needed in order to have reliable data. However, even if only one offspring has a recessive trait, they can assume that both parents carry at least one recessive gene.

Scoring Rubric

Performance Indicators

_____ Completes test crosses correctly: Test Cross 2 crosses Hh with Hh, and Test Cross 3 crosses hh with hh.

_____ Identifies *no horn* as being the dominant characteristic.

_____ Completes cross of offspring correctly: Hh with hh.

_____ Based on the cross of Hh and hh, predicts that $\frac{1}{2}$ of the offspring will have horns. Shows work for this (2 hh out of 4 offspring, or $\frac{2}{4} = \frac{1}{2}$).

Observations and Rubric Score

3 2 1 0

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Name _____

Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** Which statement is correct?

A. Some plant cells have a nucleus, but others do not.
B. Cells are the basic unit of all living things.
C. All living things are made of the same kind of cells.
D. All living things with cells are classified in the same kingdom.

____ **2.** Which is **not** a kind of tissue?

F. connective
G. epithelial
H. nervous
J. plasma

____ **3.** The stomach is an organ in which system?

A. circulatory
B. digestive
C. excretory
D. respiratory

____ **4.** People whose kidneys have failed must have their blood cleaned by a machine. Which body system does the blood-cleaning machine help?

F. circulatory
G. excretory
H. respiratory
J. skeletal

____ **5.** Which is the correct order, from simplest to most complex?

A. cell, tissue, organ, organ system
B. organ system, organ, tissue, cell
C. cell, organ, organ system, tissue
D. organ, organ system, tissue, cell

____ **6.** Cells from which organisms do **not** have membrane-bound organelles?

F. animals
G. bacteria
H. mosses
J. plants

____ **7.** Katie used to be shorter than her cousin Eric, but now she is taller. Which two systems worked together to bring nutrients to all the parts of Katie's body to help it grow?

A. excretory and digestive
B. epithelial and connective
C. circulatory and digestive
D. muscular and circulatory

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Name _____

___ **8.** Which type of cell does **not** have a nucleus?

F. animal **H.** plant
G. bacteria **J.** protist

___ **9.** Which of these classification levels is most specific?

A. genus **C.** phylum
B. order **D.** species

___ **10.** Which group contains only invertebrates?

F. amphibians **H.** birds
G. arthropods **J.** mammals

___ **11.** Which set of organisms is **most** closely related?

A. cat and catfish
B. ant and anteater
C. zebra and zebra mussel
D. dogwood tree and dog

___ **12.** Which organism has a backbone?

F. ant **H.** mollusk
G. fish **J.** worm

___ **13.** Which plant part absorbs water and nutrients from the soil?

A. flower **C.** root
B. leaf **D.** stem

___ **14.** How do stomata help a plant carry out photosynthesis?

F. by letting water out of the leaf
G. by keeping the plant from wilting
H. by letting carbon dioxide into the leaf
J. by making sugar from carbon dioxide and water

___ **15.** What is the main difference between how a fern reproduces and how a pine tree reproduces?

A. Ferns form spores; pine trees form seeds.
B. Pine seeds are naked; fern seeds are contained in a fruit.
C. Ferns can reproduce when it is dry; pines cannot.
D. Pine trees make sperm and eggs; ferns do not.

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Name _____

___ **16.** Which structure would you find on a moss plant?

F. gymnosperm **H.** stem
G. sporophyte **J.** taproot

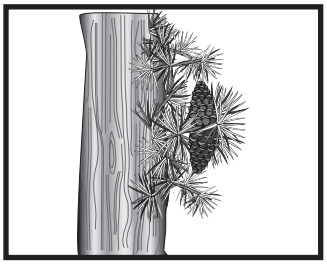
___ **17.** A scientist counted these plants in an area of tundra.

Type of Plant	Number of Individuals
moss	5000
liverwort	350
sedge (grass)	150
arctic willow tree	1

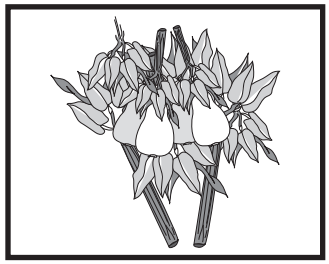
Which type of plant is most common in this area?

A. angiosperms **C.** nonvascular plants
B. gymnosperms **D.** vascular plants

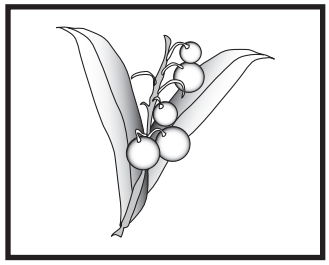
___ **18.** Which two of these three plants are most closely related, and why?



spruce tree



pear tree



lily of the valley

F. lily and pear, because both make fruits
G. spruce and lily, because both make naked seeds
H. spruce and pear, because the lily is nonvascular
J. spruce and pear, because they are both trees

___ **19.** What must happen before mitosis can begin?

A. DNA must mutate.
B. Meiosis must be completed.
C. Chromosomes must be copied.
D. Epithelial cells must regenerate.

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Name _____

___ **20.** Which process occurs only in living things that reproduce sexually?
- **F.** cell division
- **G.** life cycle
- **H.** meiosis
- **J.** mitosis

___ **21.** What forms when two gametes join?
- **A.** chromosome
- **B.** instinct
- **C.** spindle
- **D.** zygote

___ **22.** Which word describes animal behaviors such as building shelters and finding food?
- **F.** competitive
- **G.** instinctive
- **H.** learned
- **J.** symbiotic

___ **23.** Alicia is tall, with hazel eyes and attached earlobes. She has blonde hair, which she has dyed red. Which feature did Alicia **not** inherit?
- **A.** attached earlobes
- **B.** hazel eyes
- **C.** red hair
- **D.** tall height

___ **24.** Lila the greyhound has some instincts and some learned behaviors. Which is **not** a learned behavior?
- **F.** sleeping in a crate
- **G.** sitting when told to
- **H.** chasing small animals that are running
- **J.** following at her owner's heel when told to

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Name _____

Write the answer to each question.

25. A new organism is found that is multicellular, does not have a backbone, and has six legs. How would you classify this organism?

_____

_____

_____

26. Explain how oxygen from the air can reach all the cells in your little toe. Include two body systems in your explanation.

_____

_____

_____

_____

_____

27. One function of the pancreas is to make chemicals called enzymes that help digest food. Name a body system to which the pancreas belongs. Tell how you know.

_____

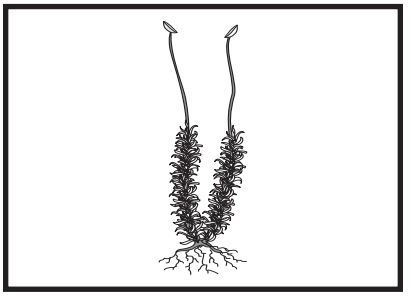
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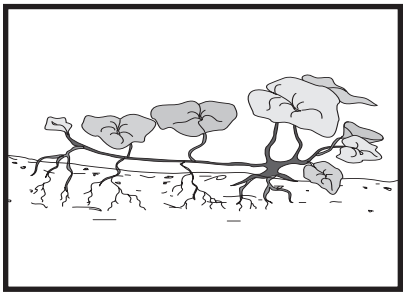
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Name _____

28. Observe the two plants shown below, then answer the questions.



moss



squash

Part A Compare and contrast how these two plants get food, water, and nutrients, and how these things move through the plants.

Part B Why can't a moss plant grow as large as a squash plant?

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Name _____

Date _____

Chapter Assessment

Energy and Ecosystems

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** The process by which plants make food, using energy from sunlight	**A.** consumer
____	**2.** A community of organisms and the environment in which they live	**B.** food chain
____	**3.** An animal that eats only producers	**C.** ecosystem
____	**4.** An organism that makes its own food	**D.** decomposer
____	**5.** An animal that eats plants or other animals	**E.** energy pyramid
____	**6.** The transfer of energy between organisms in an ecosystem	**F.** photosynthesis
____	**7.** An organism that breaks down the remains of dead plants and animals	**G.** herbivore
____	**8.** A diagram that shows how much food energy is passed to each level in a food chain	**H.** producer

Science Concepts

Write the letter of the best choice.

____ **9.** What is the source of energy for producers?

A. the sun, because producers need light to make food

B. the Earth, because soil provides warmth and nutrients

C. wind, because producers need wind to scatter their seeds

D. fresh water, because producers need water to make food

____ **10.** What kind of organism comes last in every food chain?

F. carnivore **H.** herbivore

G. decomposer **J.** producer

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Name _____

___ **11.** Suppose a colony of ants eats a plant. How much of the plant's energy is passed to the ants?

A. 1 percent
B. 10 percent
C. 50 percent
D. 90 percent

___ **12.** Which process is **not** part of the nitrogen cycle?

F. Bacteria that live on some plant roots fix nitrogen gas.
G. Plants release nitrogen compounds during transpiration.
H. Bacteria break down animal wastes and dead organisms.
J. Lightning produces nitrogen compounds that dissolve in rain.

___ **13.** Which substance enables a plant to use the sun's energy to make food?

A. chlorophyll
B. oxygen
C. sugar
D. water

___ **14.** Which is a product of photosynthesis?

F. carbon dioxide
G. nitrogen
H. oxygen
J. pigment

___ **15.** Which term is correctly described?

A. herbivore: second-level consumer
B. omnivore: producer
C. carnivore: consumer
D. decomposer: first-level consumer

___ **16.** Which ordering of these organisms makes a food chain?

F. grass → snake → locust → owl
G. owl → snake → grass → locust
H. snake → locust → grass → owl
J. grass → locust → snake → owl

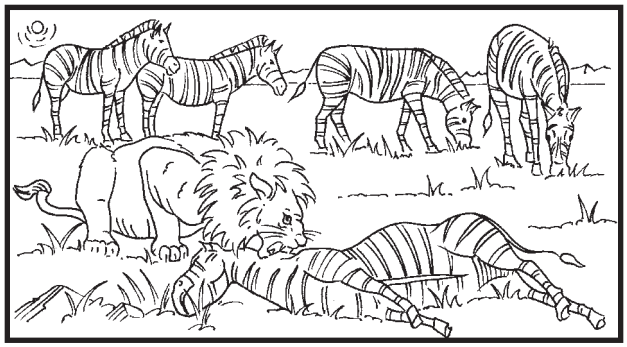
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Name _____

Inquiry Skills

17. Linda found a plant in a dark room. It didn't look very healthy. She put it in a sunny window. **Predict** what will happen.

18. The picture shows a grassland ecosystem. Write about how energy flows from organism to organism. Your explanation should include all the organisms you **observe** in the picture.



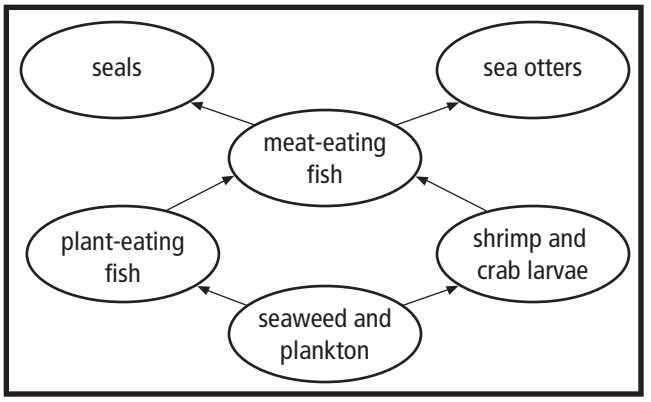
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Name _____

Critical Thinking

19. As you move up the levels in an energy pyramid, the number of organisms decreases. Tell why.

20. The diagram shows a simple food web of organisms that live in the ocean. Use the food web to answer the two parts of Question 20.



Part A Which organisms in the food web are producers? Explain.

Part B What do you think would happen if the number of meat-eating fish decreased?

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Name _____

Date _____

Performance Assessment

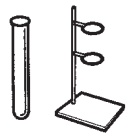
Student Task

Observing Photosynthesis

Materials


Elodea


scissors


test tube and stand



distilled water at room temperature


40-watt desk lamp


metric ruler


clock


baking soda

Procedure

1. Break off a sprig of *Elodea* small enough to fit inside the test tube. Cut the *Elodea* stem at an angle. Then gently crush the cut end.
2. Place the sprig in the test tube, with the cut end up, and cover it with distilled water. Place the test tube in the stand.
3. Place the lamp 5 cm from the test tube. Wait 1 minute. Then count how many bubbles appear from the *Elodea* in 5 minutes. Record the data.
4. Dissolved baking soda adds carbon dioxide to the water. Add a pinch of baking soda to the test tube. Place the lamp 5 cm from the test tube, wait 1 minute, and again count the bubbles that appear in 5 minutes. Record.

	Without Baking Soda	With Baking Soda
Number of bubbles that appear in 5 minutes		

5. What causes the bubbles to form on the *Elodea* leaves?

_____

6. How does the additional carbon dioxide in the water affect the number of bubbles? Why?

_____

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Observing Photosynthesis

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, *Elodea* (or other aquarium plant), sharp scissors, test tube, distilled water at room temperature, test-tube rack or stand, 40-watt desk lamp, metric ruler (or meterstick), clock (or watch), baking soda

Time 30 minutes

Suggested Grouping groups of three

Inquiry Skills experiment, measure, observe, compare, infer

Preparation Hints Obtain ring stands or test-tube racks, or figure out another way to keep test tubes upright. Obtain *Elodea* plants, which are widely available at pet stores. Any other water plant that can fit inside a test tube can substitute.

Introduce the Task Tell students they will be exploring the process of photosynthesis. Emphasize that they must pay special attention to the experimental procedure. Explain to students that they will work together to carry out this task and record what happens. Then, after a small-group discussion, they will individually answer questions on the Performance Task sheet.

Promote Discussion When students finish, ask them what the numbers of bubbles given off indicates about the speed of photosynthesis. What gas did the bubbles contain? Ask students why the amount of carbon dioxide might be an important factor.

Scoring Rubric

Performance Indicators

_____ Works with the group to set up the demonstration and collect data.

_____ Accurately measures elapsed time and records the number of bubbles.

_____ Explains how and why different amounts of carbon dioxide affected the rate of photosynthesis.

_____ Demonstrates an understanding of photosynthesis, during class discussion.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Ecosystems and Change

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** Populations that live and interact together	**A.** competition
____	**2.** A contest among organisms to find the food, water, shelter, and space they need to live	**B.** community
____	**3.** A relationship between different kinds of organisms	**C.** conservation
____	**4.** A gradual change in the kinds of organisms that live in an ecosystem	**D.** predators
____	**5.** The saving of resources	**E.** prey
____	**6.** The process of cleaning and restoring damaged ecosystems	**F.** reclamation
____	**7.** Animals that eat other animals	**G.** succession
____	**8.** Animals that are eaten by other animals	**H.** symbiosis

Science Concepts

Write the letter of the best choice.

____ **9.** What is formed when chemicals from burning fossil fuels mix with water vapor in the air?

A. acid rain
B. competition
C. succession
D. symbiosis

____ **10.** Which term refers to the rebirth of a damaged ecosystem?

F. adaptation
G. primary succession
H. secondary succession
J. symbiosis

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Name _____

___ **11.** Which is **not** a method of conserving resources?
- **A.** recycle
- **B.** reduce
- **C.** restore
- **D.** reuse

___ **12.** Which organisms steal food from hosts or harm hosts in some other way?
- **F.** parasites
- **G.** populations
- **H.** predators
- **J.** vaccinations

___ **13.** Which thing cannot be recycled?
- **A.** aluminum
- **B.** gasoline
- **C.** paper
- **D.** plastic

___ **14.** Which choice shows the order in which primary succession takes place?
- **F.** grass→soil→lichens→rock
- **G.** bare rock→lichens→grass→trees
- **H.** lichens→bare rock→grass→soil
- **J.** bare rock→soil→lichens→grass

___ **15.** Which is an example of prey?
- **A.** hawk
- **B.** lion
- **C.** mouse
- **D.** wolf

___ **16.** Which statement is **not** true of an ecosystem?
- **F.** Organisms develop adaptations to survive.
- **G.** Symbiosis is the same as competition.
- **H.** Populations often compete for the same food.
- **J.** Populations live together to form a community.

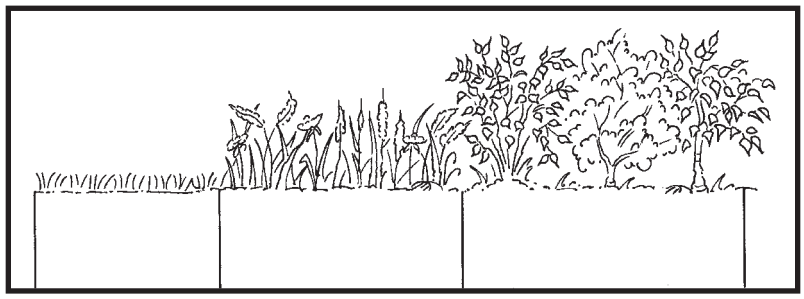
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Name _____

Inquiry Skills

17. Alice read that the African elephant is on a list of endangered species. She also read that the African elephant is a vegetarian and lives in forests and grasslands. Based on this information, what could Alice **infer** about a possible reason for the declining population of African elephants?

18. The diagram below shows changes that occurred in farmland that was abandoned several years ago. Describe the changes, and identify the process involved. **Predict** how the land might continue to change.



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Name _____

Critical Thinking

19. Suppose the people in Town A conserve resources and avoid burning fossil fuels. The people in Town B to the northwest burn lots of fossil fuels and dump wastes into the river. How might the people in Town A be affected by the actions of the people in Town B?

20. The plains of Africa, called the savanna, contain grasses, scattered trees, and shrubs. The savanna is home to many kinds of grazing animals and the predators that hunt them. It has a season of heavy rain. This is followed by a dry season in which very little rain falls.

Part A Different species of plant-eating animals on the savanna eat plants at different heights. For example, gazelles eat grasses, black rhinos eat shrubs, and giraffes feed on tree leaves. Why do you think the animals are adapted in this way?

Part B Many savanna animals give birth only during the rainy season. Why might this be so?

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Name _____

Date _____

Performance Assessment

Student Task

Oil Pollution

Materials



clear 2-L soft-drink bottle



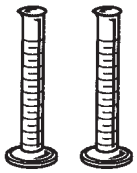
cooking oil



dish soap



water



two graduates



clock or watch

Procedure

1. Clean and rinse a clear 2-L soft-drink bottle.
2. Half-fill the bottle with water.
3. Add 50 mL of cooking oil to the water in the bottle. Screw the bottle cover back on. Shake the bottle. Record what happens. Wait 3 minutes, and again record your observations.
4. Add 100 mL of dish soap. Screw the bottle cover back on. Shake the bottle. Record what happens. Wait 3 minutes, and again record your observations.
5. Compare your results with those of other members of your class.
6. Write a brief report that includes your observations.

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Oil Pollution

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, clear 2-L soft-drink bottle, cooking oil, dish soap, water, two graduates (or two measuring cups), clock or watch

Time 30 minutes

Suggested Grouping groups of two to four

Inquiry Skills observe, measure, record

Preparation Hints Be sure the soft-drink bottles are colorless. You can premake 50-mL and 100-mL measures by marking plastic cups at the appropriate levels.

Introduce the Task Remind students that pollution is serious. Tell them that we pollute when we add harmful things to the water, ground, or air. Tell students that they are going to see the effect of adding oil to water as well as the effect that soap has on the oil-water mixture.

Promote Discussion Ask students if the oil dissolved in the water. Then ask them what happened after they added soap. Continue the discussion by leading students to realize that although the soap broke the oil into small particles, often too small to be visible to the naked eye, the oil was still there. Guide students to understand that it is very difficult to remove pollutants from the water, ground, or air.

Scoring Rubric

Performance Indicators

_____ Gathers materials quickly and effectively, and works cooperatively with other team members.

_____ Carefully follows written procedure and records observations as they are made.

_____ Compares results with those of other teams.

_____ Writes a paragraph that summarizes observations made.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** What happens in the leaves of plants?
- **A.** Water and nutrients enter the plant.
- **B.** Carbon dioxide is given off to the air.
- **C.** Light energy is absorbed and used to make food.
- **D.** Chloroplasts break down food into a form the plant can use.

____ **2.** Which plant structure carries food from its source to the rest of the plant?
- **F.** leaves
- **G.** roots
- **H.** stems
- **J.** stomata

____ **3.** Which is a product of photosynthesis?
- **A.** carbon dioxide
- **B.** chlorophyll
- **C.** oxygen
- **D.** water

____ **4.** What is transpiration?
- **F.** a step in the process of photosynthesis
- **G.** the loss of water through a plant's leaves
- **H.** an alternative-energy vehicle that reduces pollution
- **J.** an animal that transforms from consumer to producer

____ **5.** Algae grows on the inside of aquarium glass. To keep the glass clean, many aquarium owners keep loaches, a kind of fish that eats algae. Based on this information, which statement is true?
- **A.** Algae are pollutants.
- **B.** Loaches are predators.
- **C.** Algae are decomposers.
- **D.** Loaches are consumers.

____ **6.** Which organism is a carnivore?
- **F.** bacteria
- **G.** grass
- **H.** wolf
- **J.** worm

____ **7.** Which organism is **not** a decomposer?
- **A.** earthworm
- **B.** fungus
- **C.** protist
- **D.** tapeworm

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Name _____

___ **8.** Which list shows a possible order in which energy moves through an ecosystem?
- **F.** herbivore, carnivore, omnivore, producer
- **G.** sun, producer, predator, consumer, decomposer
- **H.** sun, producer, herbivore, carnivore, decomposer
- **J.** herbivore, first-level consumer, second-level consumer, producer

___ **9.** How much energy is passed on to organisms at each higher level in an energy pyramid?
- **A.** 10 percent
- **B.** 20 percent
- **C.** 50 percent
- **D.** 90 percent

___ **10.** Which two organisms would you expect to compete with each other?
- **F.** birds and insects
- **G.** deer and fish
- **H.** hyenas and cheetahs
- **J.** raccoons and sea turtles

___ **11.** If you wanted to show the complex feeding relationships in an ecosystem, which of the following would you draw a diagram of?
- **A.** food chain
- **B.** food web
- **C.** nitrogen cycle
- **D.** water cycle

___ **12.** Which statement about populations is true?
- **F.** The usual relationship between populations is symbiosis.
- **G.** Populations in a community do not interact with each other.
- **H.** The members of a population never compete with each other.
- **J.** Different populations often compete for the same sources of food.

___ **13.** Which is an example of parasitism?
- **A.** a bird eating insects that bother an ox
- **B.** a deer tick sucking blood from a dog's ear
- **C.** a remora eating scraps from a shark's meal
- **D.** an ant protecting aphids, then getting a drink from them

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Name _____

___ **14.** A spider builds a web in a field. The web catches grasshoppers, which the spider eats. What kind of relationship does the spider have with the grasshoppers?

F. commensalism
G. competition
H. predator–prey
J. symbiosis

___ **15.** A larva of the antlion (an insect) builds a pit in dusty soil. It waits for small insects to fall into the pit, and then it eats them. What is the antlion's method of hunting an example of?

A. an adaptation
B. a limiting factor
C. parasitism
D. succession

___ **16.** Fish use their gills to get dissolved oxygen from water. Aquarium owners must be sure that the population of fish is not more than the dissolved oxygen can support. What is dissolved oxygen an example of?

F. an adaptation
G. community
H. extinction
J. a limiting factor

___ **17.** Purple loosestrife is a pretty flower that grows in wetlands. It originally came from Europe. Wherever it grows, the population of native plants, such as cattails, shrinks. What is this an example of?

A. commensalism
B. community
C. competition
D. a limiting factor

___ **18.** A family stops farming its land. Twenty years later, this land is covered with trees. What is this an example of?

F. primary succession
G. secondary succession
H. temporary extinction
J. tertiary transpiration

___ **19.** A rare kind of fish lives in only one small stream. A dam is built on the stream, and all the rare fish die. What is this an example of?

A. adaptation
B. competition
C. extinction
D. a limiting factor

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Name _____

___ **20.** Which is **not** a cause of extinction?
- **F.** climate change
- **G.** competition
- **H.** conservation
- **J.** habitat change

___ **21.** Which is a natural cause of ecosystem change?
- **A.** building fences
- **B.** farming
- **C.** pollution
- **D.** volcanic eruptions

___ **22.** Suppose an area were stripped bare of plants and trees by mining. Later, people started planting new plants and trees to help return the land to its original condition. What is this process called?
- **F.** conservation
- **G.** reclamation
- **H.** recycling
- **J.** succession

___ **23.** Which is **not** an example of conservation?
- **A.** turning off lights that are not being used
- **B.** using the same paper lunch sack for a week
- **C.** shopping for second-hand clothes at a thrift store
- **D.** saving time by driving to school instead of walking

___ **24.** Which animal is **most** at risk of becoming extinct?
- **F.** a herbivore that eats only one kind of plant
- **G.** an omnivore that has learned to raid trash cans
- **H.** a carnivore that eats birds, mammals, and insects
- **J.** an omnivore that is adapted to live in many habitats

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Name _____

Write the answer to each question.

25. The larger the population in an area, the greater the competition for food. What would happen if the population of a species in an area doubled?

26. Suppose part of a glacier melts, exposing an area of bare rock. Describe how succession will occur.

27. Sea anemones use their tentacles to sting their prey. However, fish like the clown fish aren't harmed by the anemone's sting. These fish live among the anemone's tentacles, where they are protected from predators. The fish don't harm or help the anemone. What kind of relationship is this? Explain.

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Name _____

28. Read the paragraph, and answer the questions that follow.

The Dust Bowl was a grim period in U.S. history. It occurred in the Great Plains. Years of little or no rain kept crops from growing. Native plants had ways to survive drought, but these plants were gone because of farming. Without plants to hold the soil in place, the wind blew it away. There was little to eat. Starving rabbits ate the few crops that did grow before people could harvest them. People moved away by the thousands. After the Dust Bowl, people worked hard to restore the land.

Part A How did people change the ecosystem before the Dust Bowl, and how was this change partly a cause of the Dust Bowl?

_____

_____

_____

Part B Describe an example of competition and reclamation given in the paragraph.

_____

_____

_____

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Name _____

Date _____

Chapter Assessment

The Rock Cycle

Vocabulary

Match each term in Column B with its meaning in Column A.

Column A		Column B
____	**1.** Rock that forms when small grains of rock are pressed together and become cemented	**A.** streak
____	**2.** The process by which wind and water remove and carry small pieces of weathered rock from one place to another	**B.** hardness
____	**3.** Rock that forms when melted rock cools and hardens	**C.** igneous rock
____	**4.** The continuous process by which one rock type changes into another	**D.** deposition
____	**5.** A mineral's ability to resist being scratched	**E.** sedimentary rock
____	**6.** Rock changed by high heat and great pressure	**F.** metamorphic rock
____	**7.** The color of the powder left behind when you rub a mineral against a white tile	**G.** erosion
____	**8.** The process by which sediment settles out of water and wind	**H.** rock cycle

Science Concepts

Write the letter of the best choice.

____ **9.** Ruthie describes a mineral as being *waxy*. What property of the mineral is she describing?

A. hardness
B. luster
C. sedimentation
D. streak

____ **10.** Which of these would **not** be used to classify igneous rocks?

F. crystal size
G. mineral content
H. when they were formed
J. where they were formed

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Name _____

___ **11.** Which process will change a sedimentary rock into another sedimentary rock?

A. bending
B. burning
C. melting
D. weathering

___ **12.** This list should show items that are found naturally in soil. Which item should be removed from the list?

F. deposited sediment
G. decayed animal matter
H. melted rock
J. weathered rock

___ **13.** You have been given a rock that is a conglomerate. Where did your rock most likely form?

A. in a volcano
B. at the top of a hill
C. in a river
D. at the edge of a desert

___ **14.** Which of the following are the building blocks of all rocks?

F. gemstones
G. minerals
H. sand particles
J. water molecules

___ **15.** You can use a copper penny with a hardness of 3 or glass with a hardness of 6 to test a mineral's hardness. Which of these minerals could be scratched by glass but **not** by a penny? (The hardness of each mineral is given in parentheses.)

A. diamond (10)
B. fluorite (4)
C. gypsum (2)
D. topaz (8)

___ **16.** Which of the following can change a sedimentary rock into a metamorphic rock?

F. deposition
G. erosion
H. pressure
J. weathering

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Name _____

Inquiry Skills

Use the following *classification* table to answer Questions 17–18.

Mineral	Color	Color of Streak	Hardness
Talc	light green	white	1
Fluorite	light purple	white	4
Feldspar	white, salmon pink	white	5
Quartz	clear, milky white, rose, smoky gray	none	7

17. A mineral sample has a white streak and is so soft that it can be scratched by your fingernail. **Identify** the mineral. Tell how you know.

_____

_____

_____

_____

18. A mineral is white and cannot be scratched by the mineral orthoclase (hardness of 6). **Identify** the mineral. Tell how you know.

_____

_____

_____

_____

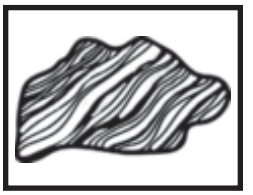
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Name _____

Critical Thinking

19. You find a rock near a volcano. It has small mineral crystals. What type of rock is it? Where was the rock formed? Explain.

20. Tyrone likes to go rock hunting. On a recent trip, he found the rock shown below.



Part A Identify Tyrone's rock. Tell how and where it formed.

Part B When Tyrone's rock broke off from its rock bed, it had sharp corners. How did Tyrone's rock change? What caused the change?

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Name _____

Date _____

Performance Assessment

Student Task

Rocks—Do You See What I See?

Materials

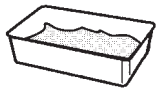

pencil or pen


3 rock samples


3 index cards

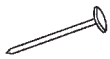

plastic bag


hand lens


basin of water


paper towels


coin


nail

Procedure

1. Use the materials at the three stations—A, B, and C—to observe your three rocks. Record your observations at each station.

   Station A—Texture

   To determine texture, observe the size of the particles, or grains, in each rock. A rock with large grains is coarse-grained. A rock with small grains is fine-grained. Record your findings.

   Station B—Color

   Observe and record the color of each rock when it is dry. Then place each rock, one at a time, into the basin of water. Record the color when the rock is wet. Record your findings.

   Station C—Hardness

   Use the scatch test to determine the hardness of each rock. Soft rocks can be scratched by your fingernail. Medium-soft rocks can be scratched by a coin. Medium-hard rocks can be scratched by a nail. Hard rocks cannot be scratched by a fingernail, coin, or nail. Record your findings.

2. Write a complete description of each rock on a separate index card. When you finish, trade cards with a classmate and see if both of you can correctly identify the rocks from the descriptions.

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Rocks—Do You See What I See?

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, 3 rock samples and 3 index cards for each student, plastic bags, three evaluation stations, hand lenses, basin of water, paper towels, coins, nails

Time 30 minutes

Suggested Grouping individuals and pairs

Inquiry Skills observe, gather and record data, classify, communicate

Preparation Hints Distribute to each student a set of three rocks and three index cards in a plastic bag. Make sure that the rocks are of different types. Also, consider asking students to bring in rocks they have collected. Create three workstations. Station A should have hand lenses and good lighting. Station B should have a basin of water and paper towels. Station C should have coins and nails.

Introduce the Task Explain to students that they will investigate the characteristics of rocks and make notes of their findings. Students will work independently for the first part of the task and with a partner for the second part. Encourage students to write clear and accurate descriptions of their findings for each rock. Partners will try to match the descriptions to the rocks.

Promote Discussion When students finish, have each pair present its findings. Ask students to explain their conclusions. Discuss the characteristics of clear communication, and provide instructive feedback as necessary.

Scoring Rubric

Performance Indicators

_____ Observes and records the textures of rocks.

_____ Observes and records the colors of rocks when wet and dry.

_____ Observes and records the hardness of rocks.

_____ Writes a complete description of each rock.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Fossils

Vocabulary

Match each term in Column B with its meaning in Column A.

Column A	Column B
____ **1.** A type of fossil formed when minerals fill the space left after an organism's remains dissolve	**A.** mold
____ **2.** A fossil that helps scientists find the age of a rock layer that may be out of order	**B.** cast
____ **3.** The study of fossils	**C.** index fossil
____ **4.** The hollow space that is left after an organism's remains dissolve	**D.** paleontology

Science Concepts

Write the letter of the best choice.

____ **5.** In which type of rock are most fossils formed?

A. amber **C.** metamorphic

B. igneous **D.** sedimentary

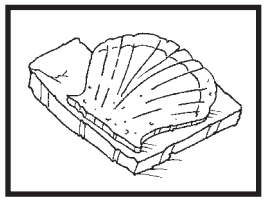
____ **6.** A bird leaves a footprint in the mud. The mud hardens into stone. What kind of fossil is this?

F. carbon film **H.** petrified

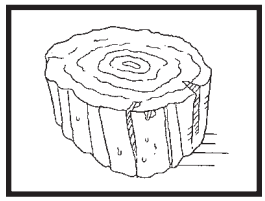
G. index **J.** trace

____ **7.** Which example is a mold fossil?

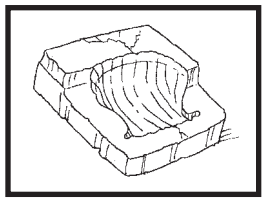
A.



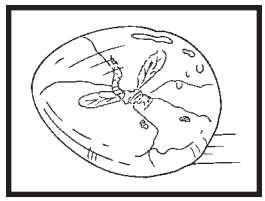
C.



B.



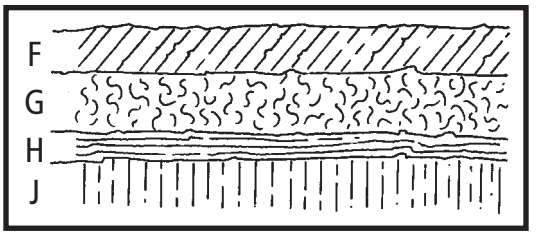
D.



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Name _____

___ **8.** Which layer is probably the oldest?



- **F.** Layer F
- **G.** Layer G
- **H.** Layer H
- **J.** Layer J

___ **9.** Which statement is true?

- **A.** Living things today are larger than their ancestors.
- **B.** Every kind of living thing has been preserved as a fossil.
- **C.** Some kinds of living things have not changed in millions of years.
- **D.** Fossils show that horses have stayed the same for millions of years.

___ **10.** A shark has a skeleton made of a soft, firm material that is also found in human ears. Which part of a shark is most likely to become a fossil?

