Answer Key

Directed Reading A

SECTION: YOU ARE HERE

1. A map is a model of the Earth's surface.
2. They noticed that as a ship sails away, it sinks below the horizon.
3. B
4. A
5. A
6. B
7. D
8. B
9. compass
10. magnetic declination
11. C
12. C
13. parallels
14. C
15. A
16. B
17. D
18. hemispheres
19. grid

SECTION: MAPPING THE EARTH'S SURFACE

1. Answers will vary. Sample answer: Because a globe is too small to show many details, such as roads and rivers.
2. map
3. distortion
4. shape, size, direction, and distance
5. a map of a smaller area
6. cones, cylinders, and planes
7. B
8. C
9. A
10. D
11. cylindrical projection
12. azimuthal
13. A
14. B
15. scale
16. compass rose
17. B
18. computers
19. radar
20. radio
21. latitude, longitude, and elevation
22. geographic information system

SECTION: TOPOGRAPHIC MAPS

1. topographic
2. elevation
3. United States Geological Survey
4. B
5. C
6. A
7. D
8. elevation
9. B
10. C
11. A
12. E
13. D
14. cross
15. It means the contour line crosses a valley or stream. The V points towards the higher elevation.
16. gentle
17. steep
18. tops of hills, mountains, and depressions
19. Depressions are marked with short, straight lines inside the circle that point downslope to the depression.

Directed Reading B

SECTION: YOU ARE HERE

1. B
2. C
3. D
4. D
5. A
6. A
7. D
8. A
9. D
10. locations
11. latitude
12. parallels
13. equator
14. North Pole
15. longitude
16. prime meridian
17. grid

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SECTION: MAPPING THE EARTH'S SURFACE

1. A
2. A
3. A
4. less
5. planes
6. Mercator
7. straight
8. conic
9. poles
10. distance
11. B
12. C
13. A
14. C
15. remote sensing
16. camera
17. satellites
18. radar
19. GPS
20. GIS

SECTION: TOPOGRAPHIC MAPS

1. A
2. D
3. contour lines
4. relief
5. contour interval
6. steep
7. gentle
8. index
9. C
10. C
11. A
12. D
13. C
14. B
15. A

Vocabulary and Section Summary

SECTION: YOU ARE HERE

1. A map is a representation of the features of a physical body such as Earth.
2. True north is the direction to the geographic North Pole.
3. Magnetic declination is the difference between the magnetic north and the true north.
4. Latitude is the distance north or south from the equator; expressed in degrees.
5. The equator is the imaginary circle halfway between the poles that divides Earth into the Northern and Southern Hemispheres.
6. Longitude is the distance east or west from the prime meridian; expressed in degrees.
7. The prime meridian is the meridian, or line of longitude, that is designated as 0° longitude.

SECTION: MAPPING THE EARTH'S SURFACE

1. Cylindrical projection is a map projection that is made by moving the contents of the globe onto a cylinder.
2. A conic projection is a map projection that is made by transferring the sur face features of the globe onto a cone.
3. An azumithal projection is a map projection that is made by moving the surface features of the globe onto a plane.
4. Remote sensing is the process of gathering and analyzing information about an object without physically being in touch with the object.

SECTION: TOPOGRAPHIC MAPS

1. A topographic map is a map that shows the surface features of Earth.
2. Elevation is the height of an object above sea level.
3. A contour line is a line that connects points of equal elevation.
4. A contour interval is the difference in elevation between one contour line and the next.
5. Relief is the variations in elevation of a land surface.
6. The index contour on a map is a darker, heavier contour line that is usually every fifth line and indicates a change in elevation.

Section Review

SECTION: YOU ARE HERE

1. Sample answer: Lines of latitude are also referred to as parallels. Lines of longitude are also known as meridians. The equator is an imaginary circle that divides the Earth into the Northern and Southern hemispheres. The prime meridian is the line that represents 0° longitude.
2. Sample answer: True north is the direction to the Earth's geographic North Pole.
3. D
4. Lines of latitude and lines of longitude are alike because they are both used to describe locations on Earth. Lines of latitude are different from lines of longitude because lines of latitude are lines that are parallel to the equator, whereas lines of longitude are lines that pass through the poles.
5. Sample answer: A compass needle will point in the direction of the north magnetic pole. You can use this information to find general directions on Earth.

