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CK-12 Physical Science For  
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Quizzes and Tests



# CK-12 Physical Science For Middle School Quizzes and Tests

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Jean Brainard, Ph.D.

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CHAPTER

1

# The World of Science Assessments

## Chapter Outline

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- 1.1 WHAT IS SCIENCE?
  - 1.2 THE SCOPE OF PHYSICAL SCIENCE
  - 1.3 THE WORLD OF SCIENCE
- 





# 1.1 What Is Science?

## Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

*Circle the letter of the correct choice.*

- An example of a scientific theory is the idea that
  - all objects attract each other.
  - gravity is a dent in the fabric of space and time.
  - radium is a radioactive element.
  - what goes up always comes back down.
- Galileo found evidence to support Copernicus' idea that
  - objects with greater mass have a greater force of attraction.
  - the sun is the center of the solar system.
  - some elements are radioactive.
  - the sun revolves around Earth.
- People began to study astronomy as early as
  - 3500 BC.
  - 350 BC.
  - 400 AD.
  - 1000 AD.
- Which choice best describes the role of laws in science?
  - explaining observations
  - summarizing observations
  - proving theories
  - providing rules for research
- The first step in the evolution of science occurred when someone proposed that
  - all matter consists of atoms.
  - particles of matter are constantly moving.
  - natural events have natural causes.
  - Earth has gravity.

### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Modern Western science began during the Scientific Revolution.
- \_\_\_\_\_ 7. Marie Curie was awarded a Nobel prize for her discovery of the structure of the nucleus of the atom.
- \_\_\_\_\_ 8. The man known as the "father of science" used experiments to test competing theories about light.

\_\_\_\_\_ 9. Science sometimes advances in big leaps.

\_\_\_\_\_ 10. Theories are unproven laws.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Science is a way of learning about the natural world that is based on evidence and \_\_\_\_\_.

12. Drawing general conclusions from many individual observations is known as \_\_\_\_\_.

13. A scientific \_\_\_\_\_ is a broad explanation that is widely accepted because it is supported by a great deal of evidence.

14. The idea that truth about the natural world can be learned through observation and induction is called \_\_\_\_\_ - \_\_\_\_\_.

15. Science withered in Europe during the period known as the \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe how science generally advances.

17. Use an example to show how induction is used in science.

## 1.2 The Scope of Physical Science

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Electricity is
  - a type of matter.
  - a form of energy.
  - a force of nature.
  - none of the above.
- Which statement best describes how energy is related to matter?
  - Energy consists of matter.
  - Energy allows matter to move.
  - Energy forms atoms of matter.
  - Energy is not related to matter.
- You might learn how lenses correct vision problems if you study
  - chemistry.
  - geology.
  - mathematics.
  - physics.
- Which of the following is not a physical science career?
  - automotive mechanic
  - physics teacher
  - chemical engineer
  - social worker
- Physics concepts explain
  - how a thermostat works.
  - what happens to the water when a mud puddle dries up.
  - why foods spoil.
  - two of the above.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Chemistry focuses on atoms and molecules.
- \_\_\_\_\_ 7. The formation of stalactites is a chemical process.
- \_\_\_\_\_ 8. Water waves involve both matter and energy.

- \_\_\_\_\_ 9. Physical science is unrelated to our daily lives.
- \_\_\_\_\_ 10. A forensic scientist prepares and dispenses medicines.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Physical science is the study of \_\_\_\_\_ and energy.
12. Important concepts in \_\_\_\_\_ include the structure, properties, and interactions of matter.
13. A candle burning is an example of a(n) \_\_\_\_\_ change.
14. All of the “stuff” that exists in the universe is \_\_\_\_\_.
15. A(n) \_\_\_\_\_ is a professional who measures and records features on Earth’s surface.

**Short Answer**

*Answer the following questions in complete sentences.*

16. What is a practical problem that might be addressed by physical science? How are matter and energy involved in the problem?

17. Compare and contrast chemistry and physics.

## 1.3 The World of Science

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Thinking like a scientist means
  - being observant.
  - using logic.
  - being curious.
  - all of the above.
- The Scientific Revolution occurred mainly in
  - South America.
  - Africa.
  - Europe.
  - North America.
- The man known as the “father of science” is
  - Aristotle.
  - Galileo.
  - Copernicus.
  - Thales.
- The idea that we can learn the truth about nature through observations and induction is called
  - empiricism.
  - logic.
  - science.
  - evidence.
- Physical science is best defined as the study of
  - motion and forces.
  - electricity and light.
  - chemical reactions.
  - matter and energy.
- In which class would you be most likely to mix chemicals and observe how they interact?
  - physics
  - life science
  - geology
  - chemistry
- Concepts in physics explain why
  - some cleaning products are better for clothes than for dishes.