- **F.** eyes
- **G.** skeleton
- **H.** teeth
- **J.** top fin

___ **11.** Which is the best description of an index fossil?

- **A.** It is in the index of a major museum.
- **B.** It lived in many places for only a short time.
- **C.** It is the best example of a certain kind of fossil.
- **D.** It lived in many places for many millions of years.

___ **12.** What do mammoths and elephants have in common?

- **F.** thick, shaggy fur
- **G.** a warm climate
- **H.** an ancestor with no tusks
- **J.** Both are extinct from hunting.

___ **13.** Which fossil method can preserve a whole animal?

- **A.** forming a cast
- **B.** forming a mold
- **C.** trapping in amber
- **D.** pressing into a carbon film

___ **14.** What was Pangea?

- **F.** small ocean animal
- **G.** ancient, giant continent
- **H.** important index fossil
- **J.** ancient relative of the scallop

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Name _____

___ **15.** A fossil fish is found in a desert. What is this evidence of?

A. The fish died when the land dried out.

B. The ancestors of that fish lived on land.

C. The land where the fossil was found was once under water.

D. The land where the fossil was found has always been a desert.

___ **16.** Fossils show that ginkgoes were much more common 30 million years ago. Fossil ginkgo leaves from that time look almost exactly like leaves from living ginkgo trees. What do these findings suggest about ginkgo trees?

F. Ginkgo trees are not suited to any modern environment.

G. Ginkgo trees changed rapidly over the past 30 million years.

H. Ginkgo trees have not changed much over the past 30 million years.

J. There are more good environments for ginkgo trees now than before.

Inquiry Skills

17. A rock layer is 25 million years old. What can you **infer** about the age of the rock layer below it if the rocks have not moved? Explain your answer.

_____

_____

_____

_____

18. A paleontologist finds a fossil of an unknown insect. How can the paleontologist **classify** the fossil, and what will he compare it to?

_____

_____

_____

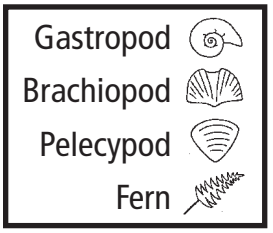
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Name _____

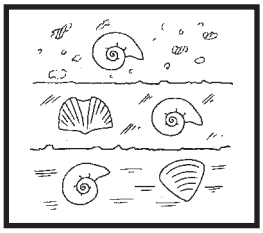
Critical Thinking

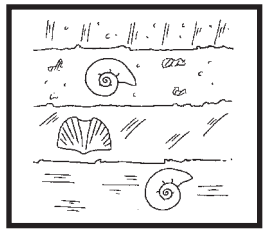
19. Organisms evolve to survive in their environments. When the environment changes, organisms that evolve quickly are the ones that survive. Organisms that do not evolve quickly do not survive. The fossil record shows that sharks first appeared more than 400 million years ago. Dinosaurs appeared about 250 million years ago and became extinct about 65 million years ago. What is one possible reason why sharks have not become extinct?

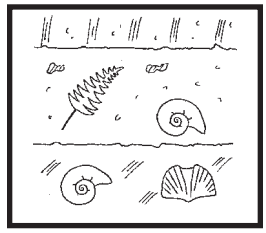
20. A scientist is looking for a new index fossil to help figure out the ages of rock layers. She has diagrams of rock layers from three locations.



fossil key


Location 1


Location 2


Location 3

Part A Which fossil is a good index fossil? Explain why you chose that fossil.

Part B Choose one of the other fossils. Explain why it is **not** a good index fossil.

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Name _____

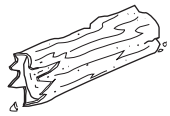
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Performance Assessment

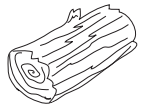
Student Task

Compare Wood and Petrified Wood

Materials



wood sample



petrified wood sample



hand lens

Procedure

1. Observe the colors of the wood and the petrified wood (fossil wood). Record the colors in the table below. (Copy the table onto another piece of paper.)
2. Use your fingernail to press into each sample. Record your results. If your fingernail makes a mark on the sample, write *Soft*. If your fingernail bends, write *Hard*.
3. Draw a sketch of each sample as it appears to your unaided eyes.
4. Use the hand lens to observe the wood and the petrified wood. Draw a sketch of what the samples look like through the hand lens.
5. Record any other observations that help you to compare and contrast the wood and the petrified wood.
6. Use your observations to compare and contrast petrified wood and wood. Write a short paragraph about your observations.

Observation	Wood	Petrified Wood
Color		
Hardness (hard or soft)		
Sketch (unaided eye)		
Sketch (hand lens)		
Other observations		

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Compare Wood and Petrified Wood

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, wood sample, petrified wood sample, hand lens

Time 25–30 minutes

Suggested Grouping individuals

Inquiry Skills observe, record, compare

Preparation Hints Observe samples yourself to get an idea of details that can be seen with a hand lens.

Introduce the Task Ask students what it means to observe something in a scientific way. Students might mention paying attention to details, measuring, and recording facts that everyone can agree on. Ask students what it means to compare two things. Tell students that in this activity, they will be observing a fossil (petrified wood) and a sample of a newer material that is similar to the fossil (wood). They will record their observations in both words and drawings in a chart. Then they will use their observations to compare and contrast the two samples in writing.

Promote Discussion After students have completed their charts, ask: **In what ways are the two samples alike? In what ways are they different? What is the quickest way to tell the two samples apart? What features of wood are preserved in fossil wood? What features are lost?**

Scoring Rubric

Performance Indicators

_____ Follows written procedure.

_____ Completes the table.

_____ Makes observations that show attention to detail and that are repeatable.

_____ Writes a compare-and-contrast paragraph that summarizes observations made.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Changes to Earth's Surface

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A mountain made of lava, ash, or other materials from eruptions	**A.** glacier
____	**2.** A movement of the ground caused by a sudden release of energy in Earth's crust	**B.** earthquake
____	**3.** A natural land shape or feature	**C.** volcano
____	**4.** A large, thick sheet of ice	**D.** magma
____	**5.** Molten rock under Earth's surface	**E.** topography
____	**6.** A break in Earth's crust	**F.** fault
____	**7.** Hill of sand, made and shaped by the wind	**G.** landform
____	**8.** All the kinds of landforms in a certain place	**H.** sand dune

Science Concepts

Write the letter of the best choice.

____ **9.** Which of Earth's layers contains soft areas on which plates float?

A. crust
B. mantle
C. outer core
D. inner core

____ **10.** Where would you most likely find a delta?

F. on a mountaintop
G. in a deep valley
H. near a river's mouth
J. at a volcano's base

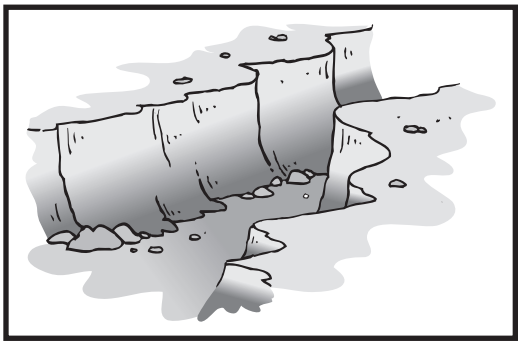
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Name _____

___ **11.** Which of the following is **not** a cause of weathering?

A. Water freezes in a crack in a rock.
B. A plant grows in a crack in a rock.
C. Sand blows against a rocky surface.
D. A river carries sand and sediment downstream.

___ **12.** How were landforms like this canyon most likely formed?



F. earthquake
G. ice erosion
H. water erosion
J. wind erosion

___ **13.** Which of the following causes both earthquakes and volcanic eruptions?

A. erosion
B. gravity
C. Earth's inner core
D. plate movement

___ **14.** You are hiking up a sloping landform. How can you tell if this landform is a moraine?

F. It will have a large, flat top.
G. It will be covered with shifting sand.
H. It will have a vent with steam coming out of it.
J. It will have bits of crushed rock, sand, or boulders.

___ **15.** The Hawaiian Islands are a chain of volcanoes. How are volcanoes like these formed?

A. A plate breaks into two parts.
B. An earthquake occurs along a fault.
C. A plate moves over a hot spot.
D. Two plates crash into one another.

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Name _____

___ **16.** Diego has drawn a diagram to show how Earth's plates may move.



Which process has Diego shown?

F. erosion
G. formation of a mountain
H. formation of glacial grooves
J. weathering

Inquiry Skills

17. What would make a better **model** for the process that causes an earthquake—two sponges rubbing against each other or a bowl of jiggling gelatin? Explain why.

_____

_____

_____

_____

18. What would be a better **model** to show an erupting volcano—a lit firecracker or a shaken can of soda? Explain why.

_____

_____

_____

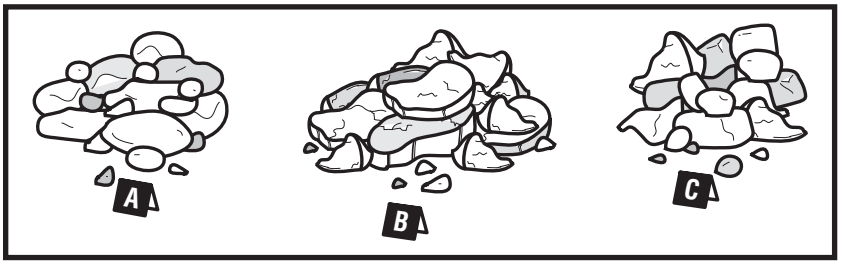
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Name _____

Critical Thinking

19. A friend tells you that volcanoes, mountains, and earthquakes have nothing in common. You disagree. Explain why.

20. Mai has been collecting rocks from different places along the same river. On one trip, she visited places very near the source of the river, places a little farther away, and places very far from the source. She forgot to label her rock samples.



Part A Label the three rock samples with the location at which they were collected.

Part B Explain how you determined the location for each sample.

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Name _____

Date _____

Performance Assessment

Student Task

Volcano Theater

Materials



scrap paper



tape



streamers



crayons or colored pencils



packing peanuts

Procedure

You will be working with a group to plan and perform a skit showing how one kind of volcano forms. Answer the following questions to plan your skit.

1. What is one way in which volcanoes form?

_____

_____

2. Draw a picture in the box to show a volcano forming in this way. Label your picture to indicate what is happening and the parts of the volcano.

3. How can you act out what is happening? You can use the items shown in the materials box, but use your imagination to think of more ideas.

_____

_____

4. How can you involve each member of your group?

_____

_____

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Volcano Theater

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, scrap paper, tape, crayons or colored pencils, packing peanuts, streamers

Time 30 minutes

Suggested Grouping groups of four

Inquiry Skills make a model, communicate, infer

Preparation Hints Make sure that groups have adequate space to work on their skits. Gather materials, and make them accessible for the groups.

Introduce the Task Tell students that they will be working in groups to plan a skit, or short play. Explain to them that they will be acting out, without using words, how a volcano forms. Review with students the different types of volcanoes, if necessary. Bring a group of four volunteers to the front of the room, and lead them as they model one type of volcano with the help of their classmates' suggestions. Be sure to point out the materials available to students as they plan their skits. Students can add materials of their own if they wish. Tell students that they will need to clean up the area after their skits.

Promote Discussion Groups of students can perform their skits for the class. Ask observers to identify which kinds of volcanoes were being modeled, and have them support their inferences with details from the skits.

Scoring Rubric

Performance Indicators

_____ Describes one of the kinds of volcanoes and tells how it forms.

_____ Draws a volcano that is forming and labels its parts.

_____ Acts out the sequence of events that takes place when a volcano forms.

_____ Involves each group member in the skit.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Using Resources

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A resource that cannot be replaced within a human lifetime	**A.** renewable resource
____	**2.** The act of preserving or protecting natural resources	**B.** nonrenewable resource
____	**3.** A resource that can be replaced within a human lifetime	**C.** pollution
____	**4.** A change in the environment that is harmful to living things	**D.** conservation

Science Concepts

Write the letter of the best choice.

____ **5.** Which of these resources is nonrenewable?

A. air **C.** sunlight
B. soil **D.** water

____ **6.** Harry gives his outgrown jacket to his younger brother. What kind of conservation is this?

F. recycling **H.** reselling
G. reducing **J.** reusing

____ **7.** Which of these resources is renewable?

A. coal **C.** oil
B. minerals **D.** water

____ **8.** Which is an example of soil conservation?

F. clearing weeds
G. fertilizing
H. contour plowing
J. Xeriscaping

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Name _____

___ **9.** Which kind of air pollution ends up in lakes and rivers?

A. acid rain **C.** sewage
B. diesel fuel **D.** smog

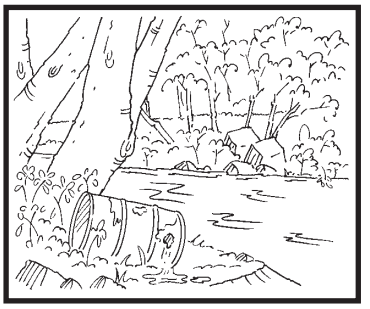
___ **10.** A farmer decides to plant corn one year and alfalfa the next year in the same field. What can she expect as a result?

F. The soil will be richer.
G. The field will look like steps.
H. The field will be drought-proof.
J. She will lose less soil to erosion.

___ **11.** What causes acid rain?

A. air pollution
B. drought
C. sewage
D. water pollution

___ **12.** The diagram shows an example of land pollution. What other kind of pollution could this situation lead to?



F. acid rain
G. air pollution
H. smog
J. water pollution

___ **13.** George and Joanne live in the desert. They have a yard with pretty stones, some cacti, and native trees. What kind of water-conservation method is this?

A. intercropping **C.** windbreak
B. terracing **D.** Xeriscaping

___ **14.** "Fossil water" is groundwater that has collected in deep rock layers for many thousands of years. Which is the best description of fossil water?

F. renewable, like other water resources
G. polluted, because it comes out of the land
H. recycled, because it is part of the water cycle
J. nonrenewable, because it cannot be replaced within a human lifetime

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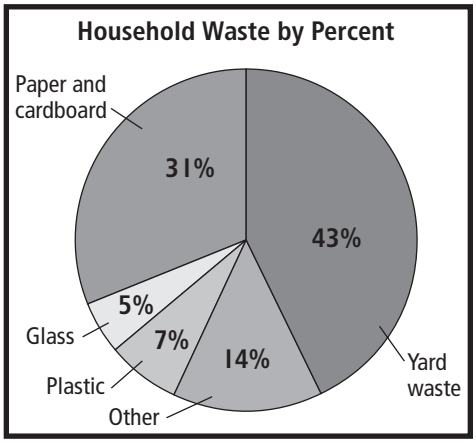
Name _____

___ **15.** Leanne's family used to buy single-serving yogurt cups that they threw away. Now they buy yogurt in big containers and serve it in bowls that they wash. What has Leanne's family done to conserve resources?

A. recycled
B. reduced
C. replaced
D. reused

___ **16.** A family pays for each bag of trash they throw away. The graph shows the percentage of each type of trash that they throw away each year. Which should they start recycling first, to save the most on their trash bill?

F. glass
G. paper and cardboard
H. plastic
J. yard waste



Inquiry Skills

17. Metals, such as aluminum, iron, nickel, and copper, are all nonrenewable resources. **Draw a conclusion** about why it is important for metals to be reused and recycled.

18. Members of a community garden want to make their soil richer. They want to find out how well crop rotation works compared with chemical fertilizer. Describe an **investigation** that they could do to answer this question. Include a description of how to **control variables** that might affect the results.

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Name _____

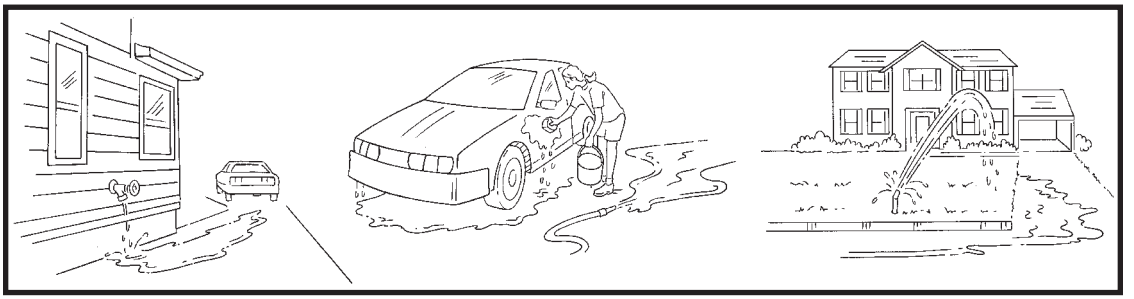
Critical Thinking

19. A factory uses water to cool its machines. Then it puts clean hot water into a nearby river. The temperature of the river rises. The warmer water has less oxygen than the cooler water did. Fish in the river start dying from lack of oxygen. Is the clean hot water from the factory an example of pollution? Explain your answer.

_____

_____

20. The neighborhood in the picture is experiencing a drought. The local government has made new rules to limit how much water each household can use each week.



Part A How are the people in this neighborhood wasting water?

_____

_____

_____

_____

Part B Describe some things the people in this neighborhood could do to conserve water.

_____

_____

_____

_____

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Name _____

Date _____

Performance Assessment

Student Task

Paper or Plastic?

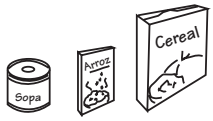
Materials



paper grocery bag



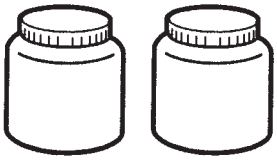
plastic grocery bag



boxes and cans



soil



2 plastic jars with lids



small (30-mL) measuring cup with water



scissors

Procedure

1. Create a data table. It needs spaces to record data and observations about the paper bag and the plastic bag, in four categories: *Capacity*, *Strength*, *Breaks Down*, and *Other Observations*.
2. Load boxes and cans into the paper bag until the bag is full. Under *Capacity*, record how many of each item the bag holds.
3. Lift the full paper bag. Observe whether the bag looks strong enough to carry the items. Record your observations under *Strength*.
4. Repeat Steps 2 and 3 for the plastic bag.
5. Under *Other Observations*, record any other things you notice about the two types of bag.
6. Plan and conduct an investigation to find out which type of bag breaks down more quickly if it is left on wet ground. Use a sample of each bag, 2 jars, soil, and water. Write down your plan before doing it. Identify the variable you are testing and the variables you are controlling.
7. Leave your investigation in place for a week. Then observe the two samples.
8. Draw a conclusion about which bag would break down more quickly if it were left at the side of a road.

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Paper or Plastic?

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, paper grocery bag, plastic grocery bag, boxes and cans of food, soil, 2 plastic jars with lids, small (30-mL) measuring cup, water, plastic spoon, scissors

Time 30 minutes, plus 10 minutes 1 week later

Suggested Grouping pairs

Inquiry Skills observe, record, plan and conduct an investigation, identify and control variables, draw conclusions

Preparation Hints Provide more than enough new, unopened food boxes and cans to fill one paper grocery bag. Use local soil, if available, or potting soil.

Introduce the Task Ask students if they have ever heard a grocery clerk ask "Paper or plastic?" Each kind of bag has advantages and disadvantages for resource use. Tell students that they will test both types of bag for strength, capacity (how much it holds), and other differences. Tell students that, sadly, some people litter by leaving bags on the ground. Students will plan and conduct an investigation to test how quickly each bag breaks down when left on wet ground.

Promote Discussion **From your testing, what are the advantages and disadvantages of each bag? People also consider whether a bag is made from renewable or nonrenewable resources. Which type of resource is used for each type of bag?** (Paper is renewable and recyclable; plastic is nonrenewable but recyclable.) There are other considerations as well, which students may research on their own. **What variable did you test in your investigation? What conclusion did you draw?**

Scoring Rubric

Performance Indicators

_____ Designs a data table that includes spaces for all requested observations and completes the data table.

_____ Plans an investigation with detailed steps.

_____ Identifies variables being tested and those being controlled.

_____ Draws a conclusion from observations made.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** Which is **not** an example of a mineral?

A. diamond
B. quartz
C. sea salt
D. window glass

____ **2.** Cora has two different minerals. Both are yellow. Both are shiny like metal. What two properties could she use to identify each mineral?

F. color and luster
G. color and streak
H. hardness and luster
J. streak and hardness

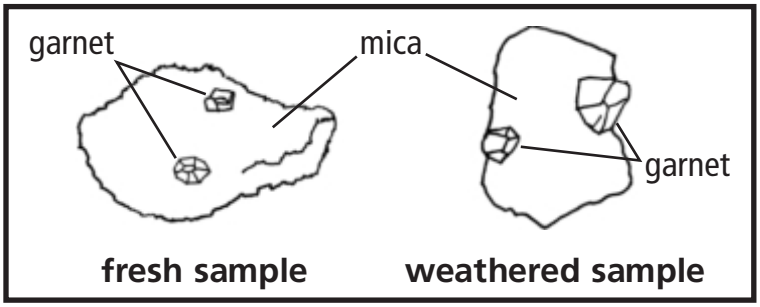
____ **3.** A blob of lava erupts from a volcano and lands in the ocean. What kind of rock will form from it?

A. igneous with large crystals
B. igneous with small crystals
C. sedimentary with one size of grain
D. sedimentary with many sizes of grain

____ **4.** Which process forms sedimentary rock?

F. cementing
G. erosion
H. evaporation
J. weathering

____ **5.** The pictures show two samples of the same kind of rock. One sample is fresh. The other has been weathered for many years. Two different minerals make up the rock—mica and garnet.



Which conclusion can you reach based on the information in the pictures?

A. These are examples of igneous rock.
B. Garnet weathers more quickly than mica.
C. Garnet is higher on the hardness scale than mica.
D. Mica has a crystalline structure, but garnet does not.

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Name _____

___ **6.** Which process can turn granite, an igneous rock, into gneiss, a metamorphic rock?

F. cementing **H.** heating
G. freezing **J.** thawing

___ **7.** In which kind of rock would you be **most** likely to find a fossil?

A. granite **C.** sandstone
B. marble **D.** slate

___ **8.** Which is **not** considered a fossil?

F. ant trapped in amber **H.** dinosaur footprint
G. cast of a shell **J.** flint arrowhead

___ **9.** Which statement **best** describes the law of superposition?

A. Each rock layer is younger than the one beneath it.
B. The position of an index fossil tells a rock layer's relative age.
C. Rock layers with index fossils are older than rock layers without them.
D. Rock layers with radioactive elements are younger than rock layers without them.

___ **10.** The fossil bones of the same kind of land animal have been found in eastern South America and in western Africa. What is this evidence of?

F. The animal could swim across the ocean.
G. The two continents have come together over millions of years.
H. The animal's bones could float, and they landed in different places.
J. The two continents were once connected but have since moved apart.

___ **11.** A rock layer in a desert area has many carbon-film plant fossils. The fossils are similar to lily pads. What do these fossils suggest?

A. The area once had a wetter environment.
B. The rock layer will also have fossil frogs.
C. The plants had hard parts that could be preserved.
D. The rock layer dates back to before the time of the dinosaurs.

___ **12.** Which landform was made by a glacier?

F. canyon **H.** sand dune
G. moraine **J.** sinkhole

___ **13.** Which statement is true?

A. All mountains have the same topography.
B. Volcanoes occur in places with little elevation.
C. Topography means all the kinds of landforms in a place.
D. All landforms are formed by movements in the Earth's crust.

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Name _____

____ **14.** What landform is the result of water eroding soft rock?

F. cinder cone **H.** plate
G. mesa **J.** sand dune

____ **15.** What would you expect to find where a faster river enters a slower river?

A. barrier island **C.** sediment deposits
B. gully **D.** waterfall

____ **16.** Which of Earth's layers is made of liquid iron?

F. crust **H.** mantle
G. inner core **J.** outer core

____ **17.** Which is the best explanation for plate movement?

A. Earth's plates slice through the lower mantle.
B. Earth's plates move when the lower mantle moves.
C. Volcanic eruptions push plates across Earth's surface.
D. Plates move because of erosion of Earth's surface.

____ **18.** Which earth movement would **not** cause an earthquake?

F. a landslide
G. plates moving apart
H. plates pushing together
J. movement along a fault

____ **19.** Mount Shasta was built up over many thousands of years from lava flows and explosive eruptions of rock and ash. What is Mount Shasta?

A. cinder cone volcano **C.** mesa volcano
B. composite volcano **D.** shield volcano

____ **20.** Where would you expect the strongest earthquakes?

F. Alaska, where the Pacific plate pushes under the North American plate
G. California, where the Pacific plate and the North American plate slide past each other
H. Iceland, where the North American plate and the Eurasian plate pull apart
J. Missouri, in the middle of the North American plate

____ **21.** Which resource is nonrenewable?

A. air **C.** sunlight
B. soil **D.** water

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Name _____

___ **22.** Which is an example of conservation?

F. forming a carpool to ride to work
G. buying new clothes to keep up with current fashion
H. replacing old videotapes with DVDs of the same movies
J. buying lunch at school instead of bringing a lunch from home

___ **23.** A farmer has planted corn in the same field for ten years. This year, her corn crop was poor even though the rain and sun were good. What conservation method could the farmer use to improve the soil in this field?

A. contour plowing
B. intercropping
C. raking
D. terracing

___ **24.** A city is deciding what kind of development to allow on a large piece of land. Which choice would conserve the **most** water?

F. a golf course covered in grass
G. a housing development for 1000 more people
H. a water park with wave pools and water slides
J. a park with native grasses, flowering plants, and shrubs

Write the answer to each question.

25. Why aren't you likely to find a fossil in metamorphic rock or igneous rock?

_____

_____

_____

26. Suppose you find a rock in your back yard. Explain how you could determine the hardness of this unknown rock, using rocks that you have already identified.

_____

_____

_____

_____

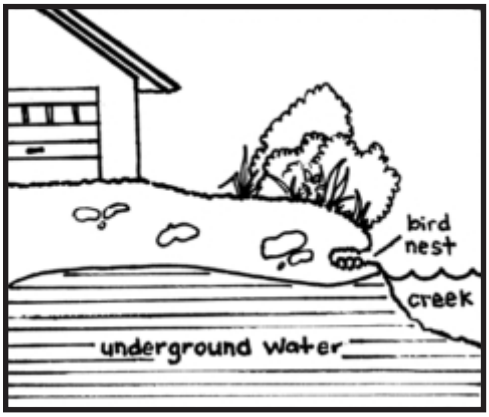
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_____

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Name _____

27. Paul helps his father change the oil in the family truck. His father tells him to pour the used oil at the edge of the yard "where it's just weeds and scrub brush." The picture below shows Paul's yard.



Part A What kinds of pollution can result if Paul pours the used oil at the edge of the yard?

_____

_____

_____

_____

Part B Will any organisms by harmed by Paul's action?

_____

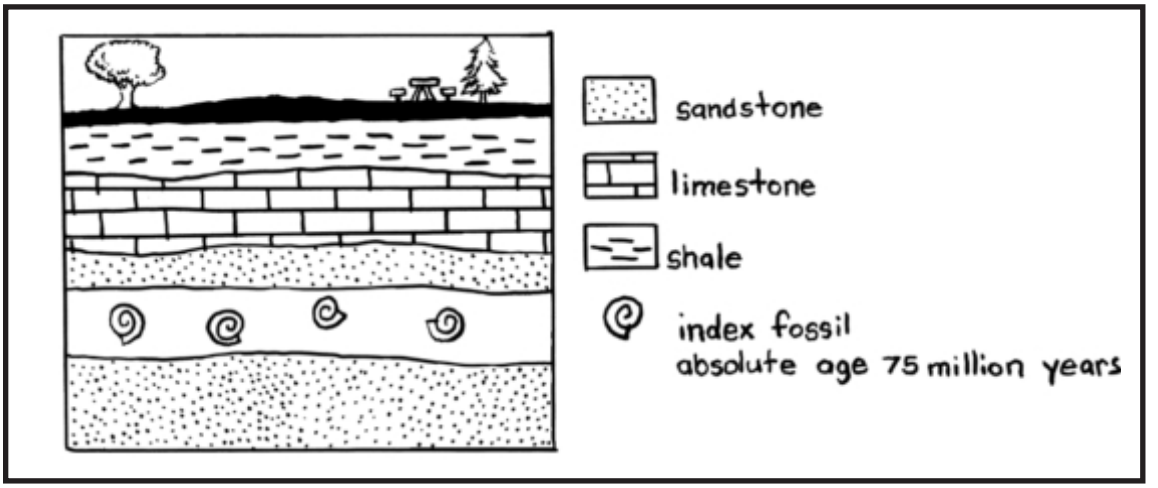
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Name _____

28. Observe the diagram of rock layers and the key, and answer the questions that follow.



Part A What method would scientists have used to determine the absolute age of the index fossil?

_____

_____

Part B Is the limestone layer older than 75 million years or younger than 75 million years? Tell how you could use the law of superposition to answer this question.

_____

_____

_____

_____

_____

_____

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Name _____

Date _____

Chapter Assessment

Weather and the Water Cycle

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** The layer of air closest to Earth's surface	**A.** air mass
____	**2.** The weight of the atmosphere pressing down on Earth	**B.** air pressure
____	**3.** The process by which water in a fish tank disappears over time	**C.** atmosphere
____	**4.** The process by which water changes from a gas to a liquid	**D.** condensation
____	**5.** A large body of air that has the same temperature and humidity throughout	**E.** evaporation
____	**6.** The movement of water from Earth, to the atmosphere, and back to Earth	**F.** front
____	**7.** The blanket of air surrounding Earth	**G.** troposphere
____	**8.** The border between two air masses	**H.** water cycle

Science Concepts

Write the letter of the best choice.

____ **9.** What is the name of a wind that blows constantly from the same direction?

A. fog **C.** ozone

B. local wind **D.** prevailing wind

____ **10.** You know that winter weather where you live is about the same every year. What is this type of weather pattern called?

F. climate **H.** pressure

G. condensation **J.** weather

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Name _____

___ **11.** You are on an island in the Caribbean Sea. Which air mass forms over you?
- **A.** continental polar
- **B.** continental tropical
- **C.** maritime polar
- **D.** maritime tropical

___ **12.** Which instrument would you use to measure the pressure of the surrounding air?
- **F.** anenometer
- **G.** barometer
- **H.** hygrometer
- **J.** thermometer

___ **13.** Where does most of Earth's weather happen?
- **A.** outer space
- **B.** stratosphere
- **C.** thermosphere
- **D.** troposphere

___ **14.** Based on your knowledge of cold and warm air masses, which of the following is true?
- **F.** Warm air is denser than cold air; cold air exerts more pressure.
- **G.** Cold air is denser than warm air; cold air exerts more pressure.
- **H.** Warm air is denser than cold air; warm air exerts more pressure.
- **J.** Cold air is denser than warm air; warm air exerts more pressure.

___ **15.** Which has the greatest effect on humidity?
- **A.** air temperature
- **B.** local climate
- **C.** local winds
- **D.** prevailing winds

___ **16.** What causes prevailing winds to move in curved paths?
- **F.** Earth's two poles
- **G.** Earth's mountains
- **H.** Earth's rotation on its axis
- **J.** Earth's revolution around the sun

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Name _____

Inquiry Skills

17. It is a cold, rainy day. The weather forecast is for the next day to be warm and sunny. What would you **predict** about the amount of evaporation that will take place on the warm, sunny day? Explain.

_____

_____

_____

_____

_____

18. You are planning a vacation to a resort. Before leaving, you **gather data** about weather forecasts for the region. You learn that a continental polar air mass will be over the region when you arrive, but that it will quickly be replaced by a maritime tropical air mass. What kind of weather can you expect when you arrive? How will the weather change after your arrival?

_____

_____

_____

_____

_____

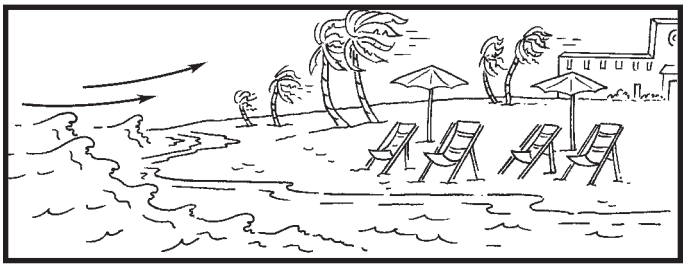
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Name _____

Critical Thinking

19. Ann is writing a report to explain the effect of mountain ranges on weather. What should her report say about the air masses and precipitation on both sides of the mountain?

20. The diagram shows the wind blowing.



Part A In which direction does the wind blow? Explain why this happens.

Part B Why is the seashore a comfortable place to be on hot summer days? Explain.

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Name _____

Date _____

Performance Assessment

Student Task

Air Pressure at Work

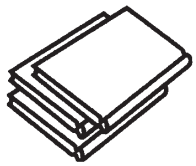
Materials



2 glass jars



water

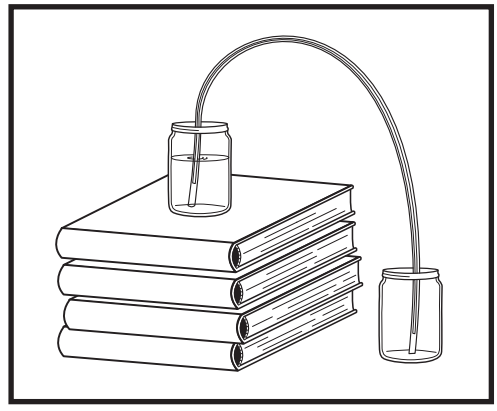


stack of books



plastic tubing

Procedure



1. Pour water into one glass jar until it is about $\frac{3}{4}$ full. Place a stack of books on a table, and place the jar of water on top of the books.
2. Put the empty glass jar next to the stack of books, as shown in the drawing.
3. Fill the plastic tubing with water. Put a finger over each end of the tube to close it.
4. With your fingers still in place, put one end of the tubing in the jar of water. Make sure the end of the tubing is underwater. Put the other end of the tubing in the empty jar. Remove both fingers from the ends of the plastic tubing.
5. After the water has started to move through the tubing, lower the jar from the pile of books to the tabletop. Leave the jars in this position until they both have the same amount of water in them.
6. Raise each jar, one at a time. Observe what happens.
7. Write a paragraph describing what happened. Compare your results with those of other teams.

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Air Pressure at Work

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, 2 glass jars, water, stack of books, plastic tubing ($\frac{3}{8}$-in. diameter)

Time 30 minutes

Suggested Grouping groups of two to four

Inquiry Skills experiment, observe

Preparation Hints Cut plastic tubing to appropriate lengths. Have books available that will stack higher than the glass jars are tall.

Introduce the Task Ask students to define *air pressure*. Write the definition on the board. Point out to students that the pressure of air can do work. Define *siphon*. Tell students that a siphon works because the pressure of the air is strong enough to push the water through the tube to a lower level.