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6. True north is the direction to the geographic North Pole. Magnetic north is the direction to the Earth's natural magnetic pole. True north and magnetic north have different locations.
7. Lines of latitude and lines of longitude form a grid system that can be used to find locations on the Earth's surface.
8. (69 mi ÷ 0.621mi) × 1 km = 111.11 km
9. This location is impossible because the greatest measure of latitude is 90º and the greatest measure of longitude is 180°.
10. Because the compass points to magnetic north, it is important to know the magnetic declination at your location. This will help you make corrections to adjust for the difference between true north and magnetic north.

SECTION: MAPPING THE EARTH'S SURFACE

1. Sample answer: A cylindrical projection transfers information from a curved surface onto a cylinder. An azimuthal projection transfers information from a curved surface onto a flat plane. A conic projection transfers information from a curved surface onto a cone.
2. B
3. Maps should include a title, a scale, a legend, a compass rose, and a date. The title describes the subject of the map; the scale, legend, and compass rose help the reader use the map; and the date describes the age of the map.
4. A GPS unit uses satellite technology to pinpoint the latitude, longitude, and elevation of the area you are in.
5. Radar is useful when mapping cloudy areas because radar waves can travel through clouds.
6. Sample answer: A conic projection would be the best map projection to use when mapping a landmass that has more area from east to west than from north to south.
7. Sample answer: A map of North America would most likely have a small scale, because a map of a large area would not show much detail. A map of my city would have a larger scale, because this map would show more detail.
8. cylindrical projection
9. The areas near the North Pole are most distorted.
10. The areas nearest the equator are the least distorted.

SECTION: TOPOGRAPHIC MAPS

1. Sample answer. A topographic map shows the surface features of the Earth. A contour interval is the difference in elevation between two adjacent contour lines. Relief is the difference in elevation between the highest and lowest points of the area being mapped.
2. A
3. Topographic maps use contour lines to show the surface features of Earth. Symbols indicate other features.
4. If the relief of an area is large, a topographic map of the area will have a large contour interval. If the relief of an area is small, a topographic map of the area will have a small contour interval.
5. Contour lines never cross. The spacing of contour lines depends on the slope characteristics of an area. Contour lines that cross a valley or a stream are V shaped and the V points upstream. The tops of mountains and the bottoms of depressions are shown by closed circles. Depressions are marked with short, straight lines inside the circle that point downslope.
6. 30 ft × 5 = 150 ft; 90 ft + 150 ft =240ft
7. The highest point on a hill or mountain is a single point, not a group of points with the same elevation.

Chapter Review

1. Sample answer: True north is the geographic North Pole. Magnetic north refers to the magnetic north pole, which changes.
2. Sample answer: Latitude is the distance north or south from the equator. Longitude is the distance east and west from the prime meridian. Both latitude and longitude are measured in degrees.

