Review

THE SCIENCE OF PHYSICS

Review Questions

1. Refer to **Table 1** of this chapter to identify at least two areas of physics involved in the following:
   - **a.** building a louder stereo system in your car
   - **b.** bungee jumping
   - **c.** judging how hot an electric stove burner is by looking at it
   - **d.** cooling off on a hot day by diving into a swimming pool

2. Which of the following scenarios fit the approach of the scientific method?
   - **a.** An auto mechanic listens to how a car runs and comes up with an idea of what might be wrong. The mechanic tests the idea by adjusting the idle speed. Then the mechanic decides his idea was wrong based on this evidence. Finally, the mechanic decides the only other problem could be the fuel pump, and he consults with the shop's other mechanics about his conclusion.
   - **b.** Because of a difference of opinions about where to take the class trip, the class president holds an election. The majority of the students decide to go to the amusement park instead of to the shore.
   - **c.** Your school's basketball team has advanced to the regional playoffs. A friend from another school says their team will win because their players want to win more than your school's team does.
   - **d.** A water fountain does not squirt high enough. The handle on the fountain seems loose, so you try to push the handle in as you turn it. When you do this, the water squirts high enough that you can get a drink. You make sure to tell all your friends how you did it.

3. You have decided to select a new car by using the scientific method. How might you proceed?

4. Consider the phrase, "The quick brown fox jumped over the lazy dog." Which details of this situation would a physicist who is modeling the path of a fox ignore?

SI UNITS

Review Questions

5. List an appropriate SI base unit (with a prefix as needed) for measuring the following:
   - **a.** the time it takes to play a CD in your stereo
   - **b.** the mass of a sports car
   - **c.** the length of a soccer field
   - **d.** the diameter of a large pizza
   - **e.** the mass of a single slice of pepperoni
   - **f.** a semester at your school
   - **g.** the distance from your home to your school
   - **h.** your mass
   - **i.** the length of your physics lab room
   - **j.** your height

6. If you square the speed expressed in meters per second, in what units will the answer be expressed?

7. If you divide a force measured in newtons (1 newton = 1 kg•m/s^2) by a speed expressed in meters per second, in what units will the answer be expressed?

Conceptual Questions

8. The height of a horse is sometimes given in units of "hands." Why was this a poor standard of length before it was redefined to refer to exactly 4 in.?

9. Explain the advantages in having the meter officially defined in terms of the distance light travels in a given time rather than as the length of a specific metal bar.

10. Einstein's famous equation indicates that $E = mc^2$, where c is the speed of light and m is the object's mass. Given this, what is the SI unit for E?

Review

ANSWERS

1. **a.** vibrations and wave phenomena, electromagnetism
   b. mechanics, vibrations and wave phenomena
   c. optics, thermodynamics
   d. thermodynamics, mechanics
2. a, d
3. Collect information on different cars, hypothesize about which car best suits your needs, test your hypothesis with test drives, interpret the results of your test drives, rethink your needs, and choose the best car to buy.
4. the fact that the fox is brown and the dog is lazy
5. Answers may vary.
   a. s or das
   b. kg or Mg
   c. m
   d. cm or dm
   e. g or dag
   f. Ms
   g. km
   h. kg
   i. m or dam
   j. cm, dm, or m
6. m^2/s^2
7. kg/s
8. The size of the unit varied depending on who was doing the measuring.
9. The size of the unit is standardized and reproducible.
10. kg•m^2/s^2