Promote Discussion Ask students where they might use a siphon. Guide them to understand that they can siphon from a high position to a lower one but not from a low position to a higher one.

Scoring Rubric

Performance Indicators

_____ Works cooperatively with partner.

_____ Gathers materials and sets up the experiment quickly and efficiently.

_____ Compares results with those of other teams.

_____ Concludes that air pressure exerts force.

Observations and Rubric Score

3 2 1 0

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Name _____

Date _____

Chapter Assessment

Earth's Oceans

Vocabulary

Match each term in Column B with its meaning in Column A.

Column A

____ **1.** The part of the ocean floor that drops steeply

____ **2.** A point of land formed when soft rock wears away

____ **3.** A measure of the amount of salt in water

____ **4.** A wall-like structure that sticks out into the ocean

____ **5.** A temporary pool of ocean water

____ **6.** The large, flat area on the bottom of the ocean

____ **7.** The area where the ocean and the land interact

____ **8.** A stream of water that flows like a river through the ocean

Column B

A. salinity

B. continental slope

C. abyssal plain

D. current

E. shore

F. headland

G. tide pool

H. jetty

Science Concepts

Write the letter of the best choice.

____ **9.** What causes waves to form?

A. Earth rotates on its axis.

B. Currents flow through the ocean.

C. Wind blows over the surface of the water.

D. Earth's gravity pulls the water up and down.

____ **10.** How does water in a wave move?

F. in a circle

G. back and forth

H. down to the ocean floor

J. up from the ocean floor

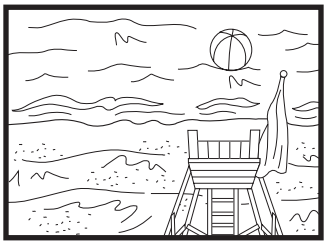
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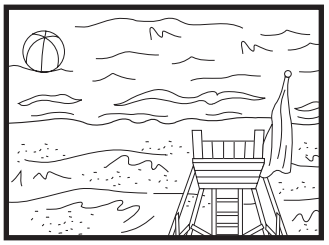
Name _____

___ **11.** What happens as you descend deeper into the ocean?

A. Temperature increases and pressure decreases.
B. Temperature increases and pressure increases.
C. Temperature decreases and pressure decreases.
D. Temperature decreases and pressure increases.

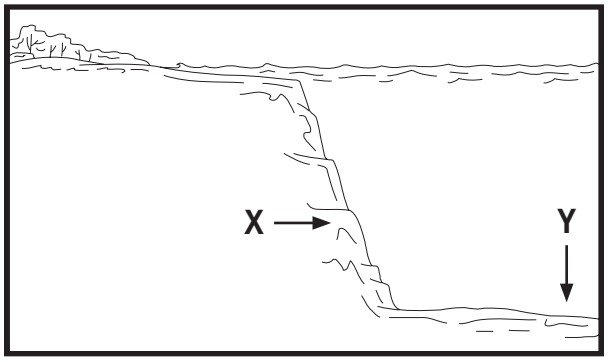
___ **12.** Look at the two pictures below. What caused the beach ball to move?





F. gravity
G. a longshore current
H. the phases of the moon
J. an undersea earthquake

Use the diagram below to answer Questions 13–14.



___ **13.** Which part of the ocean is labeled **X**?

A. abyssal plain
B. continental shelf
C. continental slope
D. mid-ocean ridge

___ **14.** Which of the following would **not** be found on the part of the ocean that is labeled **Y**?

F. active volcanoes
G. deep trenches
H. deep canyons formed by rivers
J. mountains formed by plate movement

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Name _____

___ **15.** How is an estuary different from other ocean environments?

A. It receives little light.
B. It does not attract many organisms.
C. Fresh water and salt water mix there.
D. It is where streams join to form a river.

___ **16.** Which statement about beach restoration is **not** true?

F. Beach restoration may cost millions of dollars.
G. During beach restoration, channels can be reopened.
H. Beach restoration causes permanent changes to a beach.
J. After beach restoration, the slope of the beach may be changed.

Inquiry Skills

17. If you were at the shore during a hurricane and the winds were strong and gusty, what kinds of waves would you **observe**? **Infer** what the shoreline would look like after the hurricane.

_____

_____

_____

_____

18. Rainwater flows along the side of a street, carrying leaves and twigs and depositing them where the flow turns a corner, which makes the flow slow down. Is this a good **model** for longshore currents that carry beach materials? Explain.

_____

_____

_____

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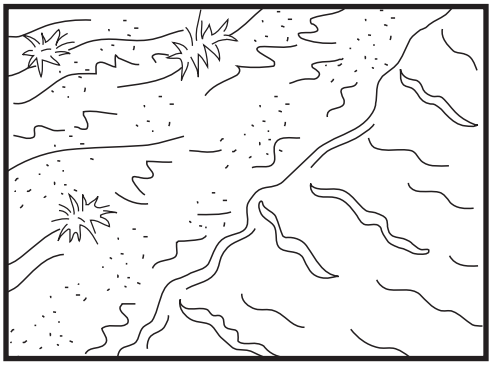
Name _____

Critical Thinking

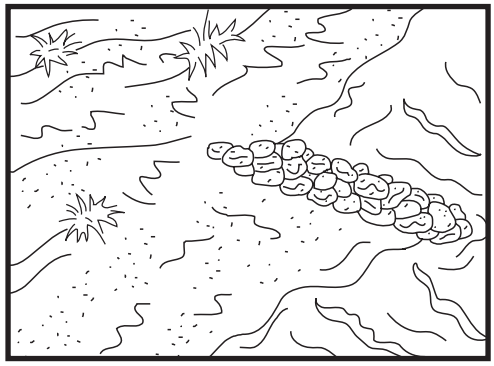
19. Why are waves usually bigger in an ocean than in a small lake?

20. Look at the pictures. Picture X shows a natural beach. Picture Y shows a beach with a jetty. Include information from the pictures in your answers to the questions below.

X



Y



Part A How does a jetty work?

Part B Why might some beach property owners oppose the building of jetties?

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Name _____

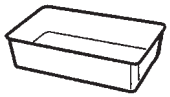
Date _____

Performance Assessment

Student Task

Making Waves

Materials



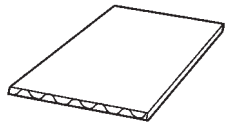
pan



water



cork



sheet of cardboard

Procedure

1. Half-fill the pan with water. Place a cork in the water. Let the pan stand until the water becomes still.
2. Gently fan the water with the sheet of cardboard. Be careful not to touch the water in the pan with the cardboard.
3. Record what happens to the cork.
4. Wait for the water to become still again, and then fan the water faster. Record your observations.
5. Repeat Step 4, fanning the water as fast as you can. Record your observations.

Trial	Observations
1. slow fanning	
2. faster fanning	
3. fastest fanning	

6. Explain what happens to the water and the cork. Describe how the movement of the water is like the movement of ocean waves. Based on your observations of the cork, explain what happens to a boat that is at rest on top of the ocean.

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Making Waves

Performance Assessment

Teacher's Directions

Materials Perfomance Task sheet, rectangular pan, water and measuring cup, cork, sheet of cardboard

Time 30 minutes

Suggested Grouping pairs or small groups

Inquiry Skills observe, predict, infer, use models, draw conclusions

Preparation Hints You may wish to fill the pans with water ahead of time.

Introduce the Task Ask students to suppose that they were adrift in the ocean in a small boat. What effect would the ocean waves have on the boat? Would they go anywhere, or would the boat stay in the same place? Encourage students to predict what would happen to the boat. Then tell students they will test their predictions by using a cork as a boat, floating on the waves.

Promote Discussion When students finish, ask them to share their results with the class. Ask students what they noticed each time the water was disturbed. **Did a ripple or wave travel across the pan from the point where the water was disturbed? What happened to the cork? Did it bob up and down but stay almost in the same place?** Explain that this experiment models the shape and movement of ocean waves. Elicit discussion about the relationship of the speed of fanning to the sizes of waves.

Scoring Rubric

Performance Indicators

_____ Makes and observes a variety of waves.

_____ Accurately records results.

_____ Draws an accurate conclusion relating the speed of fanning to the size of waves formed.

_____ Makes a logical inference, based on experimental findings, about the effect of waves on floating objects.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Earth, Moon, and Beyond

Vocabulary

Use the letters of the terms in the box to complete the sentences.

A. solar system	**C.** planet	**E.** universe	**G.** moon phase
B. galaxy	**D.** constellation	**F.** star	**H.** axis

1. The sun is a ____ , a huge ball of very hot gases.

2. The imaginary line that passes through Earth's poles is Earth's ____.

3. Each shape the moon seems to have throughout a month is called a ____.

4. A pattern of stars is a ____.

5. Everything that exists, including planets, stars, dust, and gases, is the ____.

6. The gravitational force of a star holds a ____ in orbit around it.

7. A ____ contains a group of stars, gas, and dust.

8. A ____ is made up of a star and all the planets and other objects that revolve around it.

Science Concepts

Write the letter of the best choice.

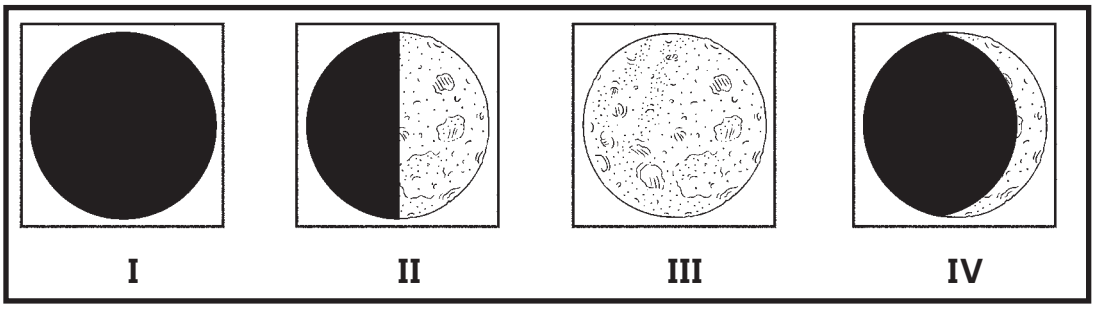
____ **9.** How are Earth and the moon alike?

A. Both have liquid water.
B. Both have satellites.
C. Both are rocky and dense.
D. Both have a thick atmosphere.

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Name _____

Use the drawings to answer Questions 10–11.



___ **10.** Which of the drawings represents the waxing crescent moon?

F. I
G. II
H. III
J. IV

___ **11.** Which of the drawings represents the first-quarter phase of the moon?

A. I
B. II
C. III
D. IV

___ **12.** Which of these is the basis for timekeeping on Earth?

F. hemispheres
G. satellites
H. time zones
J. distance from the sun

___ **13.** Which of these occurs when it is summer in the Northern Hemisphere?

A. Earth has its winter equinox.
B. The Southern Hemisphere is tilted toward the sun.
C. The sun's rays strike the Northern Hemisphere directly.
D. Earth's equator experiences three months of darkness.

___ **14.** Which is a true statement about the planets in our solar system?

F. Only Earth has liquid water.
G. The inner planets are made of frozen gases.
H. The outer planets are located in an asteroid belt.
J. Jupiter is the only outer planet that is small and rocky.

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Name _____

____ **15.** Which is **not** a type of galaxy?

A. barred spiral **C.** elliptical

B. circular **D.** irregular

____ **16.** Which of these causes seasonal changes on Earth?

F. Earth's orbit and tilt

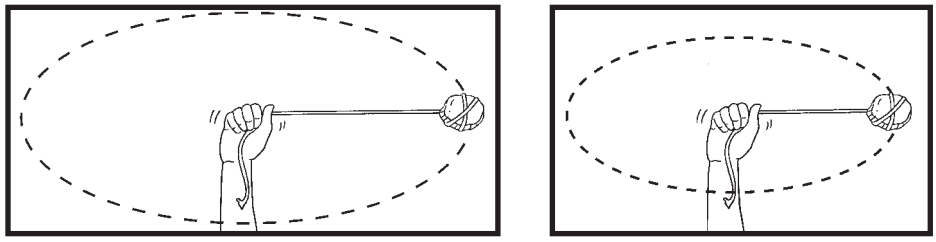
G. the shape of the sun's orbit

H. the changing shape of Earth's orbit

J. Earth's position in relation to the moon

Inquiry Skills

Use the pictures to answer Questions 17–18.



17. If you tie a string to a rock and spin the rock in a circle, you are **modeling** the orbit of Earth (the rock) around the sun (your hand). What would happen if the string were only half as long and still being turned with the same force, as shown in the picture on the right?

_____

_____

18. **Use time and space relationships** to compare the two pictures with Earth's orbit around the sun and the moon's orbit around Earth.

_____

_____

_____

_____

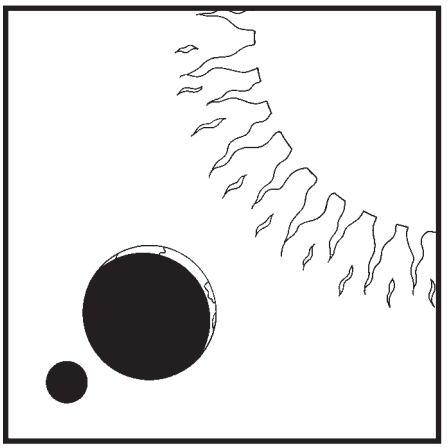
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Name _____

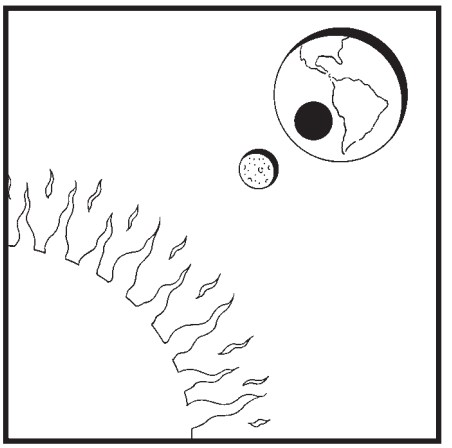
Critical Thinking

19. Compare the advantages and disadvantages of crewed space explorations and space probes.

20. The diagrams below show two kinds of eclipses.



I



II

Part A Identify the kind of eclipse shown in each diagram.

Part B Explain how you identified each diagram.

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Name _____

Date _____

Performance Assessment

Student Task

It's Just a Phase!

Materials



lamp without a shade



softball or baseball

Procedure

With your group, you are going to model the phases of the moon, using a lamp without a shade and a small ball.

1. When the teacher darkens the room, turn on the lamp.
2. Begin by standing with your back to the lamp.
3. Hold the ball at arm's length in front of you, but above the level of your head. Make sure the ball is in the light.
4. Rotate counterclockwise, keeping the ball in the same position relative to you as it revolves. Stop each eighth of the way around, and draw a picture that shows how much of the ball appears lighted.
5. What does the lamp represent? What does the ball represent?

_____

6. Describe how much of the lighted half of the ball you could see and your position at each stopping point in your rotation. What is each similar phase of the moon called?

_____

_____

7. Explain what causes the phases of the moon.

_____

_____

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It's Just a Phase!

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, lamp without a shade, softball or baseball

Time 30 minutes

Suggested Grouping groups of three

Inquiry Skills use models, observe, compare

Preparation Hints none

Introduce the Task Tell students that they will be modeling the phases of the moon. One student in each group will move the ball, and the other two will draw what is happening. Students should answer questions on the Performance Task sheet individually, after a small-group discussion.

Promote Discussion When students finish, ask why it was important to hold the ball above the level of the head. (to keep it in the light; to prevent the person's shadow from falling on the ball)

Scoring Rubric

Performance Indicators

_____ Works with the group to model the phases of the moon according to directions.

_____ Works with the group to create drawings of the moon's cycle.

_____ Can identify and name the phases of the moon.

_____ Clearly explains the phases of the moon's cycle.

Observations and Rubric Score

3 2 1 0

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Name _____

Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** Which statement about Earth's atmosphere is true?
- **A.** Most weather occurs in the highest of the four layers.
- **B.** The atmosphere is a very thick layer surrounding Earth.
- **C.** Most gases in the atmosphere are in the layer closest to Earth.
- **D.** The higher in the atmosphere you go, the higher the air pressure.

____ **2.** What is the main cause of wind?
- **F.** ocean currents that change direction
- **G.** uneven heating of Earth's surface by the sun
- **H.** differences in the rate of rotation at Earth's surface
- **J.** changes in the amount of ozone in the troposphere

____ **3.** Taylor is staying at a hotel at the beach. The weather is sunny and warm. He rushes outdoors to fly a kite at 6:00 A.M., but there is no wind. By 10:00 A.M., a good breeze is blowing. What happened between 6:00 A.M. and 10:00 A.M.?
- **A.** The prevailing winds started blowing after sunrise.
- **B.** A climate change came through and brought wind with it.
- **C.** The sun heated the land more quickly than the sea, and a sea breeze formed.
- **D.** The sun heated the sea more quickly than the land, and a land breeze formed.

____ **4.** Which process occurs when water that is heated by the sun becomes water vapor?
- **F.** condensation
- **G.** evaporation
- **H.** precipitation
- **J.** runoff

____ **5.** Which is a measure of the relative amount of moisture in the air?
- **A.** humidity
- **B.** oxygen level
- **C.** temperature
- **D.** wind speed

____ **6.** Which is **not** a factor that affects the climate in a particular area?
- **F.** ozone in the stratosphere
- **G.** distance from Earth's poles
- **H.** shape of the local landforms
- **J.** distance from a body of water

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Name _____

___ **7.** Which pattern is generally true?
- **A.** As temperature increases, humidity decreases.
- **B.** As temperature decreases, air pressure increases.
- **C.** As air pressure increases, precipitation increases.
- **D.** As air pressure decreases, temperature decreases.

___ **8.** Which instrument measures air pressure?
- **F.** anemometer
- **G.** barometer
- **H.** hygrometer
- **J.** wind vane

___ **9.** The weather has been hot and humid for days. Then thunderstorms pass through, traveling from west to east. The weather is cooler and drier for the next few days. What probably happened?
- **A.** A cold front moved through.
- **B.** A warm front moved through.
- **C.** A continental tropical air mass left.
- **D.** A maritime tropical air mass arrived.

___ **10.** What is the main difference between weather and climate?
- **F.** Climate has a pattern; weather has no pattern.
- **G.** Weather changes from day to day; climate stays the same for years.
- **H.** Climate is affected by landforms and ocean currents; weather is not.
- **J.** Weather is driven by the sun; climate is driven by prevailing winds.

___ **11.** What would be about the same at the ocean's surface and 1000 meters below the surface?
- **A.** amount of light
- **B.** salinity
- **C.** temperature
- **D.** water pressure

___ **12.** Your friend has drawn a picture that shows a scuba diver waving to a person inside the submersible *Alvin*, which is resting on the bare, flat abyssal plain. What is wrong with your friend's picture?
- **F.** The abyssal plain is hilly, not flat.
- **G.** There should be seaweed growing on the ocean floor.
- **H.** The diver would be crushed by water pressure at that depth.
- **J.** The submersible cannot travel to the ocean floor.

___ **13.** Which statement is true?
- **A.** Waves carry water across the ocean.
- **B.** Waves break only during a storm surge.
- **C.** Waves carry the energy through the ocean.
- **D.** Waves are caused by tides pulling water onto the shore.

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Name _____

___ **14.** Which is the largest current?

F. longshore current **H.** surface current
G. rip current **J.** tidal current

___ **15.** What causes tides?

A. the force of giant waves called tsunamis
B. temporary pools of water on the shoreline
C. the pull of gravity of the moon and the sun
D. prevailing winds blowing across the ocean surface

___ **16.** Which feature would you find at a sandy shore?

F. cliff **H.** sea arch
G. flat beach **J.** tide pool

___ **17.** On the beach, you find a clipboard that someone left behind. The clipboard contains this page of notes.

Sandy Beach Project Plan
• Build jetty to stop longshore current.
• Dredge sand from channel.
• Dump dredged sand on beach.
• Consider an artificial reef.

What kind of project is the clipboard's owner working on?

A. restoring a beach
B. mapping currents
C. rescuing sea creatures
D. exploring hydrothermal vents

___ **18.** What causes the weather pattern known as El Niño?

F. acid rain
G. air pollution
H. changes in winds and currents
J. a hole in the atmosphere

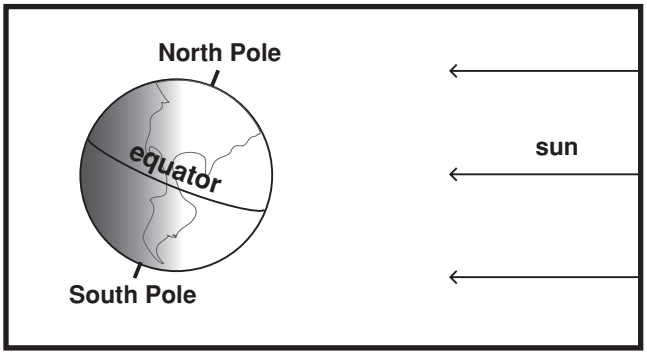
___ **19.** Why are there high tides and low tides each day?

A. Earth rotates on its axis once a day.
B. Earth revolves around the sun each day.
C. The moon revolves around Earth each day.
D. Earth tilts toward the moon each day.

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Name _____

___ **20.** Look at the diagram. What season is it in the Northern Hemisphere?



F. autumn
G. spring
H. summer
J. winter

___ **21.** Why is it warmer during summer than winter?

A. Earth is closer to the sun.
B. More warm fronts pass through.
C. There are fewer clouds to reflect sunlight.
D. Sunlight strikes Earth's surface more directly.

___ **22.** On the radio, you hear this announcement: "If you look in the sky between 9:45 and 10:15 tonight, you may notice that the moon looks red. Don't be alarmed—it's just the moon passing through Earth's shadow." What is being described?

F. a full moon
G. a lunar eclipse
H. a new moon
J. a solar eclipse

___ **23.** Which is a reason that the moon has more craters than Earth?

A. Most space objects burn up in Earth's atmosphere.
B. Earth's surface weathers more slowly than the moon's.
C. The moon's greater gravity pulls more space objects toward it.
D. The moon's moderate temperatures encourage crater formation.

___ **24.** A story describes astronauts arriving on Jupiter. When they land, they are careful to avoid the 300-year-old storm. Through their spaceship's window, they admire the dozens of moons in Jupiter's sky. Then they put on their spacesuits and step out onto Jupiter's hard, rocky surface.

Which detail tells you that this story is fiction?

F. dozens of moons
G. hard, rocky surface
H. spaceship has a window
J. 300-year-old storm

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Name _____

Write the answer to each question.

25. How do fronts affect weather changes?

_____

_____

26. Contrast how Earth rotates and how it revolves.

_____

_____

_____

_____

27. Surfers often watch weather forecasts for the open ocean hundreds or even thousands of miles away from their favorite beach. A big wind storm far out at sea is exciting news for surfers, especially if the storm does not reach land. Why would surfers be interested in storms that do not even reach their beach?

_____

_____

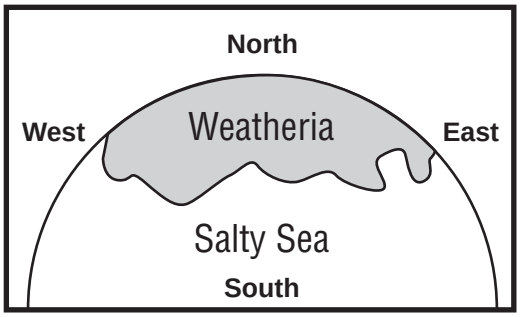
_____

_____

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Name _____

28. The diagram shows the imaginary continent of Weatheria, with the nearby Salty Sea. Weatheria, which is farther north, has cool temperatures. The Salty Sea, which is closer to the equator, has warm temperatures.



Part A What kind of air mass would form over the continent of Weatheria? Describe the properties of the air mass.

_____

_____

_____

Part B What kind of air mass would form over the Salty Sea? Describe the properties of the air mass.

_____

_____

_____

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Name _____

Date _____

Chapter Assessment

Properties of Matter

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A measure of how much mass is in a volume of matter	**A.** atom
____	**2.** A chart that organizes elements by atomic number	**B.** element
____	**3.** The smallest particle of matter that still acts like that kind of matter	**C.** density
____	**4.** A tiny particle made up of two or more atoms joined together	**D.** molecule
____	**5.** The center of the atom, where protons and neutrons are	**E.** mixture
____	**6.** A combination of two or more substances that are evenly mixed	**F.** periodic table
____	**7.** A combination of two or more different substances	**G.** nucleus
____	**8.** Matter made up of only one type of atom	**H.** solution

Science Concepts

Write the letter of the best choice.

____ **9.** Which is **not** an example of matter?

A. air **C.** soil

B. heat **D.** water

____ **10.** A pan of water boils until all of it evaporates into the air. What property of the water is the same after this change?

F. mass **H.** temperature

G. state **J.** volume

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Name _____

15	16	17	18
			2 **He** Helium
7 **N** Nitrogen	8 **O** Oxygen	9 **F** Fluorine	10 **Ne** Neon
15 **P** Phosphorus	16 **S** Sulfur	17 **Cl** Chlorine	18 **Ar** Argon
33 **As** Arsenic	34 **Se** Selenium	35 **Br** Bromine	36 **Kr** Krypton

___ **11.** The diagram shows a piece of the periodic table. Use information in the table to decide which statement is true.

A. Sulfur has 16 protons.
B. Se is the symbol for silicon.
C. The symbol for argon is Arg.
D. Helium has the most protons.

___ **12.** Which item is an example of a solution?

F. vegetable soup
G. drink mix and water
H. raisin bread
J. tossed salad

___ **13.** Which process would change the mass of an iron bolt?

A. bending
B. freezing
C. melting
D. rusting

___ **14.** Which is a physical change?

F. combustion
G. corrosion
H. recycling
J. reactivity

___ **15.** A copper penny has a mass of about 4 grams. A copper kettle has a mass of about 400 grams. What is true about the density of these two objects?

A. The kettle is 100 times as dense as the penny.
B. The penny is denser because its mass is in a smaller volume.
C. Their densities are different because they are different shapes.
D. Their densities are the same because they are made of the same substance.

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Name _____

___ **16.** Cara is investigating a substance. When she first picks it up, it keeps its shape. But after it warms up in her hand, it flows between her fingers and drips onto the table. After she puts an ice cube on the drips, she can pick them up again. Which choice best describes these changes?

F. A solution separates, then recombines.

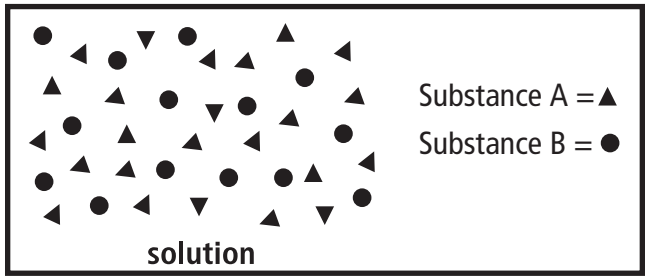
G. A mixture goes through a chemical change.

H. A solid melts into a liquid and freezes back into a solid.

J. A liquid freezes into a solid and melts back into a liquid.

Inquiry Skills

17. The diagram shows a solution made by dissolving Substance A in Substance B. What do you **observe** about the particles of the substances?



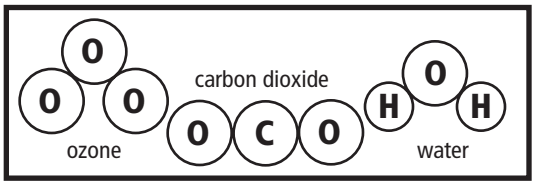
18. A winter weather forecast says that the temperature will rise past the melting point of water early in the day, so you can expect the ice on the roads to melt. Toward evening, the temperature will fall past the freezing point of water, so you should expect the roads to be icy again. Your cousin complains that the forecast has two different names for the same temperature, 0°C. **Infer** why the same temperature has two different names and how to tell which name to use.

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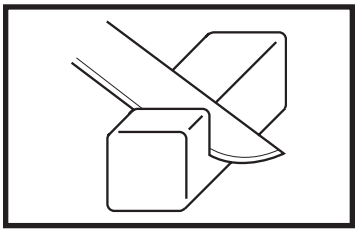
Name _____

Critical Thinking

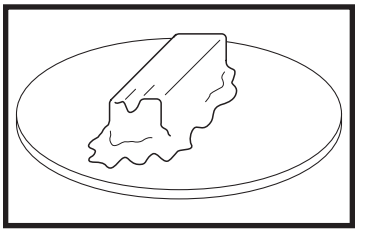
19. The picture shows models of three different molecules. Which model shows a molecule of an element? Explain.



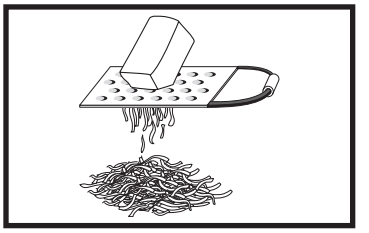
20. The pictures show chunks of cheese going through changes. Observe the pictures, and then answer the questions below.



slicing



melting



shredding

Part A Identify each change as a physical change or a chemical change. Explain your answer.

Part B Compare the mass and volume of the cheese before and after it is sliced. What term do scientists use to describe what happens to the mass and volume of the cheese?

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Name _____

Date _____

Performance Assessment

Student Task

Mass During Dissolving

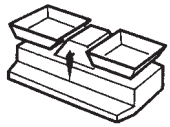
Materials



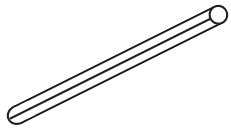
water in cup



salt in cup



balance



stirrer

Procedure

1. **Do not spill any water or salt.** If you do, clean the balance pan and start over from Step 2.
2. Use the balance to measure the mass of the cup of water and the cup of salt. Measure both cups at once, if possible. If not, measure separately, and add the two values. Record the mass in the table.
3. Predict whether the mass of the water and salt will increase, decrease, or stay the same after you combine them into a saltwater solution.
4. Pour all the salt into the cup of water. Mix with the stirrer. Keep stirring until no more salt dissolves. Let the water drip off the stirrer, back into the cup.
5. Use the balance to measure the mass of both the cup of saltwater solution and the empty cup that the salt was in. Record the mass in the table.
6. Compare the mass of the salt and water with the mass of the saltwater solution that formed. Then compare these results with your prediction of what would happen. Did the mass of the substances change during the physical change of dissolving?

Items	Mass Before Dissolving (grams)	Mass After Dissolving (grams)
salt in cup plus water in cup		
saltwater in cup plus cup from salt		

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Mass During Dissolving

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, water, salt, small plastic cups, balance, coffee stirrer

Time 30 minutes

Suggested Grouping pairs

Inquiry Skills measure, record, predict, compare

Preparation Hints Use cups that are small enough so that two cups fit on the balance pan at the same time. Fill water cups about two-thirds full. Put just enough salt in the salt cups to cover the bottom. Have extras on hand in case of spills.

Introduce the Task Tell students that they will conduct an investigation to compare the mass of two substances before and after they are made into a solution. Point out that, because students are measuring the total mass of two substances (water and salt) before and after a physical change, it's important for them to start over if they spill any water or salt. Ask them to predict the outcome of the experiment.

Promote Discussion Ask students to share their predictions. Ask if their predictions were supported by the results. Reassure students whose results were off by a very minor amount that slight variations are acceptable in science. Repeating the experiment with many student pairs helps reduce the effect of error in measurement. **During the "after" measurement, why was it important to include the cup that held the salt?** What conclusion can students draw about the mass of substances during the physical change of dissolving?

Scoring Rubric

Performance Indicators

_____ Completes data table neatly with own data.

_____ Makes a clearly stated prediction.

_____ Bases conclusions about the prediction on own data.

_____ Concludes that the mass of the substances did not change as a result of the physical change of forming a solution.

Observations and Rubric Score

3 2 1 0

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Name _____

Date _____

Chapter Assessment

Energy

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** The ability to cause a change in matter	**A.** convection
____	**2.** Energy due to an object's condition or position	**B.** chemical energy
____	**3.** Energy of motion	**C.** energy
____	**4.** Stored energy that can be released by a chemical reaction	**D.** conservation
____	**5.** Direct transfer of thermal energy from one object to another	**E.** radiation
____	**6.** Transfer of thermal energy by the movement of a gas or liquid	**F.** conduction
____	**7.** Movement of thermal energy by electromagnetic waves	**G.** potential energy
____	**8.** Saving something so that it doesn't get used up	**H.** kinetic energy

Science Concepts

Write the letter of the best choice.

____ **9.** Which of the following has potential energy?
- **A.** a ball that has been batted
- **B.** a rock sitting at the bottom of a hill
- **C.** a piece of pottery on the edge of a high shelf
- **D.** a hockey stick lying on the garage floor

____ **10.** Which activity uses the most energy?
- **F.** driving a car
- **G.** kicking a ball
- **H.** shouting to a friend
- **J.** solving a math problem

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Name _____

___ **11.** Neal made a table to show types of energy and their sources.

Type of Energy	Source
chemical energy	electrical outlet
light energy	sun
mechanical energy	food
nuclear energy	laser beam

Which type of energy is correctly paired with its source?

A. chemical energy
B. light energy
C. mechanical energy
D. nuclear energy

___ **12.** Which is a renewable source of energy?

F. coal
G. natural gas
H. oil
J. wind

___ **13.** Heat can be transferred by various processes.



Which process is shown in the picture?

A. conduction
B. conservation
C. radiation
D. reflection

___ **14.** Which of these causes the temperature of the air to rise?

F. Particles in the air move more slowly.
G. Particles in the air move more quickly.
H. Particles in the air lose kinetic energy.
J. Particles in the air gain potential energy.

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Name _____

___ **15.** Why do some pots have a layer of copper on the bottom?

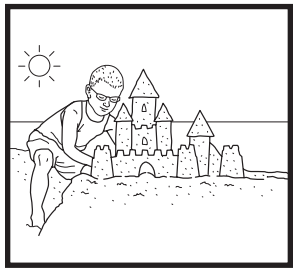
A. Copper is a good conductor of heat.
B. Copper creates convection, which heats food.
C. Copper increases the pot's mechanical energy.
D. Copper is an insulator that keeps food from burning.

___ **16.** Eric added hot water to cold water. The cold water heated up. Which process caused the heating?

F. conduction
G. convection
H. radiation
J. solar energy

Inquiry Skills

17. Look at the two pictures. In which picture would you **infer** that air particles are moving more quickly? Explain.



A



B

18. One shed is made of metal. One shed is made of wood. **Draw a conclusion** about the temperature inside each shed in summer and in winter. Explain.