- b. musical instruments interact with air and become tarnished.
- c. water freezes when it gets very cold.
- d. satellites stay in orbit around Earth.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. Science is defined as a set of facts.
- \_\_\_\_\_ 9. Science generally advances slowly.
- \_\_\_\_\_ 10. Scientists always draw the same conclusions from the same evidence.
- \_\_\_\_\_ 11. Einstein proposed the first law of gravity.
- \_\_\_\_\_ 12. The first woman to win a Nobel prize in science was Irene Joliot-Curie.
- \_\_\_\_\_ 13. Physical science explains much of what you do in your daily life.
- \_\_\_\_\_ 14. Riding a bike involves both matter and energy.
- \_\_\_\_\_ 15. There are few career choices related to physical science.
- \_\_\_\_\_ 16. Advances in physical science make modern life possible.
- \_\_\_\_\_ 17. Chemistry focuses on matter and energy at all scales, from atoms to outer space.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. A scientific \_\_\_\_\_ is a description of what always happens under certain conditions in nature.
- 19. The scientist \_\_\_\_\_ proposed that the sun is at the center of the solar system.
- 20. The methods of modern science are based on the ideas of the philosopher \_\_\_\_\_.
- 21. All of the “stuff” in the universe makes up \_\_\_\_\_.
- 22. Electricity is a form of \_\_\_\_\_.
- 23. A candle burning is an example of a(n) \_\_\_\_\_ change.
- 24. \_\_\_\_\_ gives matter the ability to change.
- 25. Concepts in \_\_\_\_\_ explain how magnets work.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Describe the scientific revolution and its place in modern Western science.

- 27. Think like a scientist. Use induction to draw a logical conclusion based on the data in the **Table 1.1**:

**TABLE 1.1: Temperature and Magnet Strength**

Temperature (degrees Celsius)	Magnet Strength (mass attracted in grams)
-22	280
-21	275
-18	270
-15	265
-13	260
-7	245
-4	220
-2	200