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3. Sample answer: The equator is the imaginary circle halfway between the poles that divides the Earth into Northern and Southern Hemispheres and represents 0° latitude. The prime meridian represents 0° longitude. It runs from the North Pole to the South Pole through Greenwich, England.
4. Sample answer: A cylindrical projection is a map projection made by transferring the surface of the globe onto a cylinder. An azimuthal projection is a map projection made by projecting the surface of the globe onto a plane.
5. Sample answer: Contour interval is the difference in elevation between one contour line and the next. An index contour is a darker, heavier contour line that usually occurs every fifth line.
6. Sample answer: The global positioning system is a system of satellites that send radio signals to receivers on Earth. The receivers calculate a given place's latitude, longitude, and elevation. A geographic information system is a computer system that stores information about an area in layers.
7. b
8. c
9. b
10. b
11. b
12. d
13. b
14. Modern mapmakers use satellite and radar technology, GPS, and GIS to make accurate maps.
15. A map legend is important because it defines the set of symbols used in the map.
16. Greenland appears large on a map with a cylindrical projection because of distortion. Maps with a cylindrical projection are increasingly distorted as the distance from the equator increases.
17. Contour lines on a topographic map show the elevation, the relief, and the shape of landforms.
18. A GPS unit receives signals from a system of satellites and then calculates the latitude and longitude of your location.
19. GIS is a computerized system that allows a user to enter different types of information about an area, which is then stored in layers.
20. An answer to this exercise can be found at the end of the Teacher Edition.
21. Sample answer: A date on a map is important because the Earth's surface is constantly changing. The date shows you how old the information is.
22. Sample answer: It is important that maps have scales because a map scale allows the user to determine distances on the map.
23. Sample answer: A topographic map of the Grand Canyon would show contour lines close together, indicating steep slopes.
24. Sample answer: A GIS system would allow the team of engineers to access information about current roads and streets, as well as power lines, sewer lines, and any other information they may need when building a highway.
25. Sample answer: I would want to have a topographic map because this type of map shows the relief of the area rather than only roads and streets.
26. 20 ft
27. It has very large relief.
28. Answers may vary. Sample answer: Two hills are shown on this map.
29. 2,025 ft

Reinforcement

WHERE ON EARTH?

1. a. Reno, Denver, and Philadelphia are all at about 40° north.
   b. Reno: about 120° westDenver: about 105° westPhiladelphia: about 75° west
2. a. Charleston, Charlotte, and Buffalo are all at about 80°west
   b. Charleston: about 33° northCharlotte: about 35° northBuffalo: about 43° north

INTERPRETING A TOPOGRAPHIC MAP

1. C
2. B
3. 7
4. more than 450 m and less than 500 m
5. more than 700 m nd less than 750 m

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6. 2
7. 1,050 m
8. 8-10 km
9. 50 m
10. The V-shaped contour lines show that the river has cut a valley into the landscape.

Critical Thinking

1. Answers may vary. Sample answer: Posidonius was curious about the world around him and questioned everyone's theories, including his own.
2. Answers may vary. Sample answer: People viewed the Earth in a distorted way because of their lack of technology. Although some scientists correctly calculated the size and shape of the Earth, there was no way to prove these theories with their limited technology.
3. The map would be distorted at the North and South Poles and in areas tothe extreme east and west of the center.
4. Answers may vary. Sample answer: Columbus believed that the circumference of the Earth was smaller than it actually is. He also believed that Europe, Africa, and Asia took up a larger portion of the Earth than they do. Therefore, he though India was much closer to Europe than it is.
5. Answers may vary. Sample answer: There was no way for people to communicate across the oceans. Before ships could sail long distances, it was easy for people to think that areas they had not seen do not exist.

Section Quizzes

SECTION: YOU ARE HERE

1. C
2. E
3. G
4. A
5. D
6. B
7. F
8. C
9. B
10. A

SECTION: MAPPING THE EARTH'S SURFACE

1. B
2. F
3. A
4. E
5. D
6. C
7. B
8. A
9. C
10. B

SECTION: TOPOGRAPHIC MAPS

1. D
2. C
3. E
4. A
5. F
6. B
7. A
8. B
9. C

Chapter Test A

1. B
2. C
3. C
4. B
5. B
6. D
7. A
8. B
9. J
10. E
11. D
12. H
13. K
14. I
15. A
16. F
17. L
18. C
19. B
20. G
21. C
22. B
23. A
24. A
25. B

Chapter Test B

1. equator
2. elevation
3. conic projection
4. true north
5. contour lines
6. D
7. D
8. C
9. B
10. A
11. Answers may vary. Sample answer: Satellites and remote sensing equipment
12. Answers may vary. Sample answer: Reporting the position of hurricanes, determining driving directions using GPS, piloting a ship across the ocean
13. True north is the direction to the geographic North Pole, which never changes. Magnetic north is the direction to the magnetic North Pole, which moves over time because of changes in the Earth's magnetic field.
14. Since the distortion of a curved surface is greater over a larger area, the map of the state of Kansas would be more distorted.
15. A topographic map would provide information about the elevation and slope of certain areas on the course.