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Name _____

Critical Thinking

19. What types of material should you wear when it's cold? Explain why these materials would keep you warm.

20. A certain type of calculator can run with or without a battery in the light. In the dark, it runs only with a battery.

Part A What kind of energy does this calculator need to run? How can you tell?

Part B Does this calculator use renewable or nonrenewable resources? Explain.

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Name _____

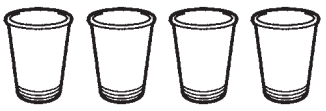
Date _____

Performance Assessment

Student Task

Keeping the Heat In

Materials



4 300-mL plastic cups



modeling clay



aluminum foil



masking tape



paper



warm water



thermometer



clock

Procedure

1. Prepare the cups. Mold a layer of clay around one cup. Wrap aluminum foil around a second cup. Tape paper around a third cup. Leave the fourth cup as is.
2. Your teacher will pour warm water into each cup. Use a thermometer to measure the water temperature in each cup. Record the temperatures in the data table below.
3. After 5 minutes, 10 minutes, and 15 minutes, again measure the temperature of the water in each cup. Record the temperatures in the table.
4. In which cup did the water cool off the fastest? In which cup did it cool off the slowest? Infer which material provides the best insulation.

	Starting Temperature	5 Minutes	10 Minutes	15 Minutes
Cup with clay				
Cup with foil				
Cup with paper				
Cup by itself				

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Keeping the Heat In

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, four 300-mL plastic cups, modeling clay, aluminum foil, masking tape, paper, warm water, thermometer, clock

Time 30 minutes

Suggested Grouping groups of three

Inquiry Skills observe, measure, record, interpret data, compare, infer

Preparation Hints Have the warm water ready. To prevent spills, be sure to pour it yourself. The water should be warm, but not so warm as to burn students.

Introduce the Task Review the chapter section about conduction, and make sure students understand the difference between a conductor and an insulator. Explain that they will test three different materials to find out how well they conduct heat energy. The material that conducts heat the best is the poorest insulator.

Promote Discussion Ask each group to share its results with the class. Extend the discussion by asking students why they recorded data for the cup that was not insulated. Ask students why it might be helpful to know whether a material is a good insulator.

Scoring Rubric

Performance Indicators

_____ Properly sets up the four cups.

_____ Carefully measures the water temperature in each cup and accurately records data in the table.

_____ Interprets the data to find the material that conducts heat energy the best.

_____ Infers the best insulator based on the data collected.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Chapter Assessment

Electricity

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A form of energy produced by moving electrons	**A.** conductor
____	**2.** A wire with electric current, wrapped around an iron bar	**B.** current electricity
____	**3.** The buildup of charges on an object	**C.** electricity
____	**4.** The flow of electrons through a conductor	**D.** electric circuit
____	**5.** A material that carries electricity well	**E.** electric current
____	**6.** A material that does not carry electricity well	**F.** electromagnet
____	**7.** A complete path that electric current follows	**G.** insulator
____	**8.** A kind of kinetic energy caused by flowing electrons	**H.** static electricity

Science Concepts

Write the letter of the best choice.

____ **9.** Which unit measures the amount of electrical energy a device uses each second?

A. amp **C.** volt

B. electron **D.** watt

____ **10.** Which part of an atom is involved in electricity?

F. electron

G. neutron

H. nucleus

J. proton

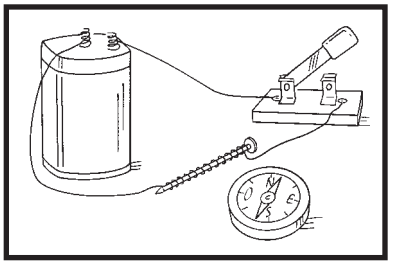
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Name _____

___ **11.** Clara pushes down the handle on a toaster. The wires inside the toaster heat up and turn red. When the toast is done, the handle pops up and the wires cool down. What part of an electric circuit did Clarissa operate?

A. battery
B. conductor
C. insulator
D. switch

___ **12.** Look at the diagram. What will happen when the switch is closed?



F. The battery will recharge.
G. The compass needle will turn.
H. A spark will jump from the nail.
J. The wire will become an insulator.

___ **13.** Which are examples of electrical conductors?

A. plastic, rubber
B. wood, paper
C. copper, aluminum
D. glass, pottery

___ **14.** A purring cat rubs up against its owner's wool pants. When the cat stops, it is still happy, but its fur is standing on end. What is happening?

F. The strands of the cat's fur are repelling one another.
G. The strands of the cat's fur are attracting one another.
H. The cat's fur caused a static discharge on the wool pants.
J. Electrons suddenly jumped from the wool pants to the cat's fur.

___ **15.** Which kind of circuit is used for the wiring in buildings?

A. electromagnetic
B. parallel
C. series
D. static

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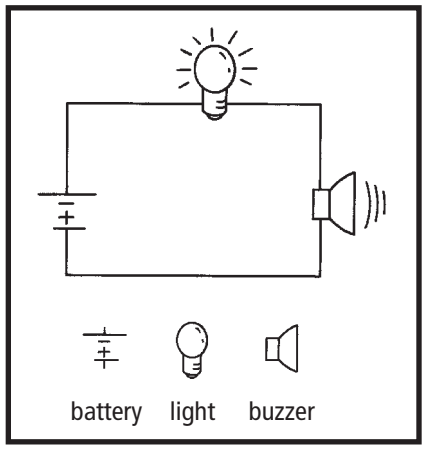
Name _____

___ **16.** Thunderstorms bring lightning. If you are swimming or boating when a thunderstorm is on the way, you must get out of the water immediately. Given this information, which statement is probably true?

F. Water is an insulator.
G. Water is a conductor.
H. Water has many volts in it.
J. Water can cause a static discharge.

Inquiry Skills

17. Examine the circuit diagram. **Predict** what will happen if the buzzer is removed. Explain the reason for your answer.



18. **Plan an experiment** to find out whether damp clothes can be electrically charged by rubbing them against each other. Include a test using dry clothes for a comparison.

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Name _____

Critical Thinking

19. Describe a device from your everyday life that changes electricity into another form of energy. Explain how many steps take place during the change, and name the kinds of energy that electricity turns into.

20. Suppose a news report describes a risk to drivers who are filling a gas tank. If the driver slides into the driver's seat while the tank is filling and then slides back out and touches the gas pump, gasoline fumes may catch fire. (This kind of fire is rare. The risk would be for drivers of cars with cloth upholstery.)

Part A What happens while the driver is sliding into and out of the driver's seat? How could this lead to a fire?

Part B How can the driver prevent this kind of fire while filling the gas tank?

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Name _____

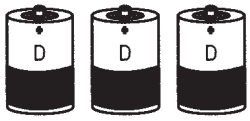
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Performance Assessment

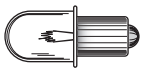
Student Task

Invent a Battery Tester

Materials



3 D-cell batteries



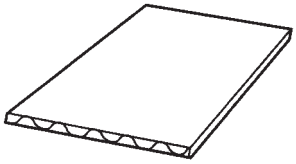
flashlight bulb



masking tape



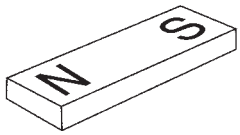
compass



sheet of cardboard



wires with ends stripped



bar magnet

Procedure

1. Work with a partner. Together, you will invent a tool to test whether a battery is live (has voltage) or dead (has no voltage). Start by looking at the materials shown above.
2. Draw a plan for your battery tester. Your plan should include a diagram of the materials you intend to use and a plan for making sure your tester works before you use it.
3. After you have drawn your plan, get the materials you need. Then build your tester. Label each part of your tester.
4. Test your battery tester by using the D-cell battery labeled *Live*. If your setup does not work, draw up a new design, build it, and test it. Change it until you have a design that works.
5. When you have a tester that works, use it to test the two batteries labeled *A* and *B*. Describe what your tester does for each battery, and write a conclusion about whether battery *A* and battery *B* are live or dead.
6. Compare your battery tester and your results with another team's. How are your testers alike? How are they different? Do both testers do the job they are supposed to do?

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Invent a Battery Tester

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, 3 D-cell batteries (2 live and 1 dead), flashlight bulb, masking tape, magnetic compass, sheet of cardboard, several strands of insulated wire with ends stripped, bar magnet

Time 15 minutes

Suggested Grouping pairs

Inquiry Skills plan and conduct an experiment, observe, record

Preparation Hints Use tape to label one live battery *Live*. Label the dead battery *A* and the other live battery *B*.

Introduce the Task Explain to students that they will invent a simple tester for a battery. Point out that a well-designed tester will do one thing if the battery is live (still has voltage in it) and another thing if the battery is dead. Ask students to think about how they will know before they use them if their testers will work. Point out to students that they may or may not use all the materials provided.

Promote Discussion Ask partners to share their setups with the class. Discuss some ways in which the setups are different. Ask: **Why was it important to use a live battery while building the tester and before using it to test other batteries?** Ask students to think about which physical senses the testers rely on. Ask: **How could you design a battery tester for someone who cannot see?**

Scoring Rubric

Performance Indicators

_____ Draws a plan before building a tester.

_____ Builds a tester that performs differently with a dead battery than with a live battery.

_____ Builds a tester that correctly identifies battery *A* as dead and battery *B* as live.

_____ Describes the design of a workable tester.

Observations and Rubric Score

3 2 1 0

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Name _____

Date _____

Chapter Assessment

Sound and Light

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A back-and-forth movement of matter	**A.** frequency
____	**2.** The loudness of a sound	**B.** opaque
____	**3.** The bouncing of light off a surface	**C.** pitch
____	**4.** Not letting light pass through	**D.** reflection
____	**5.** How high or low a sound is	**E.** refraction
____	**6.** The number of vibrations per second of a sound	**F.** translucent
____	**7.** Letting some light pass through	**G.** vibration
____	**8.** The bending of light as it moves from one material to another	**H.** volume

Science Concepts

Write the letter of the best choice.

____ **9.** Which surface would bounce back almost all the light waves that hit it?

A. clear plastic
B. frosted glass
C. mirror
D. water

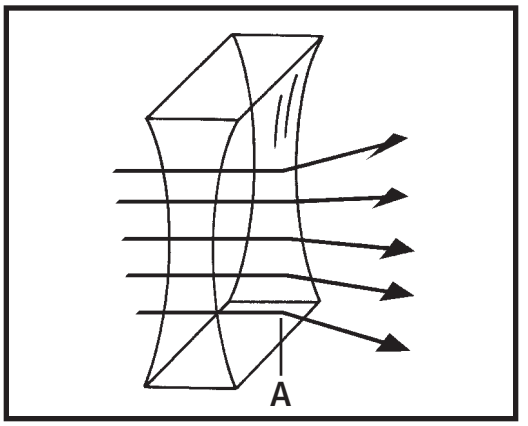
____ **10.** What do waves **not** transmit?

F. energy
G. light
H. matter
J. sound

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Name _____

Use the picture to answer questions 11–12.



____ **11.** What type of lens is shown?

A. concave
B. convex
C. opaque
D. translucent

____ **12.** What happens at point A?

F. compression
G. magnification
H. reflection
J. refraction

____ **13.** Sophia shouts down a well and hears an echo. What causes the echo?

A. Sound is absorbed at a surface.
B. Sound is reflected from a surface.
C. The frequency of sound vibrations increases.
D. The frequency of sound vibrations decreases.

____ **14.** Teresa is making a bar graph to show how quickly sound waves travel through different materials. Which material will have the shortest bar on her graph?

F. cold air
G. steel
H. warm air
J. water

____ **15.** How are X rays different from radio waves?

A. X rays have higher energy.
B. Radio waves have higher frequencies.
C. X rays pass through matter more slowly.
D. Radio waves cannot travel through space.

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Name _____

___ **16.** Javier has tightened a string on his guitar. What effect will this have?

F. The pitch of the string will be lower.

G. The string will vibrate more slowly.

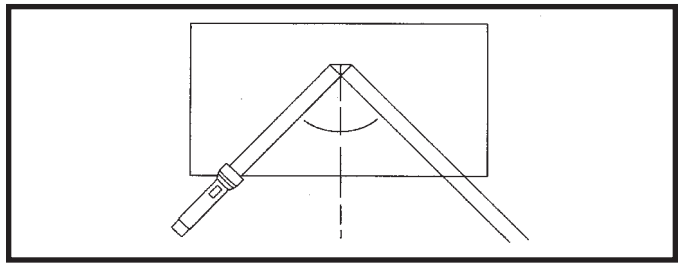
H. The string will make a softer sound.

J. The pitch of the string will be higher.

Inquiry Skills

17. Mike put two nails on a sponge. Nail A is longer than Nail B. Mike will tap on each nail to produce a sound. **Predict** how the pitches of the sounds will differ.

18. Study the following diagram. **Predict** what would happen to the angle of reflection if you increased the angle of incidence. **Design an experiment** to test your prediction.



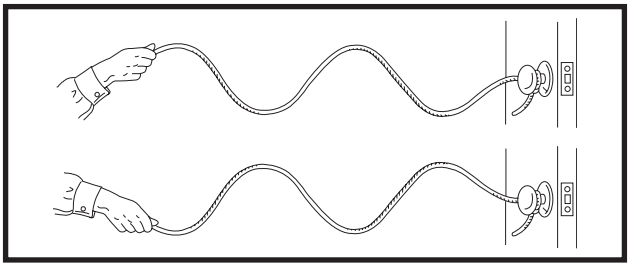
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Name _____

Critical Thinking

19. Suppose you have just returned from a sunny day at the beach. You're hungry from playing in the waves in the ocean, so you warm up some leftover roast beef in the microwave. While you wait for your food, you turn on the kitchen radio. Tell how many kinds of waves were present in the events just described.

20. The pictures below show a rope that is tied to a doorknob. A person is moving the rope to produce a wave.



Part A What type of wave moves along the rope? Explain.

Part B Which travels like the wave on the rope: sound waves or light waves? Explain.

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Name _____

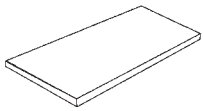
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Performance Assessment

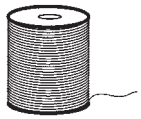
Student Task

Making Sounds

Materials



board



steel wire, 1 m long



screw



screw eye



pliers



screwdriver

Procedure

1. Place the board on a table, and partially drive in the screw at one end of the flat surface. Twist one end of the wire around the screw.
2. Partially drive in the screw eye at the other end of the board. Give it only a couple of turns.
3. Put the free end of the wire through the screw eye. Use the pliers to pull it just tight enough to straighten it out. Twist it around the screw eye.
4. Snap the wire by pulling it to one side and letting it go. Notice the pitch of the sound. Record your observations.
5. Use the pliers to turn the screw eye farther into the board two turns to tighten the wire. Snap the wire again.
6. Notice and record the difference in pitch as the wire is tightened.
7. Repeat Steps 5 and 6 two more times. Compare your results with those of other groups.

Screw Eye—Number of Turns	Observed Pitch
Initial position	
Initial position plus 2 turns	
Initial position plus 4 turns	
Initial position plus 6 turns	

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Making Sounds

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, wooden board, steel wire (1 m long), 1 screw (#10, pan head), 1 screw eye, pliers, screwdriver

Time 30 minutes

Suggested Grouping groups of two to four students

Inquiry Skills experiment, observe, draw conclusions

Preparation Hints You may want to demonstrate how to put screws and screw eyes into the board and how to attach wire to the screw and screw eye. Alternatively, you may wish to conduct this activity as a demonstration and have students record their observations.

Introduce the Task Ask students what causes sound. (a vibrating object) Then ask students to define pitch. Tell students that they will make a wire vibrate to produce a sound. They will then change the pitch of the sound. Remind them to pay attention to what they do and what they hear. **Caution:** Do not allow students to tighten the wire to the breaking point. Ask students to be quiet during this activity so all workers can hear the sounds they are making.

Promote Discussion Ask students to describe the sounds they made on the first snap. Then ask them what happened on each subsequent snap as they tightened the wire. Support the discussion by asking students to write a paragraph about what happened as they progressed through the exercise.

Scoring Rubric

Performance Indicators

_____ Follows written procedure and works cooperatively with partners.

_____ Makes careful observations and records data in the table.

_____ Compares results with those of other groups.

_____ Concludes that the pitch produced by a vibrating wire can be changed and that the pitch rises as the tension on the string increases.

Observations and Rubric Score

3	2	1	0

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Name _____

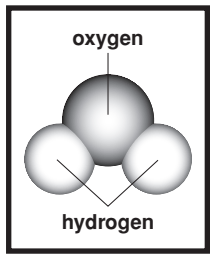
Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** Which is an example of matter?
- **A.** electricity
- **B.** heat
- **C.** light
- **D.** water

____ **2.** What does this model represent?



- **F.** atom
- **G.** element
- **H.** molecule
- **J.** solution

____ **3.** Which is an element?
- **A.** carbon dioxide
- **B.** hydrogen peroxide
- **C.** iron
- **D.** rust

____ **4.** Sasha measures the volume of a cube of aluminum and a cube of wood. Both are 1 cm on each side. Then she measures the mass of each cube. The aluminum has a mass of 2.7 g, and the wood has a mass of 0.72 g. What property is Sasha comparing?
- **F.** combustibility
- **G.** density
- **H.** melting point
- **J.** state of matter

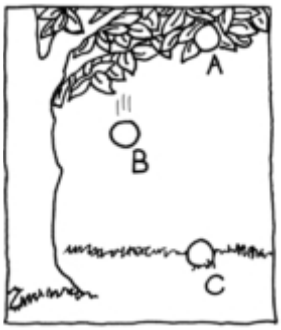
____ **5.** Two substances are involved in a chemical change. Which statement describes what is true after the change?
- **A.** A new substance has formed.
- **B.** The two substances formed a solution.
- **C.** The two substances can be separated again using a magnet.
- **D.** The physical properties of the two substances have not changed.

____ **6.** Which is a chemical property?
- **F.** boiling point
- **G.** density
- **H.** melting point
- **J.** reactivity

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Name _____

___ **7.** Which statement best describes the energy in this picture?



A. Orange C has more energy than Orange A.
B. Orange A has more potential energy than Orange C.
C. Oranges A, B, and C all have the same amount of kinetic energy.
D. Orange B has more chemical (food) energy than either of the other oranges.

___ **8.** Which of the following does **not** possess kinetic energy?
F. a pitcher winding up for a pitch
G. a swinging baseball bat
H. a ball caught in a catcher's mitt
J. a baseball moving toward center field

___ **9.** Which is an example of electric energy?
A. ice cream melting in the sun
B. music made by an electric guitar
C. movements of a battery-powered toy
D. energy of moving electrons lighting a bulb

___ **10.** A car engine burns gasoline. The burning gasoline moves a series of parts that end up turning the wheels. What kind of energy transfer is this?
F. chemical to electrical
G. chemical to mechanical
H. electrical to mechanical
J. mechanical to heat

___ **11.** Which is **not** a method of heat transfer?
A. conduction
B. convection
C. insulation
D. radiation

___ **12.** What will you experience if you grab the hot handle of a pot on the stove?
F. conduction
G. convection
H. radiation
J. reflection

___ **13.** Which of these energy resources is renewable?
A. coal
B. natural gas
C. oil
D. sunlight

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Name _____

___ **14.** Which is an advantage of switching to renewable energy resources instead of using nonrenewable fossil fuels?

F. They cost less to use than fossil fuels.
G. The same resources work all over the country.
H. They are replaced naturally and cannot be used up.
J. The same resources can run cars and trucks, as well as energy stations.

___ **15.** Armin spilled a box of paper clips behind a wooden shelf. He wrapped a long piece of wire around a steel rod. He hooked the wire up to a battery and then used the rod to pick up the paper clips. What did Armin make?

A. electric insulator
B. electric motor
C. electromagnet
D. electroscope

___ **16.** What causes static electricity?

F. buildup of charges on an object
G. electricity from an electric clothes dryer
H. chemical energy from an electric battery
J. charges produced when two substances combine

___ **17.** When you turn on a lamp, how does electric energy change?

A. to kinetic energy
B. to light energy
C. to chemical energy
D. to potential energy

___ **18.** Which electric appliance uses the least energy when used for ten minutes?

F. 1500-watt burner
G. 1350-watt skillet
H. 2700-watt oven
J. 1000-watt microwave oven

___ **19.** You should never use a metal fork to take bread out of an electric toaster. After unplugging the toaster, you can use special toast tongs to safely remove stuck bread. Which material would be safest for toast tongs?

A. aluminum
B. copper
C. steel
D. wood

___ **20.** How would you describe the pitch of a violin string that is vibrating very quickly?

F. high
G. loud
H. low
J. soft

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Name _____

___ **21.** Solar flares are huge explosions on the sun that give off large amounts of energy from the electromagnetic spectrum. Which of the following would **not** be included in a scientist's description of a solar flare?

A. radio waves
B. sound waves
C. visible light
D. X rays

___ **22.** When Carmine the cat wants to be heard, he goes to a special place in the house where sound echoes. There he meows until his owners pay attention. Where is Carmine's special place?

F. in the shower stall
G. in a clothes closet
H. under a bedspread
J. behind thick curtains

___ **23.** Which statement about a convex lens is true?

A. It reflects light waves.
B. It brings light waves together.
C. It makes objects look smaller.
D. It spreads light waves apart.

___ **24.** A frontier family made a window by rubbing grease all over a thick piece of paper. When the paper was used as a window, it let in light, but the family could not see through it. Which word describes the greased paper?

F. opaque
G. reflective
H. translucent
J. transparent

Write the answer to each question.

25. Kevin is at the beach with his family. He opens a cooler that is filled with ice, but he forgets to close the lid. Summer sunlight shines on the ice. Explain what happens to the ice, and to the mass of the ice, after Kevin leaves the cooler lid open.

_____

_____

_____

_____

_____

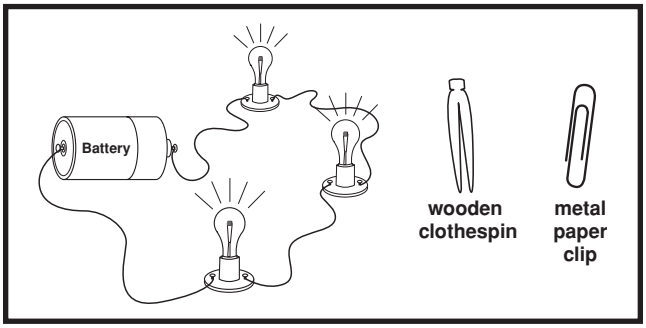
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Name _____

26. Two friends make a toy telephone by connecting two paper cups with string. How does this toy telephone work?

27. Use the diagram to answer the questions that follow.



Part A Predict what would happen to the circuit on the left if one of the bulbs burned out. Tell how you know.

Part B Which of the objects shown on the right could be used as a switch, and which could not? Explain.

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Name _____

28. In a baseboard heating system, each room has a heater near the floor, at the bottom of one wall. Baseboard heaters transfer thermal energy to the air around them. Then thermal energy spreads throughout the entire room from that one heater. It is important not to put anything above a baseboard heater. If you do, thermal energy will not reach all parts of the room.

Part A How is thermal energy transferred from the air around the baseboard heater to the air throughout the room?

_____

_____

_____

Part B What would happen if you placed a piece of furniture, such as a table, over a baseboard heater?

_____

_____

_____

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Name _____

Date _____

Chapter Assessment

Forces

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** A push or pull that causes changes in motion	**A.** force
____	**2.** A force that opposes motion	**B.** friction
____	**3.** The force of attraction that Earth exerts on objects	**C.** fulcrum
____	**4.** A wheel with a groove for a rope	**D.** gravity
____	**5.** A bar that makes it easier to move things	**E.** inclined plane
____	**6.** A ramp or sloping surface	**F.** lever
____	**7.** A device, made of only a few parts, that makes work easier	**G.** pulley
____	**8.** The balance point of a lever	**H.** simple machine

Science Concepts

Write the letter of the best choice.

____ **9.** What is the purpose of a simple machine?

A. to reduce work
B. to increase friction
C. to make work easier
D. to increase buoyancy

____ **10.** In which of these situations is work done?

F. Juan pushes against a brick wall.
G. Sean throws a football 20 yards.
H. Maria holds a book in her hands.
J. Marcus thinks of an essay topic.

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Name _____

___ **11.** A batter hits a baseball, sending it soaring into the air. Which term best describes the forces on the moving ball?

A. balanced
B. combined
C. simple
D. unbalanced

___ **12.** Two arm wrestlers exert a force on each other's hands, and the hands don't move. Which term describes the forces?

F. balanced
G. strong
H. unbalanced
J. weak

___ **13.** Two boys push on a box, to the left. They each apply a force of 50 N. At the same time, a third boy pushes on the box, to the right, using a force of 50 N. What is the net force on the box?

A. 0 N
B. 50 N, to the right
C. 50 N, to the left
D. 100 N, to the right

___ **14.** What type of machine are a wedge, a chisel, and an axe?

F. compound machine
G. inclined plane
H. pulley
J. wheel-and-axle

___ **15.** Which is **not** a simple machine?

A. bicycle
B. doorknob
C. ramp
D. seesaw

___ **16.** Which force operates when you use a bar magnet to pick up paper clips?

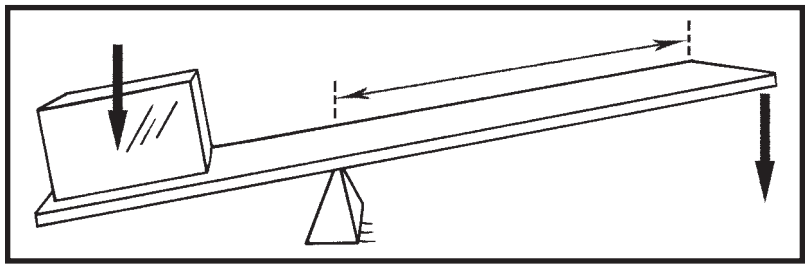
F. buoyancy
G. friction
H. gravity
J. magnetism

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Name _____

Inquiry Skills

17. Sarah is using the lever shown below. She will push down on the free end of the lever to raise the load.



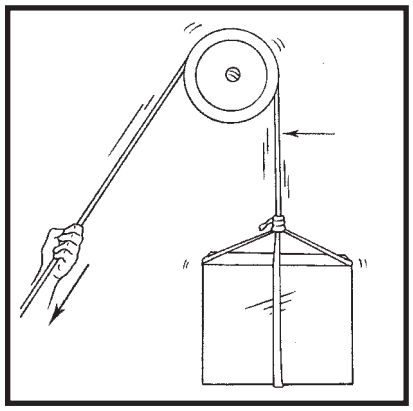
Compare the force she exerts with the load.

_____

_____

_____

18. Maxwell set up this pulley to raise the block. **Communicate** by telling how the pulley makes Maxwell's job easier.



_____

_____

_____

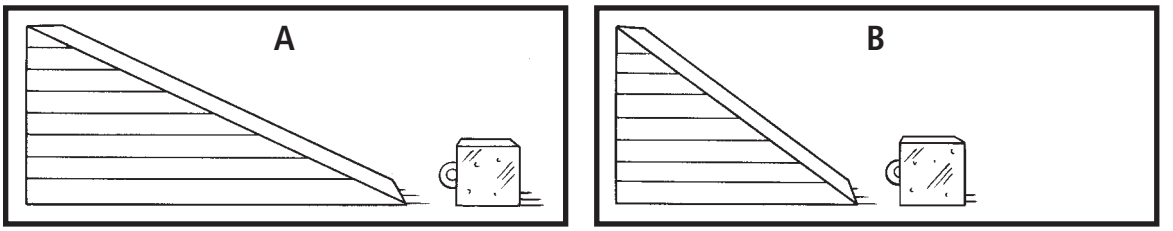
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Name _____

Critical Thinking

19. Ramp A is longer and less steep than Ramp B. Use these two ramps to explain the meaning of this statement: "Most machines make work easier by trading force for distance."



20. Alexander has been studying buoyancy. He placed an empty, sealed plastic bottle in water and recorded the results in his science journal.

Part A What did Alexander record in his journal?

Part B Alexander poured some sand in the bottle and placed the bottle back in the water. What happened to the bottle?

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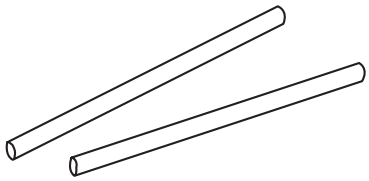
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Performance Assessment

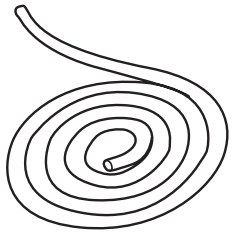
Student Task

Tug of War

Materials

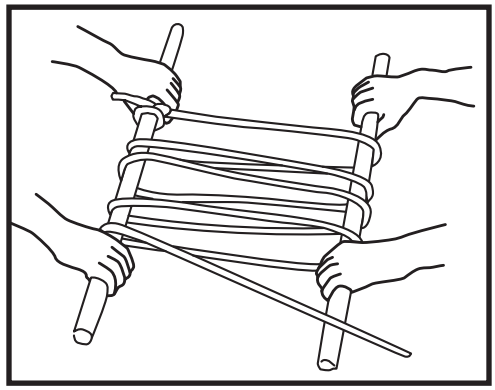


2 dowels 1 in. in diameter



rope

Procedure



1. Tie one end of the rope to a dowel.
2. Loop the rope around the two dowels four times, as shown in the diagram. There should be eight strands of rope between the dowels.
3. While two students try to hold the dowels apart, a third student should pull the free end of the rope to try to bring the dowels closer together. A referee should tell the other students to begin pulling and then to stop pulling when the two dowels are close together. How much effort did the student pulling the rope have to use? What purpose do the dowels serve?
4. Repeat Step 3. Hold the dowels the same distance apart as in Step 2. But loop the rope around the two dowels as many times as the rope will allow. Record the number of strands of rope that are between the dowels.
5. Compare your results with those of other groups. Draw a conclusion about the difference in effort expended by the single student in Steps 3 and 4.

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Tug of War

Performance Assessment

Teacher's Directions

Materials Performance Task sheet; 2 dowels (or broom handles), each about 36 in. long and 1 in. in diameter; 25 ft of rope (approximately $\frac{3}{4}$ in. in diameter)

Time 30 minutes

Suggested Grouping groups of four

Inquiry Skills make a model

Preparation Hints Cut the rope to pieces of the desired length. You may wish to tape the ends of the rope with electrical tape to prevent fraying. If synthetic rope is used, heating the end with a candle flame will melt the fibers and also prevent fraying. Sand the ends of the dowels or cover them with adhesive tape to prevent splintering.

Introduce the Task Ask students to explain the process of a tug of war. Have them predict which side will win—a side with one person or a side with two people. Ask if there is any way to give the side with one person an advantage. Lead the discussion to the concept of using simple machines to give an advantage. Tell students that they are going to make a pulley system that will allow one person to win a tug of war against two people pulling together. Model the procedure to construct the pulley system. Students must not tie the rope around anyone. Assign tasks—holding a dowel, pulling the rope, and being the referee. **Caution:** Instruct the students who pull the free end of the rope **not** to quickly overpower the students holding the dowels.

Promote Discussion Ask students to summarize the activity and their conclusions in a brief report that includes drawings of the two pulley systems. Use a chalkboard or an easel board to compile their ideas during a follow-up discussion.

Scoring Rubric

Performance Indicators

_____ Constructs apparatus as modeled and works cooperatively with other team members.

_____ Answers questions as asked during the procedure and compares results with those of other teams.

_____ Concludes that pulleys decrease the amount of effort needed to do a job and that the degree of reduction is related to the number of pulley loops.

_____ Summarizes the findings in a report with illustrations.

Observations and Rubric Score

3 **2** **1** **0**

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Name _____

Date _____

Chapter Assessment

Motion

Vocabulary

Match each term in Column B with its meaning in Column A.

	Column A	Column B
____	**1.** The distance an object travels in a certain time	**A.** acceleration
____	**2.** The tendency of an object to resist a change in motion	**B.** inertia
____	**3.** The distance an object travels in a certain direction in a certain time	**C.** speed
____	**4.** The rate at which an object's velocity changes	**D.** velocity

Science Concepts

Write the letter of the best choice.

____ **5.** A heavy ball and a light ball are rolling at the same speed on the same surface. Why will the heavy ball be harder to stop?

A. It has greater velocity.
B. It has greater momentum.
C. It experiences greater friction.
D. It has greater acceleration.

____ **6.** A marble rolls steadily at a speed of 1 m/sec in one direction for 2 minutes. What property of the marble changes?

F. acceleration
G. position
H. speed
J. velocity

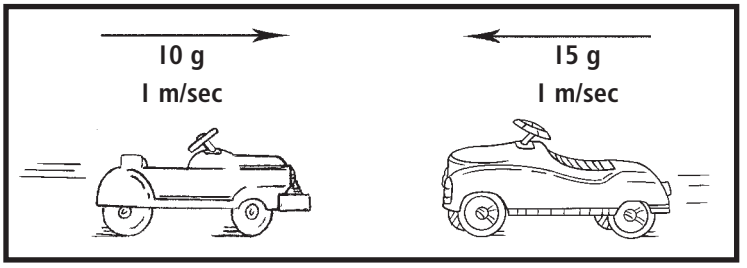
____ **7.** If the same force acts on each of the following objects, which will have the greatest acceleration?

A. a baseball
B. a football
C. a golf ball
D. a soccer ball

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Name _____

___ **8.** Which is the same about the two toy cars?



F. mass
G. momentum
H. speed
J. velocity

___ **9.** Chris jumps up and puts a basketball in the basket. What object pushes against Chris so he can jump?

A. the ball
B. the basket
C. the floor
D. the scoreboard

___ **10.** A car is stopped at a red light. The light turns green and the car starts accelerating 10 km/hr every second. What will its speed be at the end of 3 seconds?

F. 3 km/hr
G. 13 km/hr
H. 30 km/hr
J. 300 km/hr

___ **11.** As you walk, your feet push against the ground. At the same time, the ground pushes against your feet. Which of the following explains this?

A. momentum
B. Newton's first law
C. Newton's second law
D. Newton's third law

___ **12.** A train is traveling on a curved track at a constant speed. Why is the train accelerating?

F. The train travels faster around a curved track.
G. The direction of the train is constantly changing.
H. The train's size will eventually slow it down.
J. The clockwise direction of the train is constant.

___ **13.** Which of these can you probably pick up by exerting just 1 newton of force?

A. apple
B. bicycle
C. car
D. elephant

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Name _____

___ **14.** Why do astronauts "float" while they are in orbit?

F. There is no gravity in space.
G. Inertia and gravity are balanced in orbit.
H. The space shuttle escapes Earth's gravity.
J. Earth's gravity and the moon's gravity are balanced in orbit.