28. Explain why physical science might be called the “science of everything.”

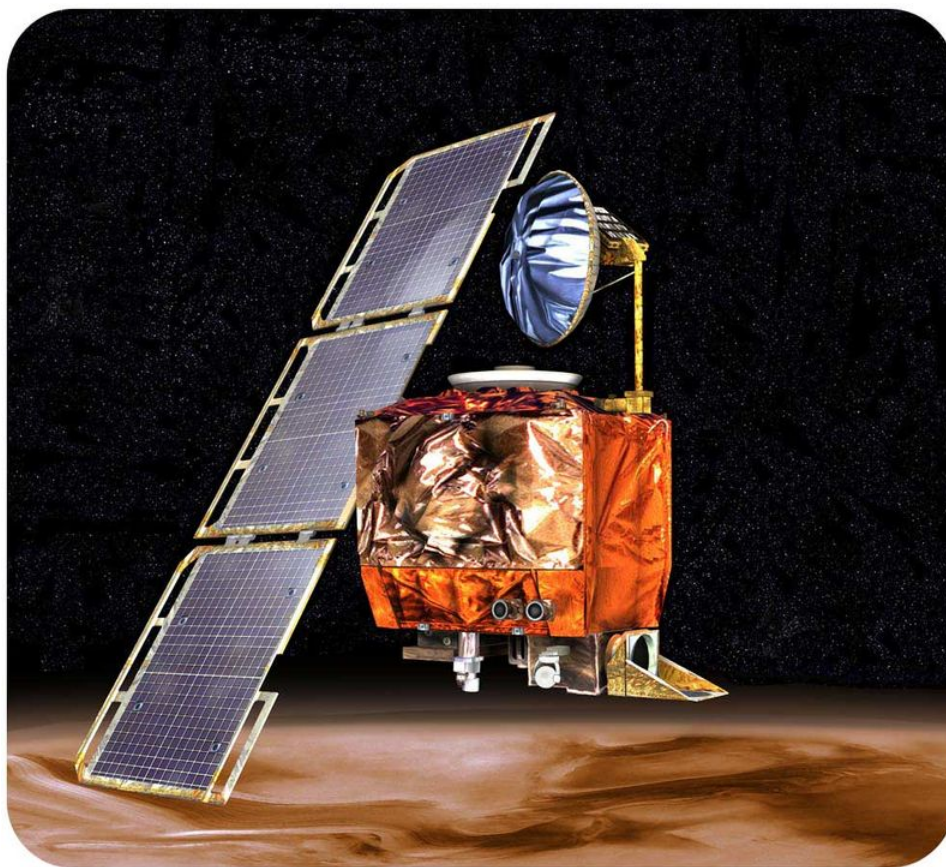
CHAPTER

**2**

# Scientific Research and Technology Assessments

## Chapter Outline

- 2.1 SCIENTIFIC INVESTIGATION
- 2.2 SCIENCE SKILLS
- 2.3 TECHNOLOGY
- 2.4 SCIENTIFIC RESEARCH AND TECHNOLOGY





## 2.1 Scientific Investigation

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The last step in most scientific investigations is
  - making a model.
  - analyzing the evidence.
  - testing the hypothesis.
  - communicating the results.
- Which of the following statements does not meet the criteria for a scientific hypothesis?
  - The moon is made of cheese.
  - Plants can grow in artificial light.
  - Copper is attracted by a magnet.
  - The universe will always exist.
- Any information that is gathered with the senses is
  - a fact.
  - evidence.
  - an observation.
  - an investigation.
- A student did an experiment to test the hypothesis that salt water freezes at a lower temperature than pure water. What is the independent variable in this experiment?
  - temperature of water
  - salt content of water
  - amount of water
  - freezing point of water
- Which factor should be a control in the experiment in question 4?
  - amount of water
  - amount of salt in water
  - temperature at which water freezes
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. There must be at least two variables in an experiment.
- \_\_\_\_\_ 7. Researchers always communicate their results by writing them up in textbooks.
- \_\_\_\_\_ 8. Evidence gathered in an investigation is useful only if it supports the hypothesis.

\_\_\_\_\_ 9. Scientists always follow the steps of a scientific investigation in the same sequence.

\_\_\_\_\_ 10. Scientists do field studies to gather real-world evidence.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A controlled scientific study of a limited number of variables is called a(n) \_\_\_\_\_.

12. A potential answer to a question that can be tested with evidence is a scientific \_\_\_\_\_.

13. The dependent variable in an experiment is also called the \_\_\_\_\_ variable.

14. \_\_\_\_\_ refers to rules for deciding between right and wrong.

15. A(n) \_\_\_\_\_ is a variable in an experiment that is held constant so it will not influence the outcome.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Write a prediction based on the following hypothesis.

Hypothesis: A heavier object falls to the ground faster than a lighter object.

17. Devise a scientific investigation to test the hypothesis in question 16. Outline the steps of your investigation.

## 2.2 Science Skills

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What does SI stand for?
  - a. significant figures
  - b. scientific notation
  - c. international system of units
  - d. a scale for measuring temperature
2. The volume of a liquid is best measured with a(n)
  - a. metric ruler.
  - b. beam balance.
  - c. thermometer.
  - d. graduated cylinder.
3. How close a measurement is to the true value is its
  - a. mean.
  - b. range.
  - c. precision.
  - d. accuracy.
4. An example of a derived quantity is
  - a. width.
  - b. length.
  - c. area.
  - d. none of the above.
5. Which unit could be used for volume?
  - a. cm
  - b.  $\text{cm}^2$
  - c.  $\text{cm}^3$
  - d.  $\text{cm}^4$

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. There are always more significant figures in the answer than in the numbers used in the calculation.
- \_\_\_\_\_ 7. Only numbers greater than 1 can be written in scientific notation.
- \_\_\_\_\_ 8. The best type of graph to show changes in data over time is a circle graph.

\_\_\_\_\_ 9. A percent can be expressed as a fraction or a decimal number.

\_\_\_\_\_ 10. You should never work alone in a science lab.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The kilogram is the basic SI unit for \_\_\_\_\_.

12. \_\_\_\_\_ refers to how exact a measurement is.

13. A representation of an object, system, or process is called a(n) \_\_\_\_\_.

14. A square with each side measuring 5 cm has an area of \_\_\_\_\_.

15. The mean of 10, 20, 30, 40, and 50 is \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Why are models used in science? What are criteria for a useful model?