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This would allow her to anticipate more difficult areas of the course.

16. Yes, since the other planets are spherical, the same methods could be used.
17. The Earth is divided into two halves by the prime meridian, forming two half spheres divided vertically. The Earth is also divided into two halves by the equator, creating two half spheres divided horizontally.
18. Rocky Point would be more difficult to hike. The contour lines are closer together, showing it is steeper than Barrel Hill.
19. The scale indicates that one inch equals five miles. Since the summits are four inches apart on the map, the summits are twenty miles apart.

Chapter Test C

1. B
2. A
3. C
4. B
5. C
6. B
7. D
8. C
9. A
10. D
11. A
12. B
13. C
14. magnetic north pole
15. prime meridian
16. azimuthal
17. sphere
18. reference point
19. North Pole
20. GIS
21. steep
22. B
23. C
24. C

Standardized Test Preparation

READING

Passage 1

1. C
2. F
3. C

Passage 2

1. B
2. G
3. C

INTERPRETING GRAPHICS

1. A
2. H

MATH

1. A
2. F
3. C
4. F
5. D

Vocabulary Activity

1. Factor in the magnetic declination
2. true north
3. contour lines
4. prime meridian
5. remote sensing
6. contour interval
7. cylindrical projection
8. latitude
9. elevation
10. topographic map
11. The treasure is at Palm Bay.

SciLinks Activity

1. They are more like maps because many images are pieced together on a grid and then displayed. They are not one photographic image.
2. Because satellites are able to detect more colors than the naked eye, they are able to see organism concentrations by their color.
3. Scientists are better able to locate mineral deposits from space images rather than mining and destroying the Earth's surface looking for possible mineral deposits.
4. One radar tells whether the measured surface is, for example, a mountain or a valley. Two satellites can tell the elevation of the surfaces, providing a topographic image.

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Performance-Based Assessment

PROCEDURE

1. a. Answers will vary.
   b. Answers will vary.
2. Answers will vary.
3. a. One degree of latitude is about 115 km.
   b. It is a constant distance.
4. Answers will vary.
5. Answers will vary. The straight-line distance will always be shorter.
6. Answers will vary.

ANALYSIS

7. Sample answer: The United States map had a greater error in measurement.
8. Sample answer: The same measurement represents a much larger distance on the United States map than on the state map. The error in measurement will be greater on the United States map because the scale is greater.

Round or Flat?

ANALYZE THE RESULTS

1. Students will likely find that the experimental and actual circumferences are not equal. The two values should be close, however.
2. Answers may vary. Factors that affect this measurement include the angle of the pencils and human error.
3. Sample answer: Because it is impossible to use a tape measure to determine the circumference of the Earth, this procedure offers a good approximation. One disadvantage is that the measurements are not exact.

DRAW CONCLUSIONS

4. Sample answer: yes; It gives a value that is close to the actual value.

Making a Compass

PROCEDURE

4. Answers may vary. Both compasses should be pointing in the same direction.
5. Answers may vary.

Orient Yourself!

ANALYZE THE RESULTS

1. Answers may vary. Students should realize that the path shown on the map did not instruct them to follow the most direct route. They should propose a more direct route to follow. Their proposal should include the direction from one control point to the next.

DRAW CONCLUSIONS

2. This route should be faster. Students should realize that in an orienteering event, participants generally need to determine the quickest route. Some students may also realize that the quickest route is not necessarily the most direct. For example, there may be obstacles in the way (like hills or lakes) that could slow participants down. Orienteering maps include these landmarks.

Topographic Tuber

ANALYZE THE RESULTS

1. The contour interval of the topographic map is 10 m.
2. Steeper parts of the potato will have contour lines that are closer together.
3. Answers may vary. Elevation is indicated by numbers on the contour lines.

DRAW CONCLUSIONS

4. Sample answer: no; Topographic maps do not necessarily start with a 0 m elevation contour line. It is possible to make a topographic map of Sometimes Island showing its contours but it is impossible to know the island's elevation above sea level.
5. Sample answer: no; Flooding an island is not an effective way of mapping it.

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