___ **15.** Suppose you are watching a football game from a seat near the top of the stadium. Which term describes your position and all the things around you?

A. gravity
B. inertia
C. motion
D. frame of reference

___ **16.** A truck, a car, a motorcycle, and a train are all moving at the same speed. Which has the most momentum?

F. car
G. motocycle
H. train
J. truck

Inquiry Skills

17. Corey has tied an object to a string and is whirling it around in circles over his head. Use one of Newton's laws to **predict** what will happen to the object if Corey lets go.

_____

_____

_____

_____

_____

18. Nani and Kim are testing their derby cars to find out whose car rolls faster. Nani lets her car roll down a sandpaper-covered ramp. Kim pushes her car down a smooth plastic ramp. **Identify the variables** in this test, and tell which variables you would **control** in order to determine which car design results in greater speed.

_____

_____

_____

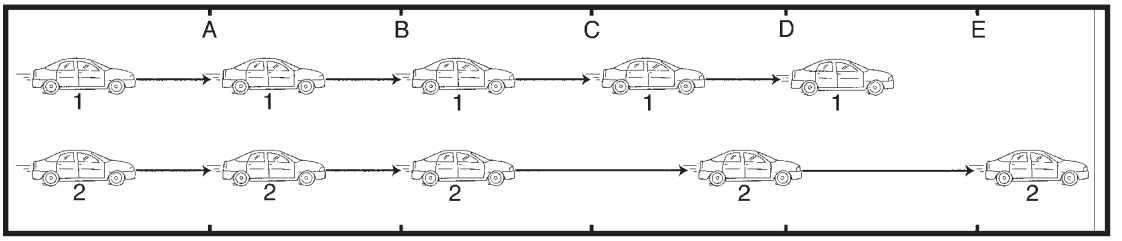
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Name _____

Critical Thinking

19. Compare and contrast the velocity and acceleration of the two cars. Then explain what must have happened to Car 2 at Point B.



20. Sarah hits a softball so hard that it travels far beyond the reach of any outfielders.

Part A Use Newton's third law of motion to describe what happens as Sarah hits the ball.

Part B According to Newton's first law of motion, what would Sarah's softball do if there were no forces acting on it after she hit it? What two forces keep Sarah's softball from doing this?

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Name _____

Date _____

Performance Assessment

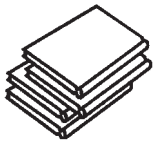
Student Task

Find Speed

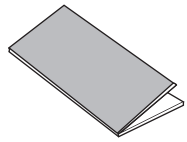
Materials



paper and ruler



books



game board



meterstick



masking tape



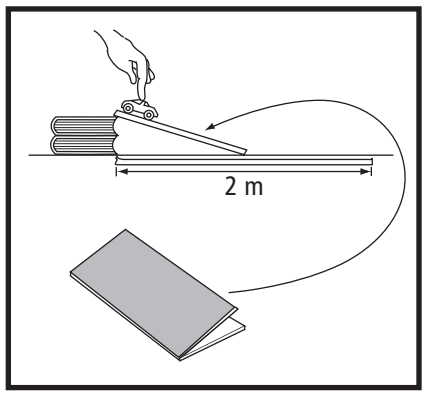
toy car



stopwatch

Procedure

1. Read the whole procedure before starting Step 2.
2. On a sheet of paper, create a table to record data for this activity. Use information from the procedure to figure out the columns and rows you need in your table. Use the ruler to make your table neat.
3. Set up the equipment as shown in the diagram. Use a strip of masking tape to mark the 2-m line.
4. Hold the car at the top of the board, and then let it go. Use a stopwatch to time how long in seconds the car takes to reach the 2-m line. Round the time to the nearest second. Record the time in your data table, in a place for *2 books*, *Trial 1*.
5. Repeat Step 4 for *2 books, Trials 2 and 3*.
6. Find the average time the car takes to reach the 2-m mark. Record the average time in the table.
7. Use the average time and the distance to find the average speed of the car.
8. Hypothesize how raising the ramp will affect the speed of the car. Then test your hypothesis by repeating Steps 4–7, using four books.



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Find Speed

Performance Assessment

Teacher's Directions

Materials Performance Task sheet, paper, 30-cm ruler, 4–6 books, single-fold game board, meterstick, masking tape, small toy car, stopwatch

Time 40 minutes

Suggested Grouping pairs

Inquiry Skills measure, observe, record, hypothesize

Preparation Hints Test the available equipment, and adjust the number of books, if necessary, to obtain clear results.

Introduce the Task Ask students, **What measurements do you need to find speed?** Explain that students will find the average speed of a toy car. First, they will create a data table. The information they need to do this is in the procedure. Once their tables are ready, they will set up the equipment and make measurements. **Why is it important to make a measurement more than once?** (to reduce errors) Point out that most stopwatches record seconds and hundredths of a second. To simplify finding the average, students should record times in whole seconds. Tell them to round down when the stopwatch reads 1–49 hundredths, and to round up when it reads 50–99 hundredths.

Promote Discussion **How did it help to have your data recorded in a table? Was it easier to make the calculations than it would have been if you'd written down the data randomly?** Ask students to share their hypotheses and to say whether their results supported their hypotheses. **What could you learn from further investigations using these materials?**

Scoring Rubric

Performance Indicators

_____ Makes a data table that includes columns (or rows) for *2 books* and *4 books* and rows (or columns) for three trials, an average, and a speed calculation.

_____ Fills in all cells in the data table and performs accurate calculations.

_____ States a hypothesis.

_____ Reaches a conclusion that is related to the hypothesis and is based on the data collected.

Observations and Rubric Score

3	2	1	0

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Name _____

Date _____

Unit Assessment

Write the letter of the best choice.

____ **1.** Which is **not** a force?
- **A.** friction
- **B.** gravity
- **C.** heat
- **D.** magnetism

____ **2.** Which is an example of acceleration?
- **F.** a runner moving at 12 km/hr for 1 hour
- **G.** a car traveling at 90 km/hr for 60 kilometers
- **H.** a skateboarder rolling at 1 m/sec for 20 seconds
- **J.** a scooter slowing from 10 km/hr to 0 km/hr in 2 seconds

____ **3.** Toni and Tammi both start sledding at the top of a hill after some snow has melted. Toni slides quickly downhill. Tammi stays in place. Which force is the same on both girls?
- **A.** friction
- **B.** gravity
- **C.** lift
- **D.** thrust

____ **4.** Sarah is climbing a wall in a rock-climbing gym. Her hands are sweaty, so she puts chalk dust on them to get a better grip. What force does Sarah increase by using the chalk dust?
- **F.** buoyant force
- **G.** friction
- **H.** gravity
- **J.** net force

____ **5.** Which factor would give a planet a greater gravitational pull?
- **A.** more mass
- **B.** faster speed
- **C.** higher velocity
- **D.** greater distance

____ **6.** What always results from an unbalanced force?
- **F.** a net force of zero
- **G.** a change in motion
- **H.** an increase in speed
- **J.** a change of direction

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Name _____

___ **7.** Which is an example of balanced forces?
- **A.** children swinging
- **B.** a child climbing up a ladder
- **C.** children going up and down on a seesaw
- **D.** a tug-of-war in which the rope does not move

___ **8.** Terrence pushes a box with a force of 80 N to the right. His friend Carter is pushing the box in the same direction, with a force of 60 N. What is the net force on the box?
- **F.** 0 N
- **G.** 20 N
- **H.** –20 N
- **J.** 140 N

___ **9.** Marvin fills a dishpan to the brim with water. He places a toy boat that weighs 9 N on the water, and water with a weight of 5 N spills out. What can you conclude from this information?
- **A.** The boat sinks.
- **B.** The boat floats.
- **C.** The boat rolls over.
- **D.** The boat sinks but then rises.

___ **10.** Which phrase correctly describes what most simple machines do?
- **F.** reduce the amount of work
- **G.** change the net force on an object to zero
- **H.** increase the total energy put into a system
- **J.** reduce the amount of force needed to do work

___ **11.** Which product equals work?
- **A.** force × friction
- **B.** force × distance
- **C.** mass × velocity
- **D.** mass × mass

___ **12.** Which is a compound machine?
- **F.** doorknob
- **G.** lawn mower
- **H.** pulley
- **J.** ramp

___ **13.** What is the pivot point of a lever called?
- **A.** bar
- **B.** fulcrum
- **C.** wedge
- **D.** wheel

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Name _____

___ **14.** A croquet ball lands in a pond. Buoyant force pushes it up with a force of +4.0 N. Gravity pulls it down with a force of –4.5 N. What is the net force on the croquet ball?

F. 0.5 N
G. –0.5 N
H. 8.5 N
J. –8.5 N

___ **15.** Which statement about astronauts orbiting Earth is correct?

A. They are weightless.
B. They are accelerating.
C. The net force on them is zero.
D. The moon's gravity keeps them in orbit.

___ **16.** A volleyball is falling toward Diego. He hits it with his fist, and it moves back toward the other team. What is the ball's change of direction an example of?

F. constant velocity
G. Newton's first law
H. Newton's second law
J. Newton's third law

___ **17.** A car travels 96 km in 2 hours. What is its speed?

A. 48 km/hr
B. 94 km/hr
C. 98 km/hr
D. 192 km/hr

___ **18.** Hannah rides her bicycle at 24 km/hr along a straight road for 1 hour. Tanya rides her bicycle at 24 km/hr around an oval track for 1 hour. What is different about their motion?

F. their speed
G. their acceleration
H. the total distance they ride
J. the friction they produce

___ **19.** Which force causes a teardrop to roll down someone's cheek?

A. buoyancy
B. friction
C. gravity
D. magnetism

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Name _____

___ **20.** Suppose you are traveling in a car and you apply the brakes to slow it down. Which of the following is true?

F. The forces on the car become balanced.
G. The forces on the car become unbalanced.
H. The forces on the car are all zero.
J. The momentum of the car increases.

___ **21.** Which would have the **least** friction?

A. socks on carpet
B. a hockey puck on ice
C. a car tire on concrete
D. wood on wood

___ **22.** If you push a chair with your hand, what is the force from your hand called?

F. action force
G. inertia
H. momentum
J. reaction force

___ **23.** If Earth pulls on a box with a force of 10 N, how much force does the box exert on Earth?

A. 0 N
B. 5 N
C. 10 N
D. −10 N

___ **24.** Roy hits a baseball with a bat, and the ball flies through the air. Which statement is true?

F. The forces on the baseball were balanced.
G. The ball hit the bat when the bat hit the ball.
H. The ball accelerated during the hit, but the bat did not.
J. The less force Roy uses, the more the ball accelerates.

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Name _____

Write the answer to each question.

25. Jupiter has the most mass of all the planets in our solar system. In 1994, a comet named Shoemaker-Levy 9 got so close to the planet Jupiter that it crashed into it instead of passing by or going into orbit around it. Use your understanding of gravitational force to explain why the comet crashed into Jupiter (not one of the other planets), and why its nearness to Jupiter made it crash.

26. Use one of the laws of motion to explain why car crashes are more dangerous than trip-and-fall accidents.

27. Can a car be driven at a constant speed and have a changing velocity? Explain.

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Name _____

28. Chris, Billie, and Dana are bowling. Each child rolls one ball straight at the pins. The data table shows the mass and velocity of their rolls.

Bowler	Mass of ball (kg)	Velocity (m/s)	Momentum
Chris	5	6	
Billie	4	8	
Dana	3	9	

Part A The ball with the most momentum knocks over the most pins. Use the equation **momentum = mass × velocity** to complete the data table. Which player's ball had the most momentum?

_____

Part B Some bowlers suggest that in order to knock over the most pins, you should use the most massive ball you can. Can the data in the table help you decide whether this is good advice? If not, can you think of a better way to collect the data? Remember what you have learned about conducting experiments and controlling variables as you answer these questions.

_____

_____

_____

_____

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_____

_____

_____

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Name _____
Date _____

Chapter Assessment

Getting Ready for Science

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
E	1. A tool that makes objects appear larger	A. balance
A	2. A tool that measures the amount of matter in an object	B. experiment
D	3. A procedure that is carried out to gather data about an object or event	C. inquiry
C	4. An organized way to answer questions by gathering information	D. investigation
B	5. A procedure that is carried out under controlled conditions to test a hypothesis	E. microscope
F	6. The general steps scientists follow to test hypotheses	F. scientific method

Science Concepts 5 points each

Write the letter of the best answer.

B 7. Which tool led to the discovery of bacteria and other tiny things living in water?
A. forceps C. thermometer
B. microscope D. spring scale

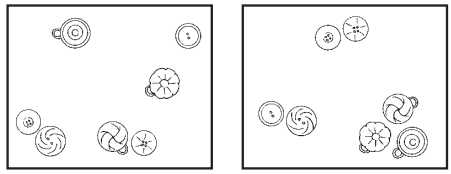
F 8. Blaine wants to measure the mass of a rock sample. Which tool should he use?
F. balance H. spring scale
G. measuring cup J. tape measure

C 9. Which science tool does **not** measure anything?
A. balance C. forceps
B. dropper D. thermometer

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Name _____

F 10. The picture shows a group of buttons before and after a student worked with them. What inquiry skill did the student use?



F. classify H. measure
G. infer J. predict

C 11. Which is an example of an inquiry about dogs?
A. Carla teaches her dog a new trick.
B. Martha goes to the library and reads a funny story about a dog.
C. Judith gives her dog two different foods at once and observes what it does.
D. Tish goes to the animal shelter to ask what dogs are available to adopt.

H 12. A paved road runs past one side of Jackson's house, and a dirt road runs past the other side. Many people ride bicycles past his house. Jackson notices that the bicycles on the dirt road have wide tires, and the bicycles on the paved road have narrow tires. Jackson thinks that wide tires must be easier to use on the dirt road. What process did Jackson use to figure this out?
F. classify H. infer
G. communicate J. measure

B 13. A team of students is building a vehicle for a competition. They do not yet know how they want to build it or what materials they need. What can the team do to save time and money before they start to build their vehicle?
A. interpret data C. conduct an experiment
B. plan and build a model D. gather and display data

G 14. Which measurement tool would give different results on the International Space Station than on Earth, even when measuring the same object?
F. ruler H. tape measure
G. spring scale J. thermometer

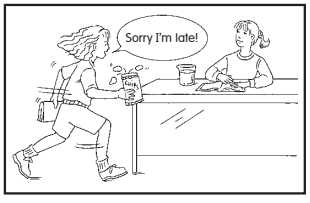
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Name _____

C 15. Which is usually the first step in the scientific method?
A. conduct an experiment C. observe and ask questions
B. form a hypothesis D. communicate results

G 16. Armin did an experiment to test whether objects dropped from a second-floor window and from a first-floor window hit the ground at the same time. His friend Michelle says Armin's results are wrong. What should they do to settle this disagreement?
F. Argue about it until one of them gives up.
G. Repeat the experiment and compare the results.
H. Change Armin's hypothesis so it matches the results.
J. Ask their friends to vote on whether the results are right.

B 17. The cartoon shows a student coming in for a science experiment. What is the next thing that the student who is talking should do?



A. eat snack, wash hands
B. skip snack, tie back hair
C. eat snack, drink water in beaker
D. skip reading instructions, start experiment

H 18. A student does an experiment and discovers that sugar water takes longer to freeze than plain water. What is another question the student could investigate that is based on the results of this experiment?
F. Does sugar water taste better than plain water?
G. Does sugar water evaporate more quickly than plain water?
H. Does sugar water freeze at a lower temperature than plain water?
J. Does water have the same volume before and after sugar is added?

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Critical Thinking 8 points each

19. Juan is planning to study earthworms. Read his plan and answer the question that follows.

Do earthworms like dark or light areas? by Juan
Hypothesis: Given a choice, a worm will crawl into the light.
Materials: 5 earthworms, damp paper towel, black paper, flashlight
What I plan to do:
1. Make a data table.
2. Place earthworm on paper towel.
3. Hold black paper so it covers half the towel.
4. Shine flashlight on paper so towel is half dark and half light.
5. Observe worm for 3 minutes.
6. Record in data table what worm did.
7. Repeat Steps 2–6 with other 4 worms.
8. Compare results to hypothesis and form conclusion.

Is Juan planning an experiment or a simple investigation? Explain.

Possible answer: Juan is planning an experiment. In an experiment, you test a hypothesis. An experiment has more steps than a simple investigation.

20. A student tested the hypothesis that ice melts more slowly in a glass tumbler than it does in a plastic or paper cup. Study the data, and then answer the questions that follow.

Type of Cup	Number of Ice Cubes	Time to Melt (min)
med. paper cup	2	25
sm. plastic cup with lid	3	75
lg. glass tumbler	5	90

Part A List all the variables you can find in this experiment.

Each cup is made of something different and is a different size. Only one cup has a lid. The number of ice cubes is different.

Part B Can the student conclude from the data that ice melts more slowly in a glass tumbler than in the other kinds of cups? Explain.

No. To find out if the material of the cup makes a difference, the student has to keep all the other variables the same and have only the variable "type of cup" different for each part of the experiment.

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Unit A • Chapter 1

Name _____
Date _____

Chapter Assessment

Cells to Body Systems

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
F	1. A group of tissues that work together to perform a certain function	A. circulatory system
B	2. The system that turns food into nutrients that body cells need	B. digestive system
A	3. The heart, blood vessels, and blood	C. tissue
G	4. A group of organs and tissues that exchange oxygen and carbon dioxide	D. muscular system
H	5. The bones that give the body structure	E. nervous system
D	6. The muscles and tendons that move bones	F. organ
E	7. The system that directs activities of all other body systems	G. respiratory system
C	8. A group of cells that work together to perform a certain function	H. skeletal system

Science Concepts 4 points each

Write the letter of the best choice.

A 9. What is the basic unit of structure and function of all living things?
- A. cell
- B. cork
- C. organ
- D. tissue

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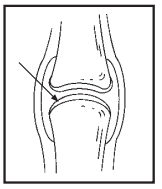
H 10. Which organelle directs a cell's activities?
- F. cytoplasm
- G. mitochondrion
- H. nucleus
- J. vacuole

A 11. Which is found only in plant cells?
- A. cell wall
- B. chromosomes
- C. cytoplasm
- D. vacuoles

F 12. Which type of tissue forms bones, tendons, and ligaments?
- F. connective tissue
- G. epithelial tissue
- H. muscle tissue
- J. nerve tissue

A 13. What is the liquid part of blood called?
- A. plasma
- B. platelets
- C. red blood cells
- D. white blood cells

Use the diagram to answer Questions 14–15.



F 14. What structure is shown in the diagram?
- F. joint
- G. muscle
- H. nerve
- J. synapse

A 15. What type of tissue does the arrow point to?
- A. connective tissue
- B. epithelial tissue
- C. muscle tissue
- D. nerve tissue

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J 16. Which type of muscle tissue forms the walls of the heart?
- F. skeletal muscle
- G. voluntary muscle
- H. smooth muscle
- J. involuntary muscle

Inquiry Skills 8 points each

17. **Compare** the organelles in a cell to organs in a human body. How are organelles similar to organs?

Possible answer: Both organelles and organs have specific functions to perform. Organelles do their jobs within cells, while organs carry out their functions for the body as a whole.

18. Nick read that the skin is the largest organ of the human body. What could Nick **infer** about the number and kinds of tissues that make up the skin?

Possible answer: Because the skin is the body's largest organ and carries out multiple functions, such as protection, sensation, and excretion, Nick can infer that the skin contains most or all of the basic tissue types: epithelial tissue, connective tissue, muscle tissue, and nerve tissue.

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Name _____

Critical Thinking 10 points each

19. Why are cells specialized to carry out specific functions?

Possible answer: It is more efficient to have cells perform only specific functions. This way, organisms can become very complex.

20. Exchange of oxygen and carbon dioxide occurs in the alveoli of the lungs. In certain diseases of the lungs, fluid or other material can build up in the alveoli.

Part A How would the buildup of material inside the alveoli affect lung function?

Possible answer: Gas exchange in the lungs occurs across the very thin alveolar walls. Fluid or other materials in the lungs would interfere with gas exchange. This would affect the levels of oxygen and carbon dioxide in the body.

Part B What symptoms might a person who has this problem exhibit?

Possible answer: If the buildup of material was severe, the person might be short of breath. The buildup of carbon dioxide in the blood might cause other problems.

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Unit A • Chapter 2

Name _____
Date _____

Chapter Assessment

Classifying Living Things

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
D	1. An animal with a backbone	A. classification
C	2. Largest group for classifying living things	B. species
B	3. Smallest group for classifying living things	C. kingdom
A	4. Organizing things into groups based on how the things are alike	D. vertebrate

Science Concepts 4 points each

Write the letter of the best choice.

A 5. Which of these is a kingdom?
A. fungi C. reptiles
B. invertebrates D. vertebrates

H 6. Which three groups are in the correct order, from largest to smallest?
F. order, class, kingdom H. family, genus, species
G. family, phylum, genus J. kingdom, species, order

C 7. Which two animals are invertebrates?
A. snail and robin C. octopus and starfish
B. zebra fish and zebra D. angelfish and butterfly

G 8. Which is a group of animals with no backbones?
F. fungi H. reptiles
G. invertebrates J. vertebrates

A 9. Which group has the greatest number of animal species?
A. invertebrates C. protists
B. mammals D. vertebrates

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Name _____

H 10. Within a kingdom, what is the largest grouping of organisms?
F. genus H. phylum
G. order J. species

C 11. Which two living things are most closely related?
A. moth and bird
B. clam and fish
C. ocelot and tiger
D. snake and starfish

H 12. What is the main difference between members of the plant kingdom and members of the animal kingdom?
F. Plants have stiff tubes; animals have backbones.
G. Animals have many cells; plants have only one cell.
H. Plants make their own food; animals eat other living things.
J. Animal cells have no nucleus; plants cells have a nucleus.

C 13. Which plant does **not** have tubes?
A. apple tree C. moss
B. fern D. pine tree

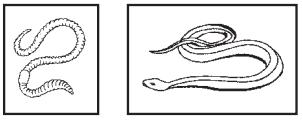
J 14. You see flowers and ferns close together in a garden flower bed. How do you know that the flowers and ferns are not part of the same plant?
F. Ferns grow on trees, not in the ground.
G. Flowers grow on trees, not in the ground.
H. Ferns make seeds in cones, not in flowers.
J. Flowers make seeds, but ferns make spores.

B 15. Which two organisms are most closely related?
A. *Panthera tigris* and *Felis pardalis*
B. *Canis domesticus* and *Canis lupus*
C. *Felis domesticus* and *Canis domesticus*
D. *Mustelus canis* and *Erythronium dens-canis*

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Name _____

J 16. Which statement about these animals is true?



F. Both are invertebrates because neither has legs.
G. The worm is an invertebrate because it has shiny skin.
H. Both are vertebrates because both have a head and a tail.
J. The snake is a vertebrate because it has a flexible backbone.

Inquiry Skills 8 points each

17. Compare and contrast the wings of a robin and the wings of a dragonfly. **Communicate** using the words *structure* and *function* in your answer.

Possible answer: A robin's wings and a dragonfly's wings are alike because they have the same function, flight. They are different because they have different structures, which means they are built differently.

18. A scientist finds a new life form. The life form is 2 m tall. It makes its own food. It has tubes that carry food and water through it. It reproduces by making seeds. **Classify** this life form as an animal, bacterium, fungus, plant, or protist. Then explain how you classified it.

The life form is a plant. Plants have many cells and make their own food. The description says it makes its own food. The description does not say that it has many cells, but it does give its size. Anything that is 2 m tall is made up of many cells.

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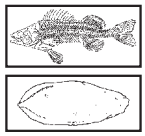
Name _____

Critical Thinking 10 points each

19. Sam collects trading cards of science fiction aliens. The aliens are from several different planets. Each alien has certain special powers. Some aliens eat other aliens, and some aliens run off electricity. Sam's friend asks if he has a certain card to trade. Sam does not know, because his cards are in a big, messy pile. How can Sam make his cards easier to find and trade? Describe at least one way Sam could do this, using the characteristics of the aliens.

Possible answer: Sam could classify his cards and sort them into groups. He could sort them first by the planets they are from, then by whether they gain energy from food or electricity, and finally by their special powers.

20. The diagrams show structures from inside two different animals, a fish and a cuttlefish. Both animals live in the water. Both structures have a similar function: to support the animal. One of these animals is an invertebrate, the other is a vertebrate.



Part A Which animal is a vertebrate, the fish or the cuttlefish? Explain.

The fish is the vertebrate. It has a backbone made up of many small bones, called vertebrae.

Part B A fish and a cuttlefish both have the word *fish* in their common names. Would a fish and a cuttlefish have the same word in their scientific names? Explain.

Possible answer: No, a fish and a cuttlefish would have different words in their scientific names. A fish and a cuttlefish are not closely related, because one is an invertebrate and the other is a vertebrate.

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Unit A • Chapter 3

Name _____
Date _____

Chapter Assessment

Plant Growth and Reproduction

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. A plant that has naked seeds	A. vascular tissue
F	2. A single reproductive cell that can grow into a new plant	B. phloem
B	3. Tissue that carries food from a plant's leaves to its cells	C. gymnosperm
H	4. To sprout	D. angiosperm
A	5. A material that supports a plant and conducts nutrients	E. xylem
G	6. Process by which plants make food	F. spore
E	7. Tissue that carries water and nutrients from the roots to every part of the plant	G. photosynthesis
D	8. A flowering plant, which has seeds protected by a fruit	H. germinate

Science Concepts 4 points each

Write the letter of the best choice.

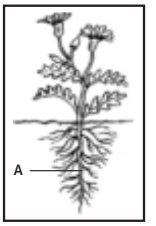
B 9. How do nutrients move through nonvascular plants?
A. along stems C. through leaves
B. from cell to cell D. through roots

G 10. What must happen to pollen grains for pollination to occur?
F. They must stick to an insect's body.
G. They must get to the stigma of a flower.
H. They must be carried by the wind.
J. They must become nectar.

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Name _____

A 11. What is one function of the plant part labeled A?
A. to anchor the plant
B. to make food for the plant
C. to protect the plant from insects
D. to transport food to the leaves



H 12. Which statement about vascular plants is **not** true?
F. They can grow to be quite large.
G. They have tissues that carry water and food.
H. They are much smaller than nonvascular plants.
J. They absorb water and nutrients through root hairs.

B 13. Katrina made a list of things that plants need for photosynthesis. Which of these does **not** belong on the list?
A. carbon dioxide
B. oxygen
C. sunlight
D. water

H 14. Which picture shows a nonvascular plant?

F. 
H. 
G. 
J. 

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Use the diagram to answer Questions 15 and 16.



C 15. On which structure does pollen collect?
A. I C. III
B. II D. IV

J 16. Which part of the plant develops into a fruit?
F. I H. III
G. II J. IV

Inquiry Skills 8 points each

17. **Compare** seeds with spores. Tell how they are alike and how they are different.
Possible answer: Both seeds and spores are reproductive structures. Both are parts of plants. When conditions are right, both can become new plants. A seed contains food that sustains the young plant until it can begin photosynthesis. A spore does not have a food supply.

18. Suppose you planted several flower seeds in a pot. You put the pot in a sunny place. You watered the seeds on the first day. After that, you didn't water them. **Infer** why the seeds never sprouted.
Possible answer: The seeds were in warm soil because the plant was placed in a sunny spot. However, the seeds were watered only once. They probably needed more water to germinate.

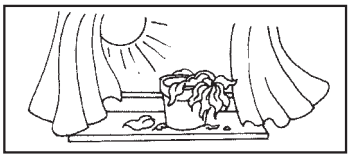
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Name _____

Critical Thinking 10 points each

19. Why do flowers produce many more pollen grains than egg cells?
Pollen grains are carried by the wind, water, or animals, so very few grains actually get to a flower. Plants produce more pollen grains because most of them are wasted.

20. Winston and his family went to visit his grandmother for a few days. When they got back, the plant sitting on the kitchen windowsill looked like this.



Part A What was wrong with the plant? How do you know?
The stem was drooping. This means the plant needed water.

Part B What could Winston do to help the plant?
Winston could water the plant. When the stem receives enough water, it will be able to support the plant.

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Unit A • Chapter 4

Name _____
Date _____

Chapter Assessment

Animal Growth and Heredity

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. Factor that contains the DNA code for a trait	A. chromosome
H	2. All the living and nonliving things that surround and affect an organism	B. dominant trait
E	3. A behavior that is passed from parents to offspring	C. gene
G	4. Process by which most cells divide	D. inherited trait
F	5. Stages that living things pass through as they grow and change	E. instinct
A	6. Threadlike structure in a cell nucleus	F. life cycle
D	7. Characteristic passed from parents to offspring	G. mitosis
B	8. A characteristic that appears even when there is only one factor present for it	H. environment

Science Concepts 4 points each

Write the letter of the best choice.

C 9. An egg hatches into a caterpillar, which eats, becomes a pupa, emerges as a moth, and lays eggs. What is this an example of?
- A. inherited trait
- B. learned behavior
- C. life cycle
- D. mitosis

G 10. A frog moves to a nearby pond because its own pond is drying up. What changed for the frog to cause it to move?
- F. its chromosomes
- G. its environment
- H. its inherited traits
- J. its instincts

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D 11. You get a sunburn. A week later, the dead skin peels off. What process formed the new skin underneath the peeling skin?
- A. asexual reproduction
- B. genetic inheritance
- C. meiosis
- D. regeneration

G 12. What do most body cells make when they go through cell division?
- F. gametes
- G. exact copies of themselves
- H. copies with half the chromosomes
- J. whatever kind of cell the body needs

D 13. What forms as a result of meiosis?
- A. zygotes
- B. new body cells for growth
- C. cells with identical chromosomes
- D. gametes with half the number of chromosomes

F 14. An arctic fox has white fur in winter to help it survive. What is this an example of?
- F. adaptation
- G. instinct
- H. mitosis
- J. learned behavior

C 15. Tippy the cat does many things. Which behavior is an instinct?
- A. ringing the doorbell
- B. meowing along with the radio
- C. sleeping more hours than he's awake
- D. running to the kitchen when a can is opened

G 16. Adam can roll his tongue. His younger brother Lee cannot. Which statement explains why?
- F. Adam can do it because he is older.
- G. Adam has a dominant factor for tongue-rolling.
- H. Lee can't because he hasn't practiced enough yet.
- J. Lee has a dominant and a recessive factor for tongue-rolling.

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Inquiry Skills 8 points each

17. Kelsey's parents both have attached earlobes—a recessive trait. They are expecting a baby boy. What can you **infer** about the likelihood that Kelsey's baby brother will have attached earlobes? Explain the reasons for your inference.

Kelsey's baby brother will have attached earlobes. For a recessive trait to show, a person has to inherit two of the same genes. Both parents must have two genes for attached earlobes, so neither one can give the baby a dominant gene for unattached earlobes.

18. You are asked to **observe** a mouse finding its way through a maze to a food treat. The second time the mouse runs the maze, it takes fewer wrong turns than the first time. The third time, it runs straight to the food, with no mistakes. Based on your observations, **infer** why instinct and learning are both needed for the mouse to run the maze.

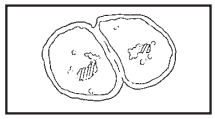
Possible answer: The instinct to eat makes the mouse search through the maze to find the food. Practice helps it to learn how to find the food more quickly each time it runs the maze.

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Name _____

Critical Thinking 10 points each

19. The diagram shows a type of bacterium reproducing. Name and describe this kind of reproduction, and tell what process is taking place while it happens.



This is asexual reproduction. In asexual reproduction, a one-celled organism reproduces through mitosis. There is no joining of cells from different parents.

20. Corn snakes have different skin types, including normal skin and albino skin (little or no coloring). Some people breed corn snakes in captivity. The table shows the results of breeding a normal corn snake and an albino corn snake.

Offspring of Two Corn Snakes

Generation	Total Offspring	Normal	Albino
parents		1	1
first	12	12	0
second	12	9	3

Part A For the second generation, figure out what fraction of the total number of offspring is normal and what fraction is albino.

In the second generation, 9 are normal, 3 are albino. 9/12 (3/4) are normal; 3/12 (1/4) are albino.

Part B What kind of trait is albino skin? What kind of trait is normal skin? Explain your answer by using data from Part A.

Albino skin is a recessive trait. It disappeared in the first generation, even though all of the offspring inherited a factor for both albino and normal skin. It reappeared in the second generation, but only in one-fourth of the snakes. Normal skin is a dominant trait. It appeared in all of the offspring of the first generation.

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Date _____

Unit Assessment

Write the letter of the best choice. **3 points each**

B **1.** Which statement is correct?
- **A.** Some plant cells have a nucleus, but others do not.
- **B.** Cells are the basic unit of all living things.
- **C.** All living things are made of the same kind of cells.
- **D.** All living things with cells are classified in the same kingdom.

J **2.** Which is **not** a kind of tissue?
- **F.** connective
- **G.** epithelial
- **H.** nervous
- **J.** plasma

B **3.** The stomach is an organ in which system?
- **A.** circulatory
- **B.** digestive
- **C.** excretory
- **D.** respiratory

G **4.** People whose kidneys have failed must have their blood cleaned by a machine. Which body system does the blood-cleaning machine help?
- **F.** circulatory
- **G.** excretory
- **H.** respiratory
- **J.** skeletal

A **5.** Which is the correct order, from simplest to most complex?
- **A.** cell, tissue, organ, organ system
- **B.** organ system, organ, tissue, cell
- **C.** cell, organ, organ system, tissue
- **D.** organ, organ system, tissue, cell

G **6.** Cells from which organisms do **not** have membrane-bound organelles?
- **F.** animals
- **G.** bacteria
- **H.** mosses
- **J.** plants

C **7.** Katie used to be shorter than her cousin Eric, but now she is taller. Which two systems worked together to bring nutrients to all the parts of Katie's body to help it grow?
- **A.** excretory and digestive
- **B.** epithelial and connective
- **C.** circulatory and digestive
- **D.** muscular and circulatory

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G **8.** Which type of cell does **not** have a nucleus?
- **F.** animal
- **G.** bacteria
- **H.** plant
- **J.** protist

D **9.** Which of these classification levels is most specific?
- **A.** genus
- **B.** order
- **C.** phylum
- **D.** species

G **10.** Which group contains only invertebrates?
- **F.** amphibians
- **G.** arthropods
- **H.** birds
- **J.** mammals

A **11.** Which set of organisms is **most** closely related?
- **A.** cat and catfish
- **B.** ant and anteater
- **C.** zebra and zebra mussel
- **D.** dogwood tree and dog

G **12.** Which organism has a backbone?
- **F.** ant
- **G.** fish
- **H.** mollusk
- **J.** worm

C **13.** Which plant part absorbs water and nutrients from the soil?
- **A.** flower
- **B.** leaf
- **C.** root
- **D.** stem

H **14.** How do stomata help a plant carry out photosynthesis?
- **F.** by letting water out of the leaf
- **G.** by keeping the plant from wilting
- **H.** by letting carbon dioxide into the leaf
- **J.** by making sugar from carbon dioxide and water

A **15.** What is the main difference between how a fern reproduces and how a pine tree reproduces?
- **A.** Ferns form spores; pine trees form seeds.
- **B.** Pine seeds are naked; fern seeds are contained in a fruit.
- **C.** Ferns can reproduce when it is dry; pines cannot.
- **D.** Pine trees make sperm and eggs; ferns do not.