17. Argue for the use of the same system of units by all scientists.

## 2.3 Technology

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. Technology refers to
  - a. devices such as computers.
  - b. processes such as the Bessemer process.
  - c. methods such as technological design.
  - d. all of the above.
2. The technological design process begins with a(n)
  - a. problem.
  - b. model.
  - c. solution.
  - d. test.
3. Which statement is true about the evolution of computers?
  - a. It began in 2000.
  - b. It is still continuing today.
  - c. The first computers used silicon chips.
  - d. all of the above
4. How are technology and science related?
  - a. Technology and science have the same goal.
  - b. Technology and science use the same scientific method.
  - c. Technology and science help one another advance.
  - d. Technology and science are unrelated.
5. The goal of technology is to
  - a. increase scientific knowledge.
  - b. set the direction that science takes.
  - c. discover new theories.
  - d. solve practical problems.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Constraints on technological design include laws of nature.
- \_\_\_\_\_ 7. The risks of a new technological design should outweigh its benefits.
- \_\_\_\_\_ 8. Nanotechnology is used inside the human body.

\_\_\_\_\_ 9. Technology may be as simple as forks and knives.

\_\_\_\_\_ 10. Fiber optic technology is used in communications.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the application of knowledge to real-world problems.

12. Professionals in technology are generally called \_\_\_\_\_.

13. The development of new technology is known as technological \_\_\_\_\_.

14. Technology is sometimes referred to as applied \_\_\_\_\_.

15. The technology called \_\_\_\_\_ uses sound waves to map the ocean floor.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Identify factors that are likely to be constraints on most technological designs. Give an example of each.

17. How are technology and society related?

## 2.4 Scientific Research and Technology

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- To be useful in science, a hypothesis must be
  - true.
  - testable.
  - replicated.
  - supported by evidence.
- Which statement is true about the responding variable in an experiment?
  - It is the independent variable.
  - It is manipulated by the researcher.
  - It must be controlled by the researcher.
  - none of the above
- The SI scale for temperature is the
  - Celsius scale.
  - Kelvin scale.
  - Metric scale.
  - Fahrenheit scale.
- Which of the following tips should you follow to keep good science records?
  - Use a loose-leaf notebook.
  - Record everything in pencil.
  - Record only the results of experiments.
  - Date all entries.
- What is the range of the following set of data: 32, 36, 42, 19, 23, 34, 22, 55?
  - 23
  - 29
  - 36
  - 74
- Bar graphs are especially useful for
  - showing percent of a whole.
  - comparing values for different types of things.
  - showing how data change over time.
  - showing the average of a set of data.
- How are technology and society related?
  - Technology attempts to solve people's problems.

- b. Technology often makes people's lives easier.
- c. Society influences the direction that technology takes.
- d. all of the above

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. A scientist never repeats any of the steps of a scientific investigation.
- \_\_\_\_\_ 9. An observation is defined as any information gathered with the eyes.
- \_\_\_\_\_ 10. All scientific investigations involve experiments.
- \_\_\_\_\_ 11. Most scientists use the International System of Units.
- \_\_\_\_\_ 12. To measure the liquid in a graduated cylinder, you should read the top of the meniscus.
- \_\_\_\_\_ 13. Derived quantities are calculated from two or more measurements.
- \_\_\_\_\_ 14. Significant figures is a way of writing very large numbers with exponents.
- \_\_\_\_\_ 15. Models are useful in technology but have no place in science.
- \_\_\_\_\_ 16. You can drink but should not eat in a science lab.
- \_\_\_\_\_ 17. Constraints on technological design may include production costs.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. A(n) \_\_\_\_\_ is an investigation of a problem in a real-world setting.
- 19. Another term for the manipulated variable in an experiment is \_\_\_\_\_ variable.
- 20. \_\_\_\_\_ refers to rules for deciding between right and wrong.
- 21. The basic SI unit for length is the \_\_\_\_\_.
- 22. \_\_\_\_\_ refers to the closeness of a measurement to the true value.
- 23. Mass is measured with a \_\_\_\_\_.
- 24. The temperature 100°C equals \_\_\_\_\_ on the Kelvin scale.
- 25. \_\_\_\_\_ is responsible for most of the major advances in medicine.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Outline the steps generally followed in a scientific investigation.

27. Max and a friend took part in a cross-country bike trip. The trip started at 9:00 AM. The **Table 2.1** shows how



far they had traveled from the starting point by the end of each hour of the trip until they reached their destination at 1:00 PM. Choose the best type of graph to represent the data, and then make the graph.