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Name _____

G **16.** Which structure would you find on a moss plant?
- **F.** gymnosperm
- **G.** sporophyte
- **H.** stem
- **J.** taproot

C **17.** A scientist counted these plants in an area of tundra.

Type of Plant	Number of Individuals
moss	5000
liverwort	350
sedge (grass)	150
arctic willow tree	1

Which type of plant is most common in this area?
- **A.** angiosperms
- **B.** gymnosperms
- **C.** nonvascular plants
- **D.** vascular plants

F **18.** Which two of these three plants are most closely related, and why?


spruce tree


pear tree


lily of the valley

- **F.** lily and pear, because both make fruits
- **G.** spruce and lily, because both make naked seeds
- **H.** spruce and pear, because the lily is nonvascular
- **J.** spruce and pear, because they are both trees

C **19.** What must happen before mitosis can begin?
- **A.** DNA must mutate.
- **B.** Meiosis must be completed.
- **C.** Chromosomes must be copied.
- **D.** Epithelial cells must regenerate.

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H **20.** Which process occurs only in living things that reproduce sexually?
- **F.** cell division
- **G.** life cycle
- **H.** meiosis
- **J.** mitosis

D **21.** What forms when two gametes join?
- **A.** chromosome
- **B.** instinct
- **C.** spindle
- **D.** zygote

G **22.** Which word describes animal behaviors such as building shelters and finding food?
- **F.** competitive
- **G.** instinctive
- **H.** learned
- **J.** symbiotic

C **23.** Alicia is tall, with hazel eyes and attached earlobes. She has blonde hair, which she has dyed red. Which feature did Alicia **not** inherit?
- **A.** attached earlobes
- **B.** hazel eyes
- **C.** red hair
- **D.** tall height

H **24.** Lila the greyhound has some instincts and some learned behaviors. Which is **not** a learned behavior?
- **F.** sleeping in a crate
- **G.** sitting when told to
- **H.** chasing small animals that are running
- **J.** following at her owner's heel when told to

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Unit A/Unit B • Chapter 5

Name _____

Write the answer to each question. **7 points each**

25. A new organism is found that is multicellular, does not have a backbone, and has six legs. How would you classify this organism?

Possible answer: I would classify it as an invertebrate in the animal kingdom. Because it has six legs, it would be an arthropod.

26. Explain how oxygen from the air can reach all the cells in your little toe. Include two body systems in your explanation.

Possible answer: When I breathe, oxygen from the air goes through my nose, trachea, and bronchi and into my lungs. In the lungs, oxygen enters my blood. The blood travels from my lungs to my heart and is then pumped out and travels through arteries to all the parts of my body, including my little toe.

27. One function of the pancreas is to make chemicals called enzymes that help digest food. Name a body system to which the pancreas belongs. Tell how you know.

Possible answer: The pancreas is part of the digestive system because it makes enzymes that help digest food, which is the function of the digestive system.

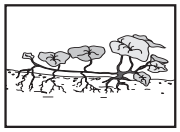
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28. Observe the two plants shown below, then answer the questions.



moss



squash

Part A Compare and contrast how these two plants get food, water, and nutrients, and how these things move through the plants.

Possible answer: The moss and the squash plant both get water and nutrients from the soil. They both use water and carbon dioxide from the air to make their own food. The squash plant has vascular tissue through which water, nutrients, and food are transported. The moss does not have vascular tissue; materials move from cell to cell.

Part B Why can't a moss plant grow as large as a squash plant?

Possible answer: Moss is a nonvascular plant. It does not have tubes to carry food, water, and nutrients from one end of the plant to the other. These things have to travel from cell to cell. If a moss plant grew too large, then the cells that are far away from air or water would not get what they needed to survive.

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Chapter Assessment

Energy and Ecosystems

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
F	**1.** The process by which plants make food, using energy from sunlight	**A.** consumer
C	**2.** A community of organisms and the environment in which they live	**B.** food chain
G	**3.** An animal that eats only producers	**C.** ecosystem
H	**4.** An organism that makes its own food	**D.** decomposer
A	**5.** An animal that eats plants or other animals	**E.** energy pyramid
B	**6.** The transfer of energy between organisms in an ecosystem	**F.** photosynthesis
D	**7.** An organism that breaks down the remains of dead plants and animals	**G.** herbivore
E	**8.** A diagram that shows how much food energy is passed to each level in a food chain	**H.** producer

Science Concepts 4 points each

Write the letter of the best choice.

A **9.** What is the source of energy for producers?
- **A.** the sun, because producers need light to make food
- **B.** the Earth, because soil provides warmth and nutrients
- **C.** wind, because producers need wind to scatter their seeds
- **D.** fresh water, because producers need water to make food

G **10.** What kind of organism comes last in every food chain?
- **F.** carnivore
- **G.** decomposer
- **H.** herbivore
- **J.** producer

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Name _____

B **11.** Suppose a colony of ants eats a plant. How much of the plant's energy is passed to the ants?
- **A.** 1 percent
- **B.** 10 percent
- **C.** 50 percent
- **D.** 90 percent

G **12.** Which process is **not** part of the nitrogen cycle?
- **F.** Bacteria that live on some plant roots fix nitrogen gas.
- **G.** Plants release nitrogen compounds during transpiration.
- **H.** Bacteria break down animal wastes and dead organisms.
- **J.** Lightning produces nitrogen compounds that dissolve in rain.

A **13.** Which substance enables a plant to use the sun's energy to make food?
- **A.** chlorophyll
- **B.** oxygen
- **C.** sugar
- **D.** water

H **14.** Which is a product of photosynthesis?
- **F.** carbon dioxide
- **G.** nitrogen
- **H.** oxygen
- **J.** pigment

C **15.** Which term is correctly described?
- **A.** herbivore: second-level consumer
- **B.** omnivore: producer
- **C.** carnivore: consumer
- **D.** decomposer: first-level consumer

J **16.** Which ordering of these organisms makes a food chain?
- **F.** grass → snake → locust → owl
- **G.** owl → snake → grass → locust
- **H.** snake → locust → grass → owl
- **J.** grass → locust → snake → owl

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Unit B • Chapter 5/Chapter 6

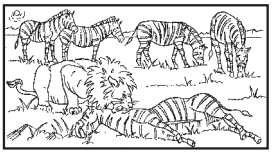
Name _____

Inquiry Skills 8 points each

17. Linda found a plant in a dark room. It didn't look very healthy. She put it in a sunny window. **Predict** what will happen.

Possible answer: The plant will start to make food through photosynthesis when the leaves are exposed to sunlight. The energy absorbed by the chlorophyll helps water and carbon dioxide combine to form sugar, which plants need to live and grow. Since the plant can now make sufficient food to meet its needs, its health will improve.

18. The picture shows a grassland ecosystem. Write about how energy flows from organism to organism. Your explanation should include all the organisms you **observe** in the picture.



Possible answer: The grass is a producer, the zebras are herbivores (first-level consumers), and the lion is a carnivore (consumer). The grass uses energy from the sun to make its own food. When the zebras eat the grass, they receive 10 percent of the energy the grass produces. The zebras store 10 percent of the energy they receive; this stored energy is passed to the lion.

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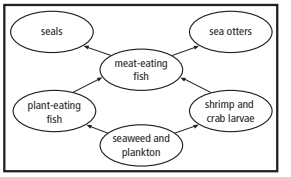
Name _____

Critical Thinking 10 points each

19. As you move up the levels in an energy pyramid, the number of organisms decreases. Tell why.

Possible answer: Nearly 90 percent of the energy in one level gets used up by the organisms for living and growing. This means only 10 percent is available for the organisms in the next level up. This smaller amount of available energy accounts for the smaller number of individuals in higher levels.

20. The diagram shows a simple food web of organisms that live in the ocean. Use the food web to answer the two parts of Question 20.



Part A Which organisms in the food web are producers? Explain.

Possible answer: Seaweed and plankton are at the base of the food web; these organisms are the producers in the food web. They are eaten by plant-eating fish and larvae.

Part B What do you think would happen if the number of meat-eating fish decreased?

Possible answer: In this food web, meat-eating fish are the only food source for the seals and sea otters. These animals would also decrease in number. The organisms that are eaten by the meat-eating fish—plant-eating fish and shrimp and crab larvae—would increase in number.

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Chapter Assessment

Ecosystems and Change

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
B	1. Populations that live and interact together	A. competition
A	2. A contest among organisms to find the food, water, shelter, and space they need to live	B. community
H	3. A relationship between different kinds of organisms	C. conservation
G	4. A gradual change in the kinds of organisms that live in an ecosystem	D. predators
C	5. The saving of resources	E. prey
F	6. The process of cleaning and restoring damaged ecosystems	F. reclamation
D	7. Animals that eat other animals	G. succession
E	8. Animals that are eaten by other animals	H. symbiosis

Science Concepts 4 points each

Write the letter of the best choice.

A **9.** What is formed when chemicals from burning fossil fuels mix with water vapor in the air?
- **A.** acid rain
- **B.** competition
- **C.** succession
- **D.** symbiosis

H **10.** Which term refers to the rebirth of a damaged ecosystem?
- **F.** adaptation
- **G.** primary succession
- **H.** secondary succession
- **J.** symbiosis

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C **11.** Which is **not** a method of conserving resources?
- **A.** recycle
- **B.** reduce
- **C.** restore
- **D.** reuse

F **12.** Which organisms steal food from hosts or harm hosts in some other way?
- **F.** parasites
- **G.** populations
- **H.** predators
- **J.** vaccinations

B **13.** Which thing cannot be recycled?
- **A.** aluminum
- **B.** gasoline
- **C.** paper
- **D.** plastic

G **14.** Which choice shows the order in which primary succession takes place?
- **F.** grass→soil→lichens→rock
- **G.** bare rock→lichens→grass→trees
- **H.** lichens→bare rock→grass→soil
- **J.** bare rock→soil→lichens→grass

C **15.** Which is an example of prey?
- **A.** hawk
- **B.** lion
- **C.** mouse
- **D.** wolf

G **16.** Which statement is **not** true of an ecosystem?
- **F.** Organisms develop adaptations to survive.
- **G.** Symbiosis is the same as competition.
- **H.** Populations often compete for the same food.
- **J.** Populations live together to form a community.

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Inquiry Skills **8 points each**

17. Alice read that the African elephant is on a list of endangered species. She also read that the African elephant is a vegetarian and lives in forests and grasslands. Based on this information, what could Alice **infer** about a possible reason for the declining population of African elephants?

Possible answer: Alice might infer that the amount of food available to the African elephant population is decreasing because of an increase in human population or a change of climate.

18. The diagram below shows changes that occurred in farmland that was abandoned several years ago. Describe the changes, and identify the process involved. **Predict** how the land might continue to change.



Possible answer: Over time, small grasses and weeds were replaced by larger grasses and plants, which were in turn replaced by shrubs. Because soil was present from the beginning, this is an example of secondary succession. The next step will probably be that trees will grow and replace the shrubs.

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Critical Thinking **10 points each**

19. Suppose the people in Town A conserve resources and avoid burning fossil fuels. The people in Town B to the northwest burn lots of fossil fuels and dump wastes into the river. How might the people in Town A be affected by the actions of the people in Town B?

Possible answer: They may have to breathe polluted air that moves into their area and be exposed to polluted water that flows from Town B.

20. The plains of Africa, called the savanna, contain grasses, scattered trees, and shrubs. The savanna is home to many kinds of grazing animals and the predators that hunt them. It has a season of heavy rain. This is followed by a dry season in which very little rain falls.

Part A Different species of plant-eating animals on the savanna eat plants at different heights. For example, gazelles eat grasses, black rhinos eat shrubs, and giraffes feed on tree leaves. Why do you think the animals are adapted in this way?

Possible answer: Eating plants of different heights reduces competition for food. Reduced competition means that each population of animals has a better chance of getting enough food to survive.

Part B Many savanna animals give birth only during the rainy season. Why might this be so?

Possible answer: Heavy rain causes the plants to grow, which means that newly born grazing animals will have a better chance of survival. The greater number of plant-eating animals also provides more food for young predators.

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Unit Assessment

Write the letter of the best choice. **3 points each**

C **1.** What happens in the leaves of plants?
- **A.** Water and nutrients enter the plant.
- **B.** Carbon dioxide is given off to the air.
- **C.** Light energy is absorbed and used to make food.
- **D.** Chloroplasts break down food into a form the plant can use.

H **2.** Which plant structure carries food from its source to the rest of the plant?
- **F.** leaves
- **G.** roots
- **H.** stems
- **J.** stomata

C **3.** Which is a product of photosynthesis?
- **A.** carbon dioxide
- **B.** chlorophyll
- **C.** oxygen
- **D.** water

G **4.** What is transpiration?
- **F.** a step in the process of photosynthesis
- **G.** the loss of water through a plant's leaves
- **H.** an alternative-energy vehicle that reduces pollution
- **J.** an animal that transforms from consumer to producer

D **5.** Algae grows on the inside of aquarium glass. To keep the glass clean, many aquarium owners keep loaches, a kind of fish that eats algae. Based on this information, which statement is true?
- **A.** Algae are pollutants.
- **B.** Loaches are predators.
- **C.** Algae are decomposers.
- **D.** Loaches are consumers.

H **6.** Which organism is a carnivore?
- **F.** bacteria
- **G.** grass
- **H.** wolf
- **J.** worm

D **7.** Which organism is **not** a decomposer?
- **A.** earthworm
- **B.** fungus
- **C.** protist
- **D.** tapeworm

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H **8.** Which list shows a possible order in which energy moves through an ecosystem?
- **F.** herbivore, carnivore, omnivore, producer
- **G.** sun, producer, predator, consumer, decomposer
- **H.** sun, producer, herbivore, carnivore, decomposer
- **J.** herbivore, first-level consumer, second-level consumer, producer

A **9.** How much energy is passed on to organisms at each higher level in an energy pyramid?
- **A.** 10 percent
- **B.** 20 percent
- **C.** 50 percent
- **D.** 90 percent

H **10.** Which two organisms would you expect to compete with each other?
- **F.** birds and insects
- **G.** deer and fish
- **H.** hyenas and cheetahs
- **J.** raccoons and sea turtles

B **11.** If you wanted to show the complex feeding relationships in an ecosystem, which of the following would you draw a diagram of?
- **A.** food chain
- **B.** food web
- **C.** nitrogen cycle
- **D.** water cycle

J **12.** Which statement about populations is true?
- **F.** The usual relationship between populations is symbiosis.
- **G.** Populations in a community do not interact with each other.
- **H.** The members of a population never compete with each other.
- **J.** Different populations often compete for the same sources of food.

B **13.** Which is an example of parasitism?
- **A.** a bird eating insects that bother an ox
- **B.** a deer tick sucking blood from a dog's ear
- **C.** a remora eating scraps from a shark's meal
- **D.** an ant protecting aphids, then getting a drink from them

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H **14.** A spider builds a web in a field. The web catches grasshoppers, which the spider eats. What kind of relationship does the spider have with the grasshoppers?
- **F.** commensalism
- **G.** competition
- **H.** predator–prey
- **J.** symbiosis

A **15.** A larva of the antlion (an insect) builds a pit in dusty soil. It waits for small insects to fall into the pit, and then it eats them. What is the antlion's method of hunting an example of?
- **A.** an adaptation
- **B.** a limiting factor
- **C.** parasitism
- **D.** succession

J **16.** Fish use their gills to get dissolved oxygen from water. Aquarium owners must be sure that the population of fish is not more than the dissolved oxygen can support. What is dissolved oxygen an example of?
- **F.** an adaptation
- **G.** community
- **H.** extinction
- **J.** a limiting factor

C **17.** Purple loosestrife is a pretty flower that grows in wetlands. It originally came from Europe. Wherever it grows, the population of native plants, such as cattails, shrinks. What is this an example of?
- **A.** commensalism
- **B.** community
- **C.** competition
- **D.** a limiting factor

G **18.** A family stops farming its land. Twenty years later, this land is covered with trees. What is this an example of?
- **F.** primary succession
- **G.** secondary succession
- **H.** temporary extinction
- **J.** tertiary transpiration

C **19.** A rare kind of fish lives in only one small stream. A dam is built on the stream, and all the rare fish die. What is this an example of?
- **A.** adaptation
- **B.** competition
- **C.** extinction
- **D.** a limiting factor

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H **20.** Which is **not** a cause of extinction?
- **F.** climate change
- **G.** competition
- **H.** conservation
- **J.** habitat change

D **21.** Which is a natural cause of ecosystem change?
- **A.** building fences
- **B.** farming
- **C.** pollution
- **D.** volcanic eruptions

G **22.** Suppose an area were stripped bare of plants and trees by mining. Later, people started planting new plants and trees to help return the land to its original condition. What is this process called?
- **F.** conservation
- **G.** reclamation
- **H.** recycling
- **J.** succession

D **23.** Which is **not** an example of conservation?
- **A.** turning off lights that are not being used
- **B.** using the same paper lunch sack for a week
- **C.** shopping for second-hand clothes at a thrift store
- **D.** saving time by driving to school instead of walking

F **24.** Which animal is **most** at risk of becoming extinct?
- **F.** a herbivore that eats only one kind of plant
- **G.** an omnivore that has learned to raid trash cans
- **H.** a carnivore that eats birds, mammals, and insects
- **J.** an omnivore that is adapted to live in many habitats

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Write the answer to each question. **7 points each**

25. The larger the population in an area, the greater the competition for food. What would happen if the population of a species in an area doubled?

Possible answer: The doubled population will eventually return to a smaller size because its demands for food will be greater than the available food. If the species were threatened, doubling its size would not have this effect unless lack of habitat was the reason for the animal's threatened status.

26. Suppose part of a glacier melts, exposing an area of bare rock. Describe how succession will occur.

Possible answer: Since no soil is present, primary succession will occur. First, lichens will grow on the bare rock, followed by mosses. As these die, new soil is formed. When there is enough soil, grass and other small plants will grow. These will eventually be replaced by larger plants and trees.

27. Sea anemones use their tentacles to sting their prey. However, fish like the clown fish aren't harmed by the anemone's sting. These fish live among the anemone's tentacles, where they are protected from predators. The fish don't harm or help the anemone. What kind of relationship is this? Explain.

Possible answer: Because one organism benefits and the other organism is neither helped nor harmed, this relationship is an example of commensalism.

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28. Read the paragraph, and answer the questions that follow.

The Dust Bowl was a grim period in U.S. history. It occurred in the Great Plains. Years of little or no rain kept crops from growing. Native plants had ways to survive drought, but these plants were gone because of farming. Without plants to hold the soil in place, the wind blew it away. There was little to eat. Starving rabbits ate the few crops that did grow before people could harvest them. People moved away by the thousands. After the Dust Bowl, people worked hard to restore the land.

Part A How did people change the ecosystem before the Dust Bowl, and how was this change partly a cause of the Dust Bowl?

Possible answer: People farmed the land, which destroyed the native plants. The native plants could have stopped the soil from blowing away, but they were all gone.

Part B Describe an example of competition and reclamation given in the paragraph.

Competition: Rabbits and people both wanted the few crops that grew. Reclamation: After the Dust Bowl, people worked to reclaim the land.

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Unit C • Chapter 7

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Chapter Assessment

The Rock Cycle

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
E	1. Rock that forms when small grains of rock are pressed together and become cemented	A. streak
G	2. The process by which wind and water remove and carry small pieces of weathered rock from one place to another	B. hardness
C	3. Rock that forms when melted rock cools and hardens	C. igneous rock
H	4. The continuous process by which one rock type changes into another	D. deposition
B	5. A mineral's ability to resist being scratched	E. sedimentary rock
F	6. Rock changed by high heat and great pressure	F. metamorphic rock
A	7. The color of the powder left behind when you rub a mineral against a white tile	G. erosion
D	8. The process by which sediment settles out of water and wind	H. rock cycle

Science Concepts 4 points each

Write the letter of the best choice.

B 9. Ruthie describes a mineral as being *waxy*. What property of the mineral is she describing?
A. hardness C. sedimentation
B. luster D. streak

H 10. Which of these would **not** be used to classify igneous rocks?
F. crystal size
G. mineral content
H. when they were formed
J. where they were formed

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D 11. Which process will change a sedimentary rock into another sedimentary rock?
A. bending C. melting
B. burning D. weathering

H 12. This list should show items that are found naturally in soil. Which item should be removed from the list?
F. deposited sediment
G. decayed animal matter
H. melted rock
J. weathered rock

C 13. You have been given a rock that is a conglomerate. Where did your rock most likely form?
A. in a volcano
B. at the top of a hill
C. in a river
D. at the edge of a desert

G 14. Which of the following are the building blocks of all rocks?
F. gemstones
G. minerals
H. sand particles
J. water molecules

B 15. You can use a copper penny with a hardness of 3 or glass with a hardness of 6 to test a mineral's hardness. Which of these minerals could be scratched by glass but **not** by a penny? (The hardness of each mineral is given in parentheses.)
A. diamond (10)
B. fluorite (4)
C. gypsum (2)
D. topaz (8)

H 16. Which of the following can change a sedimentary rock into a metamorphic rock?
F. deposition
G. erosion
H. pressure
J. weathering

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Inquiry Skills 8 points each

Use the following *classification* table to answer Questions 17–18.

Mineral	Color	Color of Streak	Hardness
Talc	light green	white	1
Fluorite	light purple	white	4
Feldspar	white, salmon pink	white	5
Quartz	clear, milky white, rose, smoky gray	none	7

17. A mineral sample has a white streak and is so soft that it can be scratched by your fingernail. **Identify** the mineral. Tell how you know.
The mineral is talc. A fingernail can scratch a mineral with a hardness of 1 or 2. Talc has a hardness of 1.The other two minerals with a white streak have hardness values greater than 2.

18. A mineral is white and cannot be scratched by the mineral orthoclase (hardness of 6). **Identify** the mineral. Tell how you know.
The mineral is quartz. Feldspar can also be white, but it has a hardness of 5, which means that it would be scratched by orthoclase.

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Critical Thinking 10 points each

19. You find a rock near a volcano. It has small mineral crystals. What type of rock is it? Where was the rock formed? Explain.
Possible answer: The rock was formed near a volcano, so it is probably an igneous rock. The rock has small mineral crystals. This means that the melted rock cooled quickly and hardened before it could grow large crystals. The rock was formed near the surface of Earth rather than deep underground.

20. Tyrone likes to go rock hunting. On a recent trip, he found the rock shown below.



Part A Identify Tyrone's rock. Tell how and where it formed.
Possible answer: Tyrone's rock is a sedimentary rock. It formed as a result of pressure that compressed layers of materials, cementing them together. This rock formed somewhere where it could be under pressure.

Part B When Tyrone's rock broke off from its rock bed, it had sharp corners. How did Tyrone's rock change? What caused the change?
Possible answer: The rock has rounded corners. The sharp corners became rounded as a result of weathering and erosion.

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Unit C • Chapter 8

Name _____
Date _____

Chapter Assessment

Fossils

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
B	1. A type of fossil formed when minerals fill the space left after an organism's remains dissolve	A. mold
C	2. A fossil that helps scientists find the age of a rock layer that may be out of order	B. cast
D	3. The study of fossils	C. index fossil
A	4. The hollow space that is left after an organism's remains dissolve	D. paleontology

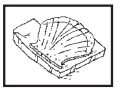
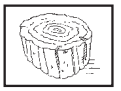
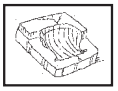
Science Concepts 4 points each

Write the letter of the best choice.

D 5. In which type of rock are most fossils formed?
A. amber C. metamorphic
B. igneous D. sedimentary

J 6. A bird leaves a footprint in the mud. The mud hardens into stone. What kind of fossil is this?
F. carbon film H. petrified
G. index J. trace

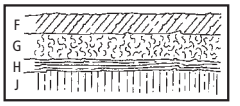
B 7. Which example is a mold fossil?

A. 
C. 
B. 
D. 

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J 8. Which layer is probably the oldest?
F. Layer F
G. Layer G
H. Layer H
J. Layer J



C 9. Which statement is true?
A. Living things today are larger than their ancestors.
B. Every kind of living thing has been preserved as a fossil.
C. Some kinds of living things have not changed in millions of years.
D. Fossils show that horses have stayed the same for millions of years.

H 10. A shark has a skeleton made of a soft, firm material that is also found in human ears. Which part of a shark is most likely to become a fossil?
F. eyes H. teeth
G. skeleton J. top fin

B 11. Which is the best description of an index fossil?
A. It is in the index of a major museum.
B. It lived in many places for only a short time.
C. It is the best example of a certain kind of fossil.
D. It lived in many places for many millions of years.

H 12. What do mammoths and elephants have in common?
F. thick, shaggy fur H. an ancestor with no tusks
G. a warm climate J. Both are extinct from hunting.

C 13. Which fossil method can preserve a whole animal?
A. forming a cast C. trapping in amber
B. forming a mold D. pressing into a carbon film

G 14. What was Pangea?
F. small ocean animal H. important index fossil
G. ancient, giant continent J. ancient relative of the scallop

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C 15. A fossil fish is found in a desert. What is this evidence of?
A. The fish died when the land dried out.
B. The ancestors of that fish lived on land.
C. The land where the fossil was found was once under water.
D. The land where the fossil was found has always been a desert.

H 16. Fossils show that ginkgoes were much more common 30 million years ago. Fossil ginkgo leaves from that time look almost exactly like leaves from living ginkgo trees. What do these findings suggest about ginkgo trees?
F. Ginkgo trees are not suited to any modern environment.
G. Ginkgo trees changed rapidly over the past 30 million years.
H. Ginkgo trees have not changed much over the past 30 million years.
J. There are more good environments for ginkgo trees now than before.

Inquiry Skills 8 points each

17. A rock layer is 25 million years old. What can you **infer** about the age of the rock layer below it if the rocks have not moved? Explain your answer.

If the rock layers have not moved, then I can infer that the layer below it is older than 25 million years. Scientists have found out that if rock layers have not moved, then the ones farther down are older.

18. A paleontologist finds a fossil of an unknown insect. How can the paleontologist **classify** the fossil, and what will he compare it to?

Possible answer: The paleontologist will compare the fossil insect with insects that are alive today. The insect will be classified with the modern insects that it most resembles.

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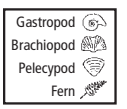
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Critical Thinking 10 points each

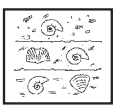
19. Organisms evolve to survive in their environments. When the environment changes, organisms that evolve quickly are the ones that survive. Organisms that do not evolve quickly do not survive. The fossil record shows that sharks first appeared more than 400 million years ago. Dinosaurs appeared about 250 million years ago and became extinct about 65 million years ago. What is one possible reason why sharks have not become extinct?

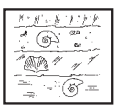
Possible answer: Sharks live in the ocean. It is possible that the ocean environment has not changed much since 400 million years ago, or at least not so much that sharks could not evolve to keep living there. Dinosaurs lived on land. Their environment must have changed so quickly that they could not evolve to match it, and they became extinct.

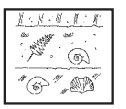
20. A scientist is looking for a new index fossil to help figure out the ages of rock layers. She has diagrams of rock layers from three locations.



fossil key


Location 1


Location 2


Location 3

Part A Which fossil is a good index fossil? Explain why you chose that fossil.

The brachiopod is a good index fossil. It appears in all the places, and it appears in only one layer at each location.

Part B Choose one of the other fossils. Explain why it is **not** a good index fossil.

Gastropod—appears in layers of many different ages
Pelecypod—appears at only one location
Fern—appears at only one location

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Unit C • Chapter 9

Name _____
Date _____

Chapter Assessment

Changes to Earth's Surface

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. A mountain made of lava, ash, or other materials from eruptions	A. glacier
B	2. A movement of the ground caused by a sudden release of energy in Earth's crust	B. earthquake
G	3. A natural land shape or feature	C. volcano
A	4. A large, thick sheet of ice	D. magma
D	5. Molten rock under Earth's surface	E. topography
F	6. A break in Earth's crust	F. fault
H	7. Hill of sand, made and shaped by the wind	G. landform
E	8. All the kinds of landforms in a certain place	H. sand dune

Science Concepts 4 points each

Write the letter of the best choice.

B 9. Which of Earth's layers contains soft areas on which plates float?
- A. crust
- B. mantle
- C. outer core
- D. inner core

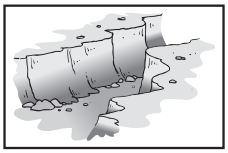
H 10. Where would you most likely find a delta?
- F. on a mountaintop
- G. in a deep valley
- H. near a river's mouth
- J. at a volcano's base

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D 11. Which of the following is **not** a cause of weathering?
- A. Water freezes in a crack in a rock.
- B. A plant grows in a crack in a rock.
- C. Sand blows against a rocky surface.
- D. A river carries sand and sediment downstream.

H 12. How were landforms like this canyon most likely formed?



- F. earthquake
- G. ice erosion
- H. water erosion
- J. wind erosion

D 13. Which of the following causes both earthquakes and volcanic eruptions?
- A. erosion
- B. gravity
- C. Earth's inner core
- D. plate movement

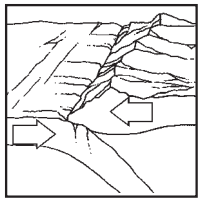
J 14. You are hiking up a sloping landform. How can you tell if this landform is a moraine?
- F. It will have a large, flat top.
- G. It will be covered with shifting sand.
- H. It will have a vent with steam coming out of it.
- J. It will have bits of crushed rock, sand, or boulders.

C 15. The Hawaiian Islands are a chain of volcanoes. How are volcanoes like these formed?
- A. A plate breaks into two parts.
- B. An earthquake occurs along a fault.
- C. A plate moves over a hot spot.
- D. Two plates crash into one another.

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G 16. Diego has drawn a diagram to show how Earth's plates may move.



Which process has Diego shown?
- F. erosion
- G. formation of a mountain
- H. formation of glacial grooves
- J. weathering

Inquiry Skills 8 points each

17. What would make a better **model** for the process that causes an earthquake—two sponges rubbing against each other or a bowl of jiggling gelatin? Explain why.

Possible answer: The sponges would be a better model. Earthquakes are caused by two plates that rub together, catching in some places and then releasing. This is what happens when two sponges rub together.

18. What would be a better **model** to show an erupting volcano—a lit firecracker or a shaken can of soda? Explain why.

Possible answer: The can of soda; volcanoes erupt when built-up pressure is released. This is similar to what happens when you open a shaken can of soda.

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Critical Thinking 10 points each

19. A friend tells you that volcanoes, mountains, and earthquakes have nothing in common. You disagree. Explain why.

Volcanoes, mountains, and earthquakes all result from the movements of Earth's plates.

20. Mai has been collecting rocks from different places along the same river. On one trip, she visited places very near the source of the river, places a little farther away, and places very far from the source. She forgot to label her rock samples.



Part A Label the three rock samples with the location at which they were collected.

Sample A: far from source; Sample B: close to source; Sample C: middle distance from source

Part B Explain how you determined the location for each sample.

The rocks with sharp angles have been worn down less than the others, so they were moved the shortest distance from the source. The rocks that are rounded have moved a long way. The rocks in Sample C still have some edges, so the river carried them farther than the rocks in Sample B but not as far as the rocks in Sample A.

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Chapter Assessment

Using Resources

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
B	1. A resource that cannot be replaced within a human lifetime	A. renewable resource
D	2. The act of preserving or protecting natural resources	B. nonrenewable resource
A	3. A resource that can be replaced within a human lifetime	C. pollution
C	4. A change in the environment that is harmful to living things	D. conservation

Science Concepts 4 points each

Write the letter of the best choice.

B 5. Which of these resources is nonrenewable?
A. air C. sunlight
B. soil D. water

J 6. Harry gives his outgrown jacket to his younger brother. What kind of conservation is this?
F. recycling H. reselling
G. reducing J. reusing

D 7. Which of these resources is renewable?
A. coal C. oil
B. minerals D. water

H 8. Which is an example of soil conservation?
F. clearing weeds
G. fertilizing
H. contour plowing
J. Xeriscaping

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A 9. Which kind of air pollution ends up in lakes and rivers?
A. acid rain C. sewage
B. diesel fuel D. smog

F 10. A farmer decides to plant corn one year and alfalfa the next year in the same field. What can she expect as a result?
F. The soil will be richer.
G. The field will look like steps.
H. The field will be drought-proof.
J. She will lose less soil to erosion.

A 11. What causes acid rain?
A. air pollution
B. drought
C. sewage
D. water pollution

J 12. The diagram shows an example of land pollution. What other kind of pollution could this situation lead to?
F. acid rain
G. air pollution
H. smog
J. water pollution



D 13. George and Joanne live in the desert. They have a yard with pretty stones, some cacti, and native trees. What kind of water-conservation method is this?
A. intercropping C. windbreak
B. terracing D. Xeriscaping

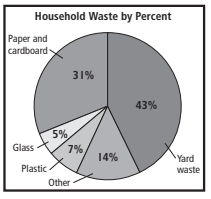
J 14. "Fossil water" is groundwater that has collected in deep rock layers for many thousands of years. Which is the best description of fossil water?
F. renewable, like other water resources
G. polluted, because it comes out of the land
H. recycled, because it is part of the water cycle
J. nonrenewable, because it cannot be replaced within a human lifetime

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B 15. Leanne's family used to buy single-serving yogurt cups that they threw away. Now they buy yogurt in big containers and serve it in bowls that they wash. What has Leanne's family done to conserve resources?
A. recycled C. replaced
B. reduced D. reused

J 16. A family pays for each bag of trash they throw away. The graph shows the percentage of each type of trash that they throw away each year. Which should they start recycling first, to save the most on their trash bill?
F. glass
G. paper and cardboard
H. plastic
J. yard waste



Inquiry Skills 8 points each

17. Metals, such as aluminum, iron, nickel, and copper, are all nonrenewable resources. **Draw a conclusion** about why it is important for metals to be reused and recycled.

Possible answer: *Nonrenewable* means that once the resource is used up, it's gone. Metals are very important for making many things. If we do not reuse and recycle metals, then we will not have any metals left to use.

18. Members of a community garden want to make their soil richer. They want to find out how well crop rotation works compared with chemical fertilizer. Describe an **investigation** that they could do to answer this question. Include a description of how to **control variables** that might affect the results.

Possible answer: The gardeners could set aside two plots and try crop rotation on one and chemical fertilizer on the other. To control variables, they would have to make sure that both test plots get the same amount of sunlight and water and that both are weeded and tended in the same way.

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Critical Thinking 10 points each

19. A factory uses water to cool its machines. Then it puts clean hot water into a nearby river. The temperature of the river rises. The warmer water has less oxygen than the cooler water did. Fish in the river start dying from lack of oxygen. Is the clean hot water from the factory an example of pollution? Explain your answer.

Possible answer: Yes, because pollution means any change in an environment that can harm living organisms. The fish are being harmed, so even though the hot water is clean, it is polluting the river just by being hot.

20. The neighborhood in the picture is experiencing a drought. The local government has made new rules to limit how much water each household can use each week.



Part A How are the people in this neighborhood wasting water?

Possible answer: The person washing the car is letting the water run when it isn't being used. There is a dripping faucet on a house. (Some students may also list the lawn sprinkler as being wasteful during a drought.)

Part B Describe some things the people in this neighborhood could do to conserve water.

Possible answer: The person with the leaky faucet could fix it. The lawns could be replaced with a Xeriscape. People could wash cars less often and shut off the hose when it's not in use.

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Unit Assessment

Write the letter of the best choice. **3 points each**

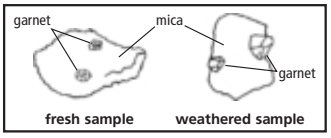
D **1.** Which is **not** an example of a mineral?
- **A.** diamond
- **B.** quartz
- **C.** sea salt
- **D.** window glass

J **2.** Cora has two different minerals. Both are yellow. Both are shiny like metal. What two properties could she use to identify each mineral?
- **F.** color and luster
- **G.** color and streak
- **H.** hardness and luster
- **J.** streak and hardness

B **3.** A blob of lava erupts from a volcano and lands in the ocean. What kind of rock will form from it?
- **A.** igneous with large crystals
- **B.** igneous with small crystals
- **C.** sedimentary with one size of grain
- **D.** sedimentary with many sizes of grain

F **4.** Which process forms sedimentary rock?
- **F.** cementing
- **G.** erosion
- **H.** evaporation
- **J.** weathering

C **5.** The pictures show two samples of the same kind of rock. One sample is fresh. The other has been weathered for many years. Two different minerals make up the rock—mica and garnet.



Which conclusion can you reach based on the information in the pictures?
- **A.** These are examples of igneous rock.
- **B.** Garnet weathers more quickly than mica.
- **C.** Garnet is higher on the hardness scale than mica.
- **D.** Mica has a crystalline structure, but garnet does not.

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H **6.** Which process can turn granite, an igneous rock, into gneiss, a metamorphic rock?
- **F.** cementing
- **G.** freezing
- **H.** heating
- **J.** thawing

C **7.** In which kind of rock would you be **most** likely to find a fossil?
- **A.** granite
- **B.** marble
- **C.** sandstone
- **D.** slate

J **8.** Which is **not** considered a fossil?
- **F.** ant trapped in amber
- **G.** cast of a shell
- **H.** dinosaur footprint
- **J.** flint arrowhead

A **9.** Which statement **best** describes the law of superposition?
- **A.** Each rock layer is younger than the one beneath it.
- **B.** The position of an index fossil tells a rock layer's relative age.
- **C.** Rock layers with index fossils are older than rock layers without them.
- **D.** Rock layers with radioactive elements are younger than rock layers without them.

J **10.** The fossil bones of the same kind of land animal have been found in eastern South America and in western Africa. What is this evidence of?
- **F.** The animal could swim across the ocean.
- **G.** The two continents have come together over millions of years.
- **H.** The animal's bones could float, and they landed in different places.
- **J.** The two continents were once connected but have since moved apart.

A **11.** A rock layer in a desert area has many carbon-film plant fossils. The fossils are similar to lily pads. What do these fossils suggest?
- **A.** The area once had a wetter environment.
- **B.** The rock layer will also have fossil frogs.
- **C.** The plants had hard parts that could be preserved.
- **D.** The rock layer dates back to before the time of the dinosaurs.

G **12.** Which landform was made by a glacier?
- **F.** canyon
- **G.** moraine
- **H.** sand dune
- **J.** sinkhole

C **13.** Which statement is true?
- **A.** All mountains have the same topography.
- **B.** Volcanoes occur in places with little elevation.
- **C.** Topography means all the kinds of landforms in a place.
- **D.** All landforms are formed by movements in the Earth's crust.

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G **14.** What landform is the result of water eroding soft rock?
- **F.** cinder cone
- **G.** mesa
- **H.** plate
- **J.** sand dune

C **15.** What would you expect to find where a faster river enters a slower river?
- **A.** barrier island
- **B.** gully
- **C.** sediment deposits
- **D.** waterfall

J **16.** Which of Earth's layers is made of liquid iron?
- **F.** crust
- **G.** inner core
- **H.** mantle
- **J.** outer core

B **17.** Which is the best explanation for plate movement?
- **A.** Earth's plates slice through the lower mantle.
- **B.** Earth's plates move when the lower mantle moves.
- **C.** Volcanic eruptions push plates across Earth's surface.
- **D.** Plates move because of erosion of Earth's surface.

F **18.** Which earth movement would **not** cause an earthquake?
- **F.** a landslide
- **G.** plates moving apart
- **H.** plates pushing together
- **J.** movement along a fault

B **19.** Mount Shasta was built up over many thousands of years from lava flows and explosive eruptions of rock and ash. What is Mount Shasta?
- **A.** cinder cone volcano
- **B.** composite volcano
- **C.** mesa volcano
- **D.** shield volcano

F **20.** Where would you expect the strongest earthquakes?
- **F.** Alaska, where the Pacific plate pushes under the North American plate
- **G.** California, where the Pacific plate and the North American plate slide past each other
- **H.** Iceland, where the North American plate and the Eurasian plate pull apart
- **J.** Missouri, in the middle of the North American plate

B **21.** Which resource is nonrenewable?
- **A.** air
- **B.** soil
- **C.** sunlight
- **D.** water

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F **22.** Which is an example of conservation?
- **F.** forming a carpool to ride to work
- **G.** buying new clothes to keep up with current fashion
- **H.** replacing old videotapes with DVDs of the same movies
- **J.** buying lunch at school instead of bringing a lunch from home

B **23.** A farmer has planted corn in the same field for ten years. This year, her corn crop was poor even though the rain and sun were good. What conservation method could the farmer use to improve the soil in this field?
- **A.** contour plowing
- **B.** intercropping
- **C.** raking
- **D.** terracing

J **24.** A city is deciding what kind of development to allow on a large piece of land. Which choice would conserve the **most** water?
- **F.** a golf course covered in grass
- **G.** a housing development for 1000 more people
- **H.** a water park with wave pools and water slides
- **J.** a park with native grasses, flowering plants, and shrubs

Write the answer to each question. **7 points each**

25. Why aren't you likely to find a fossil in metamorphic rock or igneous rock?

Possible answer: The pressure and heat needed to form metamorphic or igneous rock would destroy any fossils that might be contained in the rock.

26. Suppose you find a rock in your back yard. Explain how you could determine the hardness of this unknown rock, using rocks that you have already identified.

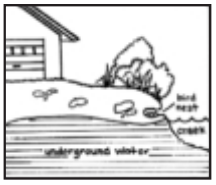
Possible answer: You could compare a rock of known hardness (for example, quartz) to your unknown rock by rubbing them together. If the quartz scratches the unknown rock, then the quartz is harder. If the opposite occurs, then the unknown rock is harder. You could repeat this process with other identified rocks until you narrow down the unknown rock's hardness.

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27. Paul helps his father change the oil in the family truck. His father tells him to pour the used oil at the edge of the yard "where it's just weeds and scrub brush." The picture below shows Paul's yard.



Part A What kinds of pollution can result if Paul pours the used oil at the edge of the yard?

Possible answer: If Paul pours the used oil in the corner of the yard, the oil will cause land pollution as it seeps into the soil. It will pollute the underground water. Rain will wash the oil into the nearby creek and cause water pollution.

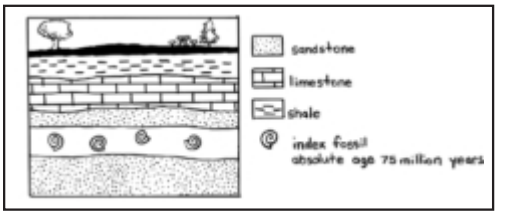
Part B Will any organisms by harmed by Paul's action?

Possible answer: There is a bird nest dug into the bank of the creek. The birds might be harmed if the water in the creek becomes polluted.

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28. Observe the diagram of rock layers and the key, and answer the questions that follow.



Part A What method would scientists have used to determine the absolute age of the index fossil?

Possible answer: Scientists would have used radioactive dating to find out the absolute age.

Part B Is the limestone layer older than 75 million years or younger than 75 million years? Tell how you could use the law of superposition to answer this question.

Possible answer: The limestone layer is younger than 75 million years. The law of superposition says that the oldest rock layers were laid down first. The limestone layer is on top of the layer with the index fossil. The index fossil has an absolute age of 75 million years, so the limestone layer has to be younger.

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Chapter Assessment

Weather and the Water Cycle

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
G	1. The layer of air closest to Earth's surface	A. air mass
B	2. The weight of the atmosphere pressing down on Earth	B. air pressure
E	3. The process by which water in a fish tank disappears over time	C. atmosphere
D	4. The process by which water changes from a gas to a liquid	D. condensation
A	5. A large body of air that has the same temperature and humidity throughout	E. evaporation
H	6. The movement of water from Earth, to the atmosphere, and back to Earth	F. front
C	7. The blanket of air surrounding Earth	G. troposphere
F	8. The border between two air masses	H. water cycle

Science Concepts 4 points each

Write the letter of the best choice.

D **9.** What is the name of a wind that blows constantly from the same direction?
A. fog **C.** ozone
B. local wind **D.** prevailing wind

F **10.** You know that winter weather where you live is about the same every year. What is this type of weather pattern called?
F. climate **H.** pressure
G. condensation **J.** weather

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D **11.** You are on an island in the Caribbean Sea. Which air mass forms over you?
A. continental polar
B. continental tropical
C. maritime polar
D. maritime tropical

G **12.** Which instrument would you use to measure the pressure of the surrounding air?
F. anenometer
G. barometer
H. hygrometer
J. thermometer

D **13.** Where does most of Earth's weather happen?
A. outer space
B. stratosphere
C. thermosphere
D. troposphere

G **14.** Based on your knowledge of cold and warm air masses, which of the following is true?
F. Warm air is denser than cold air; cold air exerts more pressure.
G. Cold air is denser than warm air; cold air exerts more pressure.
H. Warm air is denser than cold air; warm air exerts more pressure.
J. Cold air is denser than warm air; warm air exerts more pressure.

A **15.** Which has the greatest effect on humidity?
A. air temperature
B. local climate
C. local winds
D. prevailing winds

H **16.** What causes prevailing winds to move in curved paths?
F. Earth's two poles
G. Earth's mountains
H. Earth's rotation on its axis
J. Earth's revolution around the sun

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Inquiry Skills 8 points each

17. It is a cold, rainy day. The weather forecast is for the next day to be warm and sunny. What would you **predict** about the amount of evaporation that will take place on the warm, sunny day? Explain.

Possible answer: The amount of evaporation will be greater on the warm, sunny day than on the cold, rainy day. Sunlight provides the energy that causes water to evaporate.

18. You are planning a vacation to a resort. Before leaving, you **gather data** about weather forecasts for the region. You learn that a continental polar air mass will be over the region when you arrive, but that it will quickly be replaced by a maritime tropical air mass. What kind of weather can you expect when you arrive? How will the weather change after your arrival?

Because of the continental polar air mass, the weather will be cool and dry when you arrive at the resort. When the maritime tropical air mass arrives, the weather will change to hot and humid with the possibility of thunderstorms and perhaps even hurricanes.

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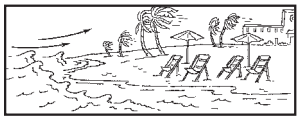
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Critical Thinking 10 points each

19. Ann is writing a report to explain the effect of mountain ranges on weather. What should her report say about the air masses and precipitation on both sides of the mountain?

As air moves up and over mountain ranges, the air cools. Much of the water vapor condenses, resulting in precipitation. At higher elevations, with colder temperatures, snow will be the main form of precipitation. When the air passes to the other side of the mountains, most of the water vapor will no longer be present. The air will warm as it comes down the mountain. There will be little or no precipitation.

20. The diagram shows the wind blowing.



Part A In which direction does the wind blow? Explain why this happens.

The wind is blowing from the sea toward the land because the air over the land is warmer than the air over the sea. The air over land rises, and the air over the sea moves inland.

Part B Why is the seashore a comfortable place to be on hot summer days? Explain.

The seashore is comfortable on hot summer days because a cool breeze blows inland from the sea, as shown in the diagram.

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Chapter Assessment

Earth's Oceans

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
B	1. The part of the ocean floor that drops steeply	A. salinity
F	2. A point of land formed when soft rock wears away	B. continental slope
A	3. A measure of the amount of salt in water	C. abyssal plain
H	4. A wall-like structure that sticks out into the ocean	D. current
G	5. A temporary pool of ocean water	E. shore
C	6. The large, flat area on the bottom of the ocean	F. headland
E	7. The area where the ocean and the land interact	G. tide pool
D	8. A stream of water that flows like a river through the ocean	H. jetty

Science Concepts 4 points each

Write the letter of the best choice.

C **9.** What causes waves to form?
- **A.** Earth rotates on its axis.
- **B.** Currents flow through the ocean.
- **C.** Wind blows over the surface of the water.
- **D.** Earth's gravity pulls the water up and down.

F **10.** How does water in a wave move?
- **F.** in a circle
- **G.** back and forth
- **H.** down to the ocean floor
- **J.** up from the ocean floor

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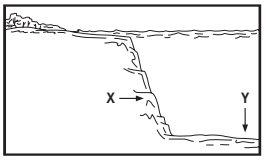
D **11.** What happens as you descend deeper into the ocean?
- **A.** Temperature increases and pressure decreases.
- **B.** Temperature increases and pressure increases.
- **C.** Temperature decreases and pressure decreases.
- **D.** Temperature decreases and pressure increases.

G **12.** Look at the two pictures below. What caused the beach ball to move?



- **F.** gravity
- **G.** a longshore current
- **H.** the phases of the moon
- **J.** an undersea earthquake

Use the diagram below to answer Questions 13–14.



C **13.** Which part of the ocean is labeled **X**?
- **A.** abyssal plain
- **B.** continental shelf
- **C.** continental slope
- **D.** mid-ocean ridge

H **14.** Which of the following would **not** be found on the part of the ocean that is labeled **Y**?
- **F.** active volcanoes
- **G.** deep trenches
- **H.** deep canyons formed by rivers
- **J.** mountains formed by plate movement

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C **15.** How is an estuary different from other ocean environments?
- **A.** It receives little light.
- **B.** It does not attract many organisms.
- **C.** Fresh water and salt water mix there.
- **D.** It is where streams join to form a river.

H **16.** Which statement about beach restoration is **not** true?
- **F.** Beach restoration may cost millions of dollars.
- **G.** During beach restoration, channels can be reopened.
- **H.** Beach restoration causes permanent changes to a beach.
- **J.** After beach restoration, the slope of the beach may be changed.

Inquiry Skills **8 points each**

17. If you were at the shore during a hurricane and the winds were strong and gusty, what kinds of waves would you **observe**? **Infer** what the shoreline would look like after the hurricane.

Possible answer: The strong, gusty winds would cause waves to surge stronger and higher than normal waves. The waves would be choppy and capped with white. After the storm, the shore might be eroded.

18. Rainwater flows along the side of a street, carrying leaves and twigs and depositing them where the flow turns a corner, which makes the flow slow down. Is this a good **model** for longshore currents that carry beach materials? Explain.

Possible answer: Yes; longshore currents drop their sediments at a place where the current slows, just as the flow of rainwater deposits leaves and twigs as it slows to turn a corner.

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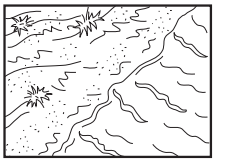
Critical Thinking **10 points each**

19. Why are waves usually bigger in an ocean than in a small lake?

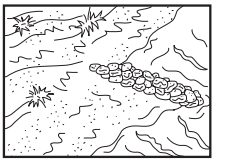
The size of a wave depends on the area of the water and the strength of the wind. The wind may blow with the same strength over the lake and over the ocean, but the ocean surface is larger. So, the wind blows over a longer distance as it moves over the ocean, producing larger waves.

20. Look at the pictures. Picture X shows a natural beach. Picture Y shows a beach with a jetty. Include information from the pictures in your answers to the questions below.

X



Y



Part A How does a jetty work?

A jetty traps sand carried by the longshore current. Picture Y shows that sand has built up before the jetty.

Part B Why might some beach property owners oppose the building of jetties?

Picture Y shows that erosion has occurred past the jetty. This is why property owners past a jetty might object.

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Chapter Assessment

Earth, Moon, and Beyond

Vocabulary **4 points each**

Use the letters of the terms in the box to complete the sentences.

A. solar system	**C.** planet	**E.** universe	**G.** moon phase
B. galaxy	**D.** constellation	**F.** star	**H.** axis

1. The sun is a F, a huge ball of very hot gases.
2. The imaginary line that passes through Earth's poles is Earth's H.
3. Each shape the moon seems to have throughout a month is called a G.
4. A pattern of stars is a D.
5. Everything that exists, including planets, stars, dust, and gases, is the E.
6. The gravitational force of a star holds a C in orbit around it.
7. A B contains a group of stars, gas, and dust.
8. A A is made up of a star and all the planets and other objects that revolve around it.

Science Concepts **4 points each**

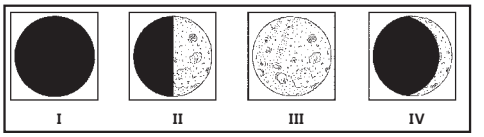
Write the letter of the best choice.

C **9.** How are Earth and the moon alike?
- **A.** Both have liquid water.
- **B.** Both have satellites.
- **C.** Both are rocky and dense.
- **D.** Both have a thick atmosphere.

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Use the drawings to answer Questions 10–11.



J **10.** Which of the drawings represents the waxing crescent moon?
- **F.** I
- **G.** II
- **H.** III
- **J.** IV

B **11.** Which of the drawings represents the first-quarter phase of the moon?
- **A.** I
- **B.** II
- **C.** III
- **D.** IV

H **12.** Which of these is the basis for timekeeping on Earth?
- **F.** hemispheres
- **G.** satellites
- **H.** time zones
- **J.** distance from the sun

C **13.** Which of these occurs when it is summer in the Northern Hemisphere?
- **A.** Earth has its winter equinox.
- **B.** The Southern Hemisphere is tilted toward the sun.
- **C.** The sun's rays strike the Northern Hemisphere directly.
- **D.** Earth's equator experiences three months of darkness.

F **14.** Which is a true statement about the planets in our solar system?
- **F.** Only Earth has liquid water.
- **G.** The inner planets are made of frozen gases.
- **H.** The outer planets are located in an asteroid belt.
- **J.** Jupiter is the only outer planet that is small and rocky.

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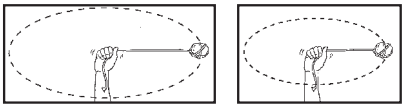
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B 15. Which is **not** a type of galaxy?
- A. barred spiral
- B. circular
- C. elliptical
- D. irregular

F 16. Which of these causes seasonal changes on Earth?
- F. Earth's orbit and tilt
- G. the shape of the sun's orbit
- H. the changing shape of Earth's orbit
- J. Earth's position in relation to the moon

Inquiry Skills 8 points each

Use the pictures to answer Questions 17–18.



17. If you tie a string to a rock and spin the rock in a circle, you are **modeling** the orbit of Earth (the rock) around the sun (your hand). What would happen if the string were only half as long and still being turned with the same force, as shown in the picture on the right?

Possible answers: The rock would orbit the hand much faster. The orbit would be shorter.

18. **Use time and space relationships** to compare the two pictures with Earth's orbit around the sun and the moon's orbit around Earth.

Possible answer: The distance between Earth and the moon is much smaller than the distance between Earth and the sun. This means that the moon orbits Earth much faster than Earth orbits the sun. So, the picture on the right represents the moon orbiting Earth, and the picture on the left represents Earth orbiting the sun.

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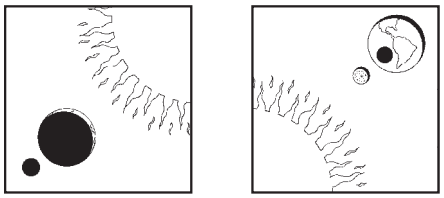
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Critical Thinking 10 points each

19. Compare the advantages and disadvantages of crewed space explorations and space probes.

Possible answer: Space probes, which are robots, can go where humans cannot go and do not need food or water. But humans can think and make decisions when problems occur.

20. The diagrams below show two kinds of eclipses.



I II

Part A Identify the kind of eclipse shown in each diagram.

Picture I: lunar eclipse; Picture II: solar eclipse

Part B Explain how you identified each diagram.

In Picture I, the moon is in Earth's shadow, which causes a lunar eclipse. In Picture II, the moon is between Earth and the sun, so the moon casts a shadow on Earth. This is a solar eclipse.

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Unit Assessment

Write the letter of the best choice. 3 points each

C 1. Which statement about Earth's atmosphere is true?
- A. Most weather occurs in the highest of the four layers.
- B. The atmosphere is a very thick layer surrounding Earth.
- C. Most gases in the atmosphere are in the layer closest to Earth.
- D. The higher in the atmosphere you go, the higher the air pressure.

G 2. What is the main cause of wind?
- F. ocean currents that change direction
- G. uneven heating of Earth's surface by the sun
- H. differences in the rate of rotation at Earth's surface
- J. changes in the amount of ozone in the troposphere

C 3. Taylor is staying at a hotel at the beach. The weather is sunny and warm. He rushes outdoors to fly a kite at 6:00 A.M., but there is no wind. By 10:00 A.M., a good breeze is blowing. What happened between 6:00 A.M. and 10:00 A.M.?
- A. The prevailing winds started blowing after sunrise.
- B. A climate change came through and brought wind with it.
- C. The sun heated the land more quickly than the sea, and a sea breeze formed.
- D. The sun heated the sea more quickly than the land, and a land breeze formed.

G 4. Which process occurs when water that is heated by the sun becomes water vapor?
- F. condensation
- G. evaporation
- H. precipitation
- J. runoff

A 5. Which is a measure of the relative amount of moisture in the air?
- A. humidity
- B. oxygen level
- C. temperature
- D. wind speed

F 6. Which is **not** a factor that affects the climate in a particular area?
- F. ozone in the stratosphere
- G. distance from Earth's poles
- H. shape of the local landforms
- J. distance from a body of water

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B 7. Which pattern is generally true?
- A. As temperature increases, humidity decreases.
- B. As temperature decreases, air pressure increases.
- C. As air pressure increases, precipitation increases.
- D. As air pressure decreases, temperature decreases.

G 8. Which instrument measures air pressure?
- F. anemometer
- G. barometer
- H. hygrometer
- J. wind vane

A 9. The weather has been hot and humid for days. Then thunderstorms pass through, traveling from west to east. The weather is cooler and drier for the next few days. What probably happened?
- A. A cold front moved through.
- B. A warm front moved through.
- C. A continental tropical air mass left.
- D. A maritime tropical air mass arrived.

G 10. What is the main difference between weather and climate?
- F. Climate has a pattern; weather has no pattern.
- G. Weather changes from day to day; climate stays the same for years.
- H. Climate is affected by landforms and ocean currents; weather is not.
- J. Weather is driven by the sun; climate is driven by prevailing winds.

B 11. What would be about the same at the ocean's surface and 1000 meters below the surface?
- A. amount of light
- B. salinity
- C. temperature
- D. water pressure

H 12. Your friend has drawn a picture that shows a scuba diver waving to a person inside the submersible *Alvin*, which is resting on the bare, flat abyssal plain. What is wrong with your friend's picture?
- F. The abyssal plain is hilly, not flat.
- G. There should be seaweed growing on the ocean floor.
- H. The diver would be crushed by water pressure at that depth.
- J. The submersible cannot travel to the ocean floor.

C 13. Which statement is true?
- A. Waves carry water across the ocean.
- B. Waves break only during a storm surge.
- C. Waves carry the energy through the ocean.
- D. Waves are caused by tides pulling water onto the shore.

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H **14.** Which is the largest current?
- **F.** longshore current
- **G.** rip current
- **H.** surface current
- **J.** tidal current

C **15.** What causes tides?
- **A.** the force of giant waves called tsunamis
- **B.** temporary pools of water on the shoreline
- **C.** the pull of gravity of the moon and the sun
- **D.** prevailing winds blowing across the ocean surface

G **16.** Which feature would you find at a sandy shore?
- **F.** cliff
- **G.** flat beach
- **H.** sea arch
- **J.** tide pool

A **17.** On the beach, you find a clipboard that someone left behind. The clipboard contains this page of notes.

Sandy Beach Project Plan
• Build jetty to stop longshore current.
• Dredge sand from channel.
• Dump dredged sand on beach.
• Consider an artificial reef.

What kind of project is the clipboard's owner working on?
- **A.** restoring a beach
- **B.** mapping currents
- **C.** rescuing sea creatures
- **D.** exploring hydrothermal vents

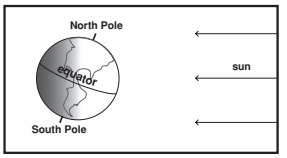
H **18.** What causes the weather pattern known as El Niño?
- **F.** acid rain
- **G.** air pollution
- **H.** changes in winds and currents
- **J.** a hole in the atmosphere

A **19.** Why are there high tides and low tides each day?
- **A.** Earth rotates on its axis once a day.
- **B.** Earth revolves around the sun each day.
- **C.** The moon revolves around Earth each day.
- **D.** Earth tilts toward the moon each day.

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H **20.** Look at the diagram. What season is it in the Northern Hemisphere?



- **F.** autumn
- **G.** spring
- **H.** summer
- **J.** winter

D **21.** Why is it warmer during summer than winter?
- **A.** Earth is closer to the sun.
- **B.** More warm fronts pass through.
- **C.** There are fewer clouds to reflect sunlight.
- **D.** Sunlight strikes Earth's surface more directly.

G **22.** On the radio, you hear this announcement: "If you look in the sky between 9:45 and 10:15 tonight, you may notice that the moon looks red. Don't be alarmed—it's just the moon passing through Earth's shadow." What is being described?
- **F.** a full moon
- **G.** a lunar eclipse
- **H.** a new moon
- **J.** a solar eclipse

A **23.** Which is a reason that the moon has more craters than Earth?
- **A.** Most space objects burn up in Earth's atmosphere.
- **B.** Earth's surface weathers more slowly than the moon's.
- **C.** The moon's greater gravity pulls more space objects toward it.
- **D.** The moon's moderate temperatures encourage crater formation.

G **24.** A story describes astronauts arriving on Jupiter. When they land, they are careful to avoid the 300-year-old storm. Through their spaceship's window, they admire the dozens of moons in Jupiter's sky. Then they put on their spacesuits and step out onto Jupiter's hard, rocky surface.

Which detail tells you that this story is fiction?
- **F.** dozens of moons
- **G.** hard, rocky surface
- **H.** spaceship has a window
- **J.** 300-year-old storm

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Write the answer to each question. **7 points each**

25. How do fronts affect weather changes?

Possible answer: At a front, rising warm air cools and forms clouds. Precipitation usually follows.

26. Contrast how Earth rotates and how it revolves.

Possible answer: Earth rotates around its axis. It rotates once every 24 hours, which makes a day. Earth revolves around the sun on a path called its orbit. It takes about 365 days, or one year, to make a complete trip around the sun.

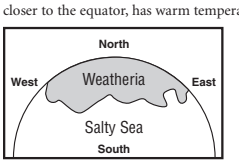
27. Surfers often watch weather forecasts for the open ocean hundreds or even thousands of miles away from their favorite beach. A big wind storm far out at sea is exciting news for surfers, especially if the storm does not reach land. Why would surfers be interested in storms that do not even reach their beach?

Possible answer: Energy from the wind forms ripples, which join to form waves. Then the waves travel as energy across the ocean. Winds far out at sea can form big waves that travel across the ocean, even if the storm does not.

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28. The diagram shows the imaginary continent of Weatheria, with the nearby Salty Sea. Weatheria, which is farther north, has cool temperatures. The Salty Sea, which is closer to the equator, has warm temperatures.



Part A What kind of air mass would form over the continent of Weatheria? Describe the properties of the air mass.

Possible answer: A continental polar air mass would form over the continent of Weatheria. That air mass would be cool and dry.

Part B What kind of air mass would form over the Salty Sea? Describe the properties of the air mass.

Possible answer: A maritime tropical air mass would form over the Salty Sea. That air mass would be warm and humid.

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Unit E • Chapter 14

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Date _____

Chapter Assessment

Properties of Matter

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. A measure of how much mass is in a volume of matter	A. atom
F	2. A chart that organizes elements by atomic number	B. element
A	3. The smallest particle of matter that still acts like that kind of matter	C. density
D	4. A tiny particle made up of two or more atoms joined together	D. molecule
G	5. The center of the atom, where protons and neutrons are	E. mixture
H	6. A combination of two or more substances that are evenly mixed	F. periodic table
E	7. A combination of two or more different substances	G. nucleus
B	8. Matter made up of only one type of atom	H. solution

Science Concepts 4 points each

Write the letter of the best choice.

B 9. Which is **not** an example of matter?
- A. air
- B. heat
- C. soil
- D. water

F 10. A pan of water boils until all of it evaporates into the air. What property of the water is the same after this change?
- F. mass
- G. state
- H. temperature
- J. volume

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15	16	17	18
			2 He Helium
7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton

A 11. The diagram shows a piece of the periodic table. Use information in the table to decide which statement is true.
- A. Sulfur has 16 protons.
- B. Se is the symbol for silicon.
- C. The symbol for argon is Arg.
- D. Helium has the most protons.

G 12. Which item is an example of a solution?
- F. vegetable soup
- G. drink mix and water
- H. raisin bread
- J. tossed salad

D 13. Which process would change the mass of an iron bolt?
- A. bending
- B. freezing
- C. melting
- D. rusting

H 14. Which is a physical change?
- F. combustion
- G. corrosion
- H. recycling
- J. reactivity

D 15. A copper penny has a mass of about 4 grams. A copper kettle has a mass of about 400 grams. What is true about the density of these two objects?
- A. The kettle is 100 times as dense as the penny.
- B. The penny is denser because its mass is in a smaller volume.
- C. Their densities are different because they are different shapes.
- D. Their densities are the same because they are made of the same substance.

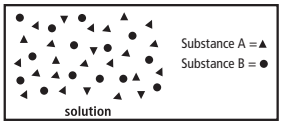
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H 16. Cara is investigating a substance. When she first picks it up, it keeps its shape. But after it warms up in her hand, it flows between her fingers and drips onto the table. After she puts an ice cube on the drips, she can pick them up again. Which choice best describes these changes?
- F. A solution separates, then recombines.
- G. A mixture goes through a chemical change.
- H. A solid melts into a liquid and freezes back into a solid.
- J. A liquid freezes into a solid and melts back into a liquid.

Inquiry Skills 8 points each

17. The diagram shows a solution made by dissolving Substance A in Substance B. What do you **observe** about the particles of the substances?



Possible answer: The particles of the two substances are evenly mixed.

18. A winter weather forecast says that the temperature will rise past the melting point of water early in the day, so you can expect the ice on the roads to melt. Toward evening, the temperature will fall past the freezing point of water, so you should expect the roads to be icy again. Your cousin complains that the forecast has two different names for the same temperature, 0°C. **Infer** why the same temperature has two different names and how to tell which name to use.

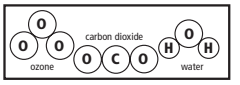
Possible answer: Water changes between the solid and liquid states at 0°C. If it is changing from solid (ice) to liquid (water), then 0°C is called the melting point. If it is changing from liquid (water) to solid (ice), then it is called the freezing point.

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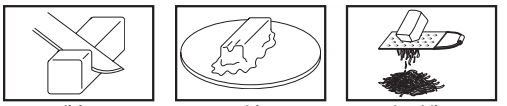
Critical Thinking 10 points each

19. The picture shows models of three different molecules. Which model shows a molecule of an element? Explain.



Possible answer: The ozone molecule is an element. An element is made up of just one kind of atom. The carbon dioxide molecule has two kinds of atoms: carbon and oxygen. The water molecule has one oxygen and two hydrogen atoms.

20. The pictures show chunks of cheese going through changes. Observe the pictures, and then answer the questions below.



Part A Identify each change as a physical change or a chemical change. Explain your answer.

Possible answer: All three changes are physical changes. In a physical change, the substance does not change. Slicing and shredding cheese changes its shape, but it is still cheese. Melting it makes it a liquid, but it is still cheese.

Part B Compare the mass and volume of the cheese before and after it is sliced. What term do scientists use to describe what happens to the mass and volume of the cheese?

Possible answer: The mass and volume of the cheese are the same after it is sliced as they were before. Scientists say that the mass and volume of the cheese have been *conserved*.

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Name _____
Date _____

Chapter Assessment

Energy

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. The ability to cause a change in matter	A. convection
G	2. Energy due to an object's condition or position	B. chemical energy
H	3. Energy of motion	C. energy
B	4. Stored energy that can be released by a chemical reaction	D. conservation
F	5. Direct transfer of thermal energy from one object to another	E. radiation
A	6. Transfer of thermal energy by the movement of a gas or liquid	F. conduction
E	7. Movement of thermal energy by electromagnetic waves	G. potential energy
D	8. Saving something so that it doesn't get used up	H. kinetic energy

Science Concepts 4 points each

Write the letter of the best choice.

C 9. Which of the following has potential energy?
- A. a ball that has been batted
- B. a rock sitting at the bottom of a hill
- C. a piece of pottery on the edge of a high shelf
- D. a hockey stick lying on the garage floor

F 10. Which activity uses the most energy?
- F. driving a car
- G. kicking a ball
- H. shouting to a friend
- J. solving a math problem

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B 11. Neal made a table to show types of energy and their sources.