**TABLE 2.1: Time and Distance on Bike Trip**

<b>Time</b>	<b>Distance Traveled from Starting Point (km)</b>
9:00 AM	0
10:00 AM	15
11:00 AM	25
12:00 AM	35
1:00 PM	40

28. Describe an example that shows how science and technology work together to help each other advance.

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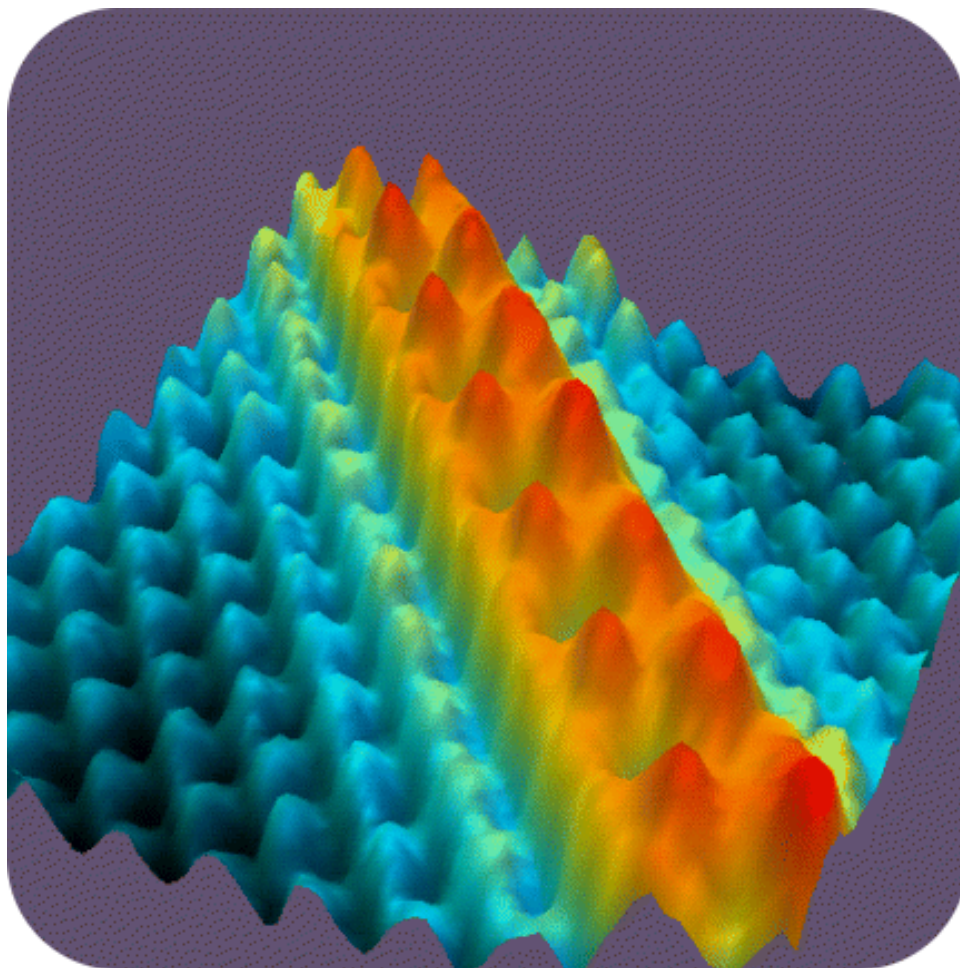
## Answer Key

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**CHAPTER 3****Introduction to Matter Assessments****Chapter Outline**

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- 3.1 PROPERTIES OF MATTER**
  - 3.2 TYPES OF MATTER**
  - 3.3 CHANGES IN MATTER**
  - 3.4 INTRODUCTION TO MATTER**
- 



## 3.1 Properties of Matter

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- All of the following are matter except
  - air.
  - gas.
  - sound.
  - water.
- The volume of a liquid may be measured with a(n)
  - scale.
  - balance.
  - metric ruler.
  - graduated cylinder.
- A physical property of matter is
  - color.
  - flammability.
  - reactivity.
  - none of the above.
- Chemical properties of matter include
  - ability to rust.
  - odor.
  - hardness.
  - all of the above.
- If an object has a mass of 42 kg and a volume of  $2 \text{ m}^3$  what is its density?
  - $84 \text{ kg/m}^3$
  - $44 \text{ kg/m}^3$
  - $21 \text{ kg/m