Type of Energy	Source
chemical energy	electrical outlet
light energy	sun
mechanical energy	food
nuclear energy	laser beam

Which type of energy is correctly paired with its source?
- A. chemical energy
- B. light energy
- C. mechanical energy
- D. nuclear energy

J 12. Which is a renewable source of energy?
- F. coal
- G. natural gas
- H. oil
- J. wind

C 13. Heat can be transferred by various processes.



Which process is shown in the picture?
- A. conduction
- B. conservation
- C. radiation
- D. reflection

G 14. Which of these causes the temperature of the air to rise?
- F. Particles in the air move more slowly.
- G. Particles in the air move more quickly.
- H. Particles in the air lose kinetic energy.
- J. Particles in the air gain potential energy.

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Name _____

A 15. Why do some pots have a layer of copper on the bottom?
- A. Copper is a good conductor of heat.
- B. Copper creates convection, which heats food.
- C. Copper increases the pot's mechanical energy.
- D. Copper is an insulator that keeps food from burning.

G 16. Eric added hot water to cold water. The cold water heated up. Which process caused the heating?
- F. conduction
- G. convection
- H. radiation
- J. solar energy

Inquiry Skills 8 points each

17. Look at the two pictures. In which picture would you **infer** that air particles are moving more quickly? Explain.



A



B

Picture A shows the scene with the higher temperature; the higher the temperature, the more quickly air particles move.

18. One shed is made of metal. One shed is made of wood. **Draw a conclusion** about the temperature inside each shed in summer and in winter. Explain.

Compared to the shed made of wood, the inside of the metal shed will have a higher temperature in summer and a lower temperature in winter. In the summer, the metal shed absorbs more heat; in the winter, the metal shed more readily loses heat to the surroundings.

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Name _____

Critical Thinking 10 points each

19. What types of material should you wear when it's cold? Explain why these materials would keep you warm.

When it's cold, you should wear materials that are good insulators, such as wool and fleece. Insulators keep heat trapped near your body.

20. A certain type of calculator can run with or without a battery in the light. In the dark, it runs only with a battery.

Part A What kind of energy does this calculator need to run? How can you tell?

Possible answer: The calculator needs electric energy produced from either solar energy or chemical energy (from the battery). I can tell because in the light it doesn't need the battery, but in the dark it does.

Part B Does this calculator use renewable or nonrenewable resources? Explain.

Possible answer: The calculator uses both renewable and nonrenewable resources. Solar energy is renewable, but the chemical energy stored in the battery is not.

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Unit E • Chapter 16

Name _____
Date _____

Chapter Assessment

Electricity

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	1. A form of energy produced by moving electrons	A. conductor
F	2. A wire with electric current, wrapped around an iron bar	B. current electricity
H	3. The buildup of charges on an object	C. electricity
E	4. The flow of electrons through a conductor	D. electric circuit
A	5. A material that carries electricity well	E. electric current
G	6. A material that does not carry electricity well	F. electromagnet
D	7. A complete path that electric current follows	G. insulator
B	8. A kind of kinetic energy caused by flowing electrons	H. static electricity

Science Concepts 4 points each

Write the letter of the best choice.

D 9. Which unit measures the amount of electrical energy a device uses each second?
- A. amp
- B. electron
- C. volt
- D. watt

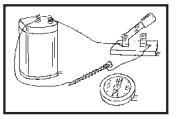
F 10. Which part of an atom is involved in electricity?
- F. electron
- G. neutron
- H. nucleus
- J. proton

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Name _____

D 11. Clara pushes down the handle on a toaster. The wires inside the toaster heat up and turn red. When the toast is done, the handle pops up and the wires cool down. What part of an electric circuit did Clarissa operate?
- A. battery
- B. conductor
- C. insulator
- D. switch

G 12. Look at the diagram. What will happen when the switch is closed?
- F. The battery will recharge.
- G. The compass needle will turn.
- H. A spark will jump from the nail.
- J. The wire will become an insulator.



C 13. Which are examples of electrical conductors?
- A. plastic, rubber
- B. wood, paper
- C. copper, aluminum
- D. glass, pottery

F 14. A purring cat rubs up against its owner's wool pants. When the cat stops, it is still happy, but its fur is standing on end. What is happening?
- F. The strands of the cat's fur are repelling one another.
- G. The strands of the cat's fur are attracting one another.
- H. The cat's fur caused a static discharge on the wool pants.
- J. Electrons suddenly jumped from the wool pants to the cat's fur.

B 15. Which kind of circuit is used for the wiring in buildings?
- A. electromagnetic
- B. parallel
- C. series
- D. static

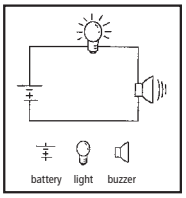
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Name _____

G 16. Thunderstorms bring lightning. If you are swimming or boating when a thunderstorm is on the way, you must get out of the water immediately. Given this information, which statement is probably true?
- F. Water is an insulator.
- G. Water is a conductor.
- H. Water has many volts in it.
- J. Water can cause a static discharge.

Inquiry Skills 8 points each

17. Examine the circuit diagram. **Predict** what will happen if the buzzer is removed. Explain the reason for your answer.



If the buzzer is taken out of the circuit, then the bulb will go out, because it is a series circuit. In a series circuit, current has to go through every part of the circuit for it to work.

18. **Plan an experiment** to find out whether damp clothes can be electrically charged by rubbing them against each other. Include a test using dry clothes for a comparison.

Students' experimental designs should include the kind of clothing they will use (what material); a test while the clothing is dry; how they will make the clothing damp; how long they will rub the clothing; and how they will test the clothing to see if it has an electric charge (perhaps by testing whether it attracts lightweight objects).

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Critical Thinking 10 points each

19. Describe a device from your everyday life that changes electricity into another form of energy. Explain how many steps take place during the change, and name the kinds of energy that electricity turns into.

Answers will vary. All answers should include a device that uses electricity (for example, radio, computer, dishwasher, flashlight) and a description of the kind of energy that comes out of the device (sound, light, motion, or heat). If a device produces more than one type of energy, then most or all forms should be listed.

20. Suppose a news report describes a risk to drivers who are filling a gas tank. If the driver slides into the driver's seat while the tank is filling and then slides back out and touches the gas pump, gasoline fumes may catch fire. (This kind of fire is rare. The risk would be for drivers of cars with cloth upholstery.)

Part A What happens while the driver is sliding into and out of the driver's seat? How could this lead to a fire?

Possible answer: When the driver slides across the seat of the car, his or her clothes rub against the seat. Electrons move from the seat to the clothes or from the clothes to the seat. The driver and the seat become electrically charged. When the driver touches the gas pump, there is a spark (static discharge), which can set the fumes on fire.

Part B How can the driver prevent this kind of fire while filling the gas tank?

Answers will vary. One way to prevent a fire is to stay out of the car while filling the gas tank. Another way is to touch the side of the car before touching the gas pump so that there would be no spark at the pump.

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Chapter Assessment

Sound and Light

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
G	1. A back-and-forth movement of matter	A. frequency
H	2. The loudness of a sound	B. opaque
D	3. The bouncing of light off a surface	C. pitch
B	4. Not letting light pass through	D. reflection
C	5. How high or low a sound is	E. refraction
A	6. The number of vibrations per second of a sound	F. translucent
F	7. Letting some light pass through	G. vibration
E	8. The bending of light as it moves from one material to another	H. volume

Science Concepts 4 points each

Write the letter of the best choice.

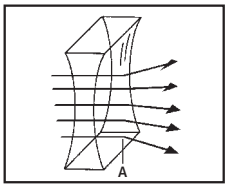
C 9. Which surface would bounce back almost all the light waves that hit it?
- A. clear plastic
- B. frosted glass
- C. mirror
- D. water

H 10. What do waves **not** transmit?
- F. energy
- G. light
- H. matter
- J. sound

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Name _____

Use the picture to answer questions 11–12.



A 11. What type of lens is shown?
- A. concave
- B. convex
- C. opaque
- D. translucent

J 12. What happens at point A?
- F. compression
- G. magnification
- H. reflection
- J. refraction

B 13. Sophia shouts down a well and hears an echo. What causes the echo?
- A. Sound is absorbed at a surface.
- B. Sound is reflected from a surface.
- C. The frequency of sound vibrations increases.
- D. The frequency of sound vibrations decreases.

F 14. Teresa is making a bar graph to show how quickly sound waves travel through different materials. Which material will have the shortest bar on her graph?
- F. cold air
- G. steel
- H. warm air
- J. water

A 15. How are X rays different from radio waves?
- A. X rays have higher energy.
- B. Radio waves have higher frequencies.
- C. X rays pass through matter more slowly.
- D. Radio waves cannot travel through space.

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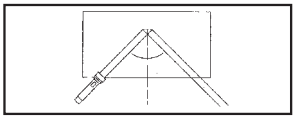
J 16. Javier has tightened a string on his guitar. What effect will this have?
- F. The pitch of the string will be lower.
- G. The string will vibrate more slowly.
- H. The string will make a softer sound.
- J. The pitch of the string will be higher.

Inquiry Skills 8 points each

17. Mike put two nails on a sponge. Nail A is longer than Nail B. Mike will tap on each nail to produce a sound. **Predict** how the pitches of the sounds will differ.

Possible answer: Nail A is longer than Nail B. This means that the sound produced by tapping Nail A will have a lower pitch than the sound made by tapping Nail B.

18. Study the following diagram. **Predict** what would happen to the angle of reflection if you increased the angle of incidence. **Design an experiment** to test your prediction.



Possible answer: An increase in the angle of incidence causes an increase in the angle of reflection. To test this prediction, set the flashlight at different angles, increasing the angle of incidence each time. Measure and record each angle of incidence and reflection.

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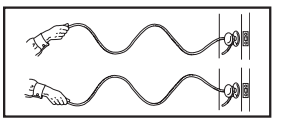
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Critical Thinking 10 points each

19. Suppose you have just returned from a sunny day at the beach. You're hungry from playing in the waves in the ocean, so you warm up some leftover roast beef in the microwave. While you wait for your food, you turn on the kitchen radio. Tell how many kinds of waves were present in the events just described.

Students should identify the following: water waves in the ocean; light waves from the sun; microwaves inside the microwave oven; radio waves transmitted to the radio; sound waves from the radio.

20. The pictures below show a rope that is tied to a doorknob. A person is moving the rope to produce a wave.



Part A What type of wave moves along the rope? Explain.

As the rope moves up and down, the wave travels to the right. This kind of wave is a transverse wave.

Part B Which travels like the wave on the rope: sound waves or light waves? Explain.

Light waves are also transverse waves, so they travel like the wave on the rope. A sound wave is a compression wave. In a compression wave, the particles vibrate in the same direction as the wave travels.

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Unit E

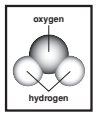
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Unit Assessment

Write the letter of the best choice. **3 points each**

D **1.** Which is an example of matter?
- **A.** electricity
- **B.** heat
- **C.** light
- **D.** water

H **2.** What does this model represent?



- **F.** atom
- **G.** element
- **H.** molecule
- **J.** solution

C **3.** Which is an element?
- **A.** carbon dioxide
- **B.** hydrogen peroxide
- **C.** iron
- **D.** rust

G **4.** Sasha measures the volume of a cube of aluminum and a cube of wood. Both are 1 cm on each side. Then she measures the mass of each cube. The aluminum has a mass of 2.7 g, and the wood has a mass of 0.72 g. What property is Sasha comparing?
- **F.** combustibility
- **G.** density
- **H.** melting point
- **J.** state of matter

A **5.** Two substances are involved in a chemical change. Which statement describes what is true after the change?
- **A.** A new substance has formed.
- **B.** The two substances formed a solution.
- **C.** The two substances can be separated again using a magnet.
- **D.** The physical properties of the two substances have not changed.

J **6.** Which is a chemical property?
- **F.** boiling point
- **G.** density
- **H.** melting point
- **J.** reactivity

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B **7.** Which statement best describes the energy in this picture?



- **A.** Orange C has more energy than Orange A.
- **B.** Orange A has more potential energy than Orange C.
- **C.** Oranges A, B, and C all have the same amount of kinetic energy.
- **D.** Orange B has more chemical (food) energy than either of the other oranges.

H **8.** Which of the following does **not** possess kinetic energy?
- **F.** a pitcher winding up for a pitch
- **G.** a swinging baseball bat
- **H.** a ball caught in a catcher's mitt
- **J.** a baseball moving toward center field

D **9.** Which is an example of electric energy?
- **A.** ice cream melting in the sun
- **B.** music made by an electric guitar
- **C.** movements of a battery-powered toy
- **D.** energy of moving electrons lighting a bulb

G **10.** A car engine burns gasoline. The burning gasoline moves a series of parts that end up turning the wheels. What kind of energy transfer is this?
- **F.** chemical to electrical
- **G.** chemical to mechanical
- **H.** electrical to mechanical
- **J.** mechanical to heat

C **11.** Which is **not** a method of heat transfer?
- **A.** conduction
- **B.** convection
- **C.** insulation
- **D.** radiation

F **12.** What will you experience if you grab the hot handle of a pot on the stove?
- **F.** conduction
- **G.** convection
- **H.** radiation
- **J.** reflection

D **13.** Which of these energy resources is renewable?
- **A.** coal
- **B.** natural gas
- **C.** oil
- **D.** sunlight

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H **14.** Which is an advantage of switching to renewable energy resources instead of using nonrenewable fossil fuels?
- **F.** They cost less to use than fossil fuels.
- **G.** The same resources work all over the country.
- **H.** They are replaced naturally and cannot be used up.
- **J.** The same resources can run cars and trucks, as well as energy stations.

C **15.** Armin spilled a box of paper clips behind a wooden shelf. He wrapped a long piece of wire around a steel rod. He hooked the wire up to a battery and then used the rod to pick up the paper clips. What did Armin make?
- **A.** electric insulator
- **B.** electric motor
- **C.** electromagnet
- **D.** electroscope

F **16.** What causes static electricity?
- **F.** buildup of charges on an object
- **G.** electricity from an electric clothes dryer
- **H.** chemical energy from an electric battery
- **J.** charges produced when two substances combine

B **17.** When you turn on a lamp, how does electric energy change?
- **A.** to kinetic energy
- **B.** to light energy
- **C.** to chemical energy
- **D.** to potential energy

J **18.** Which electric appliance uses the least energy when used for ten minutes?
- **F.** 1500-watt burner
- **G.** 1350-watt skillet
- **H.** 2700-watt oven
- **J.** 1000-watt microwave oven

D **19.** You should never use a metal fork to take bread out of an electric toaster. After unplugging the toaster, you can use special toast tongs to safely remove stuck bread. Which material would be safest for toast tongs?
- **A.** aluminum
- **B.** copper
- **C.** steel
- **D.** wood

F **20.** How would you describe the pitch of a violin string that is vibrating very quickly?
- **F.** high
- **G.** loud
- **H.** low
- **J.** soft

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B **21.** Solar flares are huge explosions on the sun that give off large amounts of energy from the electromagnetic spectrum. Which of the following would **not** be included in a scientist's description of a solar flare?
- **A.** radio waves
- **B.** sound waves
- **C.** visible light
- **D.** X rays

F **22.** When Carmine the cat wants to be heard, he goes to a special place in the house where sound echoes. There he meows until his owners pay attention. Where is Carmine's special place?
- **F.** in the shower stall
- **G.** in a clothes closet
- **H.** under a bedspread
- **J.** behind thick curtains

B **23.** Which statement about a convex lens is true?
- **A.** It reflects light waves.
- **B.** It brings light waves together.
- **C.** It makes objects look smaller.
- **D.** It spreads light waves apart.

H **24.** A frontier family made a window by rubbing grease all over a thick piece of paper. When the paper was used as a window, it let in light, but the family could not see through it. Which word describes the greased paper?
- **F.** opaque
- **G.** reflective
- **H.** translucent
- **J.** transparent

Write the answer to each question. **7 points each**

25. Kevin is at the beach with his family. He opens a cooler that is filled with ice, but he forgets to close the lid. Summer sunlight shines on the ice. Explain what happens to the ice, and to the mass of the ice, after Kevin leaves the cooler lid open.

Possible answer: After Kevin leaves the cooler lid open, the ice melts. Energy from the sun heats the ice by radiation. The sun keeps heating the ice until all its particles have broken free and the ice has changed state into liquid water. The mass of the water that came from the ice is the same as the mass of the ice.

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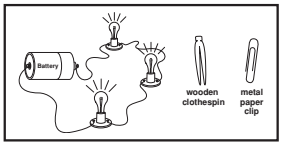
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26. Two friends make a toy telephone by connecting two paper cups with string. How does this toy telephone work?

Possible answer: Talking into the cup makes the air in the cup vibrate, and it makes the cup vibrate. The string vibrates because it is attached to the cup. The string carries the sound waves to the other cup. On the other end, the vibrating string makes the cup vibrate. The cup makes the air inside of it vibrate. The air makes the listener's eardrum vibrate, and the listener hears the speaker's words.

27. Use the diagram to answer the questions that follow.



Part A Predict what would happen to the circuit on the left if one of the bulbs burned out. Tell how you know.

Possible answer: This is a series circuit. If one of the bulbs burned out, there would be a break in the circuit. None of the other bulbs would light because current would no longer flow through the circuit.

Part B Which of the objects shown on the right could be used as a switch, and which could not? Explain.

Possible answer: The paper clip could be used as a switch because it is made of metal, which is a good conductor. The clothespin could not be used as a switch because current does not flow through wood, which is an insulator.

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28. In a baseboard heating system, each room has a heater near the floor, at the bottom of one wall. Baseboard heaters transfer thermal energy to the air around them. Then thermal energy spreads throughout the entire room from that one heater. It is important not to put anything above a baseboard heater. If you do, thermal energy will not reach all parts of the room.

Part A How is thermal energy transferred from the air around the baseboard heater to the air throughout the room?

Possible answer: Because air is a gas, thermal energy is transferred from the air around the baseboard heater to the air throughout the room by convection.

Part B What would happen if you placed a piece of furniture, such as a table, over a baseboard heater?

Possible answer: If you put a table over a baseboard heater, only the air under the table would be warmed. Convection would not transfer thermal energy to the rest of the room.

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Chapter Assessment

Forces

Vocabulary 4 points each

Match each term in Column B with its meaning in Column A.

	Column A	Column B
A	1. A push or pull that causes changes in motion	A. force
B	2. A force that opposes motion	B. friction
D	3. The force of attraction that Earth exerts on objects	C. fulcrum
		D. gravity
G	4. A wheel with a groove for a rope	E. inclined plane
F	5. A bar that makes it easier to move things	F. lever
E	6. A ramp or sloping surface	G. pulley
H	7. A device, made of only a few parts, that makes work easier	H. simple machine
C	8. The balance point of a lever	

Science Concepts 4 points each

Write the letter of the best choice.

C **9.** What is the purpose of a simple machine?
- **A.** to reduce work
- **B.** to increase friction
- **C.** to make work easier
- **D.** to increase buoyancy

G **10.** In which of these situations is work done?
- **F.** Juan pushes against a brick wall.
- **G.** Sean throws a football 20 yards.
- **H.** Maria holds a book in her hands.
- **J.** Marcus thinks of an essay topic.

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D **11.** A batter hits a baseball, sending it soaring into the air. Which term best describes the forces on the moving ball?
- **A.** balanced
- **B.** combined
- **C.** simple
- **D.** unbalanced

F **12.** Two arm wrestlers exert a force on each other's hands, and the hands don't move. Which term describes the forces?
- **F.** balanced
- **G.** strong
- **H.** unbalanced
- **J.** weak

C **13.** Two boys push on a box, to the left. They each apply a force of 50 N. At the same time, a third boy pushes on the box, to the right, using a force of 50 N. What is the net force on the box?
- **A.** 0 N
- **B.** 50 N, to the right
- **C.** 50 N, to the left
- **D.** 100 N, to the right

G **14.** What type of machine are a wedge, a chisel, and an axe?
- **F.** compound machine
- **G.** inclined plane
- **H.** pulley
- **J.** wheel-and-axle

A **15.** Which is **not** a simple machine?
- **A.** bicycle
- **B.** doorknob
- **C.** ramp
- **D.** seesaw

J **16.** Which force operates when you use a bar magnet to pick up paper clips?
- **F.** buoyancy
- **G.** friction
- **H.** gravity
- **J.** magnetism

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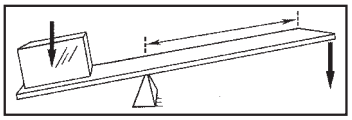
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Unit F • Chapter 18/Chapter 19

Name _____

Inquiry Skills **8 points each**

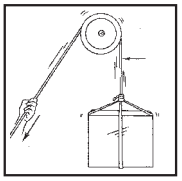
17. Sarah is using the lever shown below. She will push down on the free end of the lever to raise the load.



Compare the force she exerts with the load.

The force she applies (effort) is less than the load. The lever reduces the amount of force she must exert to lift the load.

18. Maxwell set up this pulley to raise the block. **Communicate** by telling how the pulley makes Maxwell's job easier.



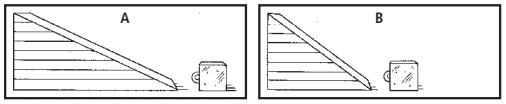
Although the pulley doesn't multiply Maxwell's effort force, it does change its direction. It is easier to pull down on the rope to raise the object than to push the object upward.

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Critical Thinking **10 points each**

19. Ramp A is longer and less steep than Ramp B. Use these two ramps to explain the meaning of this statement: "Most machines make work easier by trading force for distance."



Students' answers should indicate that the amount of force needed to move the object will decrease as the length of the ramp increases but that the effort must be exerted through a longer distance. (The product of force and ramp length will be constant.)

20. Alexander has been studying buoyancy. He placed an empty, sealed plastic bottle in water and recorded the results in his science journal.

Part A What did Alexander record in his journal?

Students' answers should indicate that the bottle floated because the buoyant force on the bottle was equal to or greater than the bottle's weight.

Part B Alexander poured some sand in the bottle and placed the bottle back in the water. What happened to the bottle?

Students' answers should indicate that the bottle floated or sank, depending on the amount of sand added. The bottle would sink only when the buoyant force was less than the weight of the bottle and its contents.

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Chapter Assessment

Motion

Vocabulary **4 points each**

Match each term in Column B with its meaning in Column A.

	Column A	Column B
C	**1.** The distance an object travels in a certain time	**A.** acceleration
B	**2.** The tendency of an object to resist a change in motion	**B.** inertia
		C. speed
D	**3.** The distance an object travels in a certain direction in a certain time	**D.** velocity
A	**4.** The rate at which an object's velocity changes	

Science Concepts **4 points each**

Write the letter of the best choice.

B **5.** A heavy ball and a light ball are rolling at the same speed on the same surface. Why will the heavy ball be harder to stop?
- **A.** It has greater velocity.
- **B.** It has greater momentum.
- **C.** It experiences greater friction.
- **D.** It has greater acceleration.

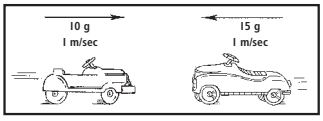
G **6.** A marble rolls steadily at a speed of 1 m/sec in one direction for 2 minutes. What property of the marble changes?
- **F.** acceleration
- **G.** position
- **H.** speed
- **J.** velocity

C **7.** If the same force acts on each of the following objects, which will have the greatest acceleration?
- **A.** a baseball
- **B.** a football
- **C.** a golf ball
- **D.** a soccer ball

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H **8.** Which is the same about the two toy cars?



- **F.** mass
- **G.** momentum
- **H.** speed
- **J.** velocity

C **9.** Chris jumps up and puts a basketball in the basket. What object pushes against Chris so he can jump?
- **A.** the ball
- **B.** the basket
- **C.** the floor
- **D.** the scoreboard

H **10.** A car is stopped at a red light. The light turns green and the car starts accelerating 10 km/hr every second. What will its speed be at the end of 3 seconds?
- **F.** 3 km/hr
- **G.** 13 km/hr
- **H.** 30 km/hr
- **J.** 300 km/hr

D **11.** As you walk, your feet push against the ground. At the same time, the ground pushes against your feet. Which of the following explains this?
- **A.** momentum
- **B.** Newton's first law
- **C.** Newton's second law
- **D.** Newton's third law

G **12.** A train is traveling on a curved track at a constant speed. Why is the train accelerating?
- **F.** The train travels faster around a curved track.
- **G.** The direction of the train is constantly changing.
- **H.** The train's size will eventually slow it down.
- **J.** The clockwise direction of the train is constant.

A **13.** Which of these can you probably pick up by exerting just 1 newton of force?
- **A.** apple
- **B.** bicycle
- **C.** car
- **D.** elephant

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Unit F • Chapter 19/Unit F

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G **14.** Why do astronauts "float" while they are in orbit?
- **F.** There is no gravity in space.
- **G.** Inertia and gravity are balanced in orbit.
- **H.** The space shuttle escapes Earth's gravity.
- **J.** Earth's gravity and the moon's gravity are balanced in orbit.

D **15.** Suppose you are watching a football game from a seat near the top of the stadium. Which term describes your position and all the things around you?
- **A.** gravity
- **B.** inertia
- **C.** motion
- **D.** frame of reference

H **16.** A truck, a car, a motorcycle, and a train are all moving at the same speed. Which has the most momentum?
- **F.** car
- **G.** motocycle
- **H.** train
- **J.** truck

Inquiry Skills **8 points each**

17. Corey has tied an object to a string and is whirling it around in circles over his head. Use one of Newton's laws to **predict** what will happen to the object if Corey lets go.

Newton's first law says that an object that is moving will keep moving in a straight line unless there is a force to change its motion. If Corey lets go, the object will fly off in a straight line. The object will eventually fall to the ground because of the pull of gravity.

18. Nani and Kim are testing their derby cars to find out whose car rolls faster. Nani lets her car roll down a sandpaper-covered ramp. Kim pushes her car down a smooth plastic ramp. **Identify the variables** in this test, and tell which variables you would **control** in order to determine which car design results in greater speed.

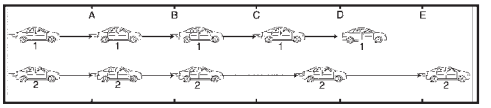
The variables include the car design, the surface of the ramps, the height of the ramps, and the way each girl starts the car. To test the variable of car design, you would hold the other variables constant.

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Critical Thinking **10 points each**

19. Compare and contrast the velocity and acceleration of the two cars. Then explain what must have happened to Car 2 at Point B.



Car 1 and Car 2 have the same velocity until Point B. Then only Car 2 accelerates. A force must have acted on Car 2 at Point B to make it change its motion.

20. Sarah hits a softball so hard that it travels far beyond the reach of any outfielders.

Part A Use Newton's third law of motion to describe what happens as Sarah hits the ball.

Newton's third law of motion says that for every action, there is an equal and opposite reaction. The action is Sarah's bat hitting the ball. The reaction is the ball hitting the bat.

Part B According to Newton's first law of motion, what would Sarah's softball do if there were no forces acting on it after she hit it? What two forces keep Sarah's softball from doing this?

Sarah's softball would keep moving in the same direction and at the same speed forever unless a force changed its motion. Friction with the air is one force that slows the ball down, and the force of gravity pulls the ball back to Earth.

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Unit Assessment

Write the letter of the best choice.

C **1.** Which is **not** a force?
- **A.** friction
- **B.** gravity
- **C.** heat
- **D.** magnetism

J **2.** Which is an example of acceleration?
- **F.** a runner moving at 12 km/hr for 1 hour
- **G.** a car traveling at 90 km/hr for 60 kilometers
- **H.** a skateboarder rolling at 1 m/sec for 20 seconds
- **J.** a scooter slowing from 10 km/hr to 0 km/hr in 2 seconds

B **3.** Toni and Tammi both start sledding at the top of a hill after some snow has melted. Toni slides quickly downhill. Tammi stays in place. Which force is the same on both girls?
- **A.** friction
- **B.** gravity
- **C.** lift
- **D.** thrust

G **4.** Sarah is climbing a wall in a rock-climbing gym. Her hands are sweaty, so she puts chalk dust on them to get a better grip. What force does Sarah increase by using the chalk dust?
- **F.** buoyant force
- **G.** friction
- **H.** gravity
- **J.** net force

A **5.** Which factor would give a planet a greater gravitational pull?
- **A.** more mass
- **B.** faster speed
- **C.** higher velocity
- **D.** greater distance

G **6.** What always results from an unbalanced force?
- **F.** a net force of zero
- **G.** a change in motion
- **H.** an increase in speed
- **J.** a change of direction

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D **7.** Which is an example of balanced forces?
- **A.** children swinging
- **B.** a child climbing up a ladder
- **C.** children going up and down on a seesaw
- **D.** a tug-of-war in which the rope does not move

J **8.** Terrence pushes a box with a force of 80 N to the right. His friend Carter is pushing the box in the same direction, with a force of 60 N. What is the net force on the box?
- **F.** 0 N
- **G.** 20 N
- **H.** –20 N
- **J.** 140 N

A **9.** Marvin fills a dishpan to the brim with water. He places a toy boat that weighs 9 N on the water, and water with a weight of 5 N spills out. What can you conclude from this information?
- **A.** The boat sinks.
- **B.** The boat floats.
- **C.** The boat rolls over.
- **D.** The boat sinks but then rises.

J **10.** Which phrase correctly describes what most simple machines do?
- **F.** reduce the amount of work
- **G.** change the net force on an object to zero
- **H.** increase the total energy put into a system
- **J.** reduce the amount of force needed to do work

B **11.** Which product equals work?
- **A.** force × friction
- **B.** force × distance
- **C.** mass × velocity
- **D.** mass × mass

G **12.** Which is a compound machine?
- **F.** doorknob
- **G.** lawn mower
- **H.** pulley
- **J.** ramp

B **13.** What is the pivot point of a lever called?
- **A.** bar
- **B.** fulcrum
- **C.** wedge
- **D.** wheel

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G **14.** A croquet ball lands in a pond. Buoyant force pushes it up with a force of +4.0 N. Gravity pulls it down with a force of –4.5 N. What is the net force on the croquet ball?
- **F.** 0.5 N
- **G.** –0.5 N
- **H.** 8.5 N
- **J.** –8.5 N

B **15.** Which statement about astronauts orbiting Earth is correct?
- **A.** They are weightless.
- **B.** They are accelerating.
- **C.** The net force on them is zero.
- **D.** The moon's gravity keeps them in orbit.

G **16.** A volleyball is falling toward Diego. He hits it with his fist, and it moves back toward the other team. What is the ball's change of direction an example of?
- **F.** constant velocity
- **G.** Newton's first law
- **H.** Newton's second law
- **J.** Newton's third law

A **17.** A car travels 96 km in 2 hours. What is its speed?
- **A.** 48 km/hr
- **B.** 94 km/hr
- **C.** 98 km/hr
- **D.** 192 km/hr

G **18.** Hannah rides her bicycle at 24 km/hr along a straight road for 1 hour. Tanya rides her bicycle at 24 km/hr around an oval track for 1 hour. What is different about their motion?
- **F.** their speed
- **G.** their acceleration
- **H.** the total distance they ride
- **J.** the friction they produce

C **19.** Which force causes a teardrop to roll down someone's cheek?
- **A.** buoyancy
- **B.** friction
- **C.** gravity
- **D.** magnetism

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G **20.** Suppose you are traveling in a car and you apply the brakes to slow it down. Which of the following is true?
- **F.** The forces on the car become balanced.
- **G.** The forces on the car become unbalanced.
- **H.** The forces on the car are all zero.
- **J.** The momentum of the car increases.

B **21.** Which would have the **least** friction?
- **A.** socks on carpet
- **B.** a hockey puck on ice
- **C.** a car tire on concrete
- **D.** wood on wood

F **22.** If you push a chair with your hand, what is the force from your hand called?
- **F.** action force
- **G.** inertia
- **H.** momentum
- **J.** reaction force

C **23.** If Earth pulls on a box with a force of 10 N, how much force does the box exert on Earth?
- **A.** 0 N
- **B.** 5 N
- **C.** 10 N
- **D.** –10 N

G **24.** Roy hits a baseball with a bat, and the ball flies through the air. Which statement is true?
- **F.** The forces on the baseball were balanced.
- **G.** The ball hit the bat when the bat hit the ball.
- **H.** The ball accelerated during the hit, but the bat did not.
- **J.** The less force Roy uses, the more the ball accelerates.

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Write the answer to each question. **7 points each**

25. Jupiter has the most mass of all the planets in our solar system. In 1994, a comet named Shoemaker-Levy 9 got so close to the planet Jupiter that it crashed into it instead of passing by or going into orbit around it. Use your understanding of gravitational force to explain why the comet crashed into Jupiter (not one of the other planets), and why its nearness to Jupiter made it crash.

Possible answer: Gravitational force is stronger for objects that have more mass. It is also stronger when two objects are close together. Jupiter has the most mass of all the planets, so it also exerts the strongest gravitational force. The comet passed so close to Jupiter that Jupiter's gravity was strong enough to pull it in.

26. Use one of the laws of motion to explain why car crashes are more dangerous than trip-and-fall accidents.

Possible answer: According to Newton's second law, force = mass × acceleration. Cars have more mass and move faster than people who are walking. The greater force involved in car crashes makes them more dangerous than trip-and-fall accidents.

27. Can a car be driven at a constant speed and have a changing velocity? Explain.

Possible answer: Yes; an object's velocity is its speed and its direction. An object can change its direction without changing its speed, thereby changing its velocity.

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28. Chris, Billie, and Dana are bowling. Each child rolls one ball straight at the pins. The data table shows the mass and velocity of their rolls.

Bowler	Mass of ball (kg)	Velocity (m/s)	Momentum
Chris	5	6	**30**
Billie	4	8	**32**
Dana	3	9	**27**

Part A The ball with the most momentum knocks over the most pins. Use the equation **momentum** = **mass** × **velocity** to complete the data table. Which player's ball had the most momentum?

Billie's bowling ball (32 kg-m/s)

Part B Some bowlers suggest that in order to knock over the most pins, you should use the most massive ball you can. Can the data in the table help you decide whether this is good advice? If not, can you think of a better way to collect the data? Remember what you have learned about conducting experiments and controlling variables as you answer these questions.

Possible answer: The data may not be reliable. Three different people bowl; they probably differ in strength and skill, and each probably throws the ball in a different way. Also, there is just one set of data. You could gather more reliable data by having the same bowler throw balls of different mass and seeing if the bowler knocked over more pins using the ball with the greatest mass after repeated throws with each ball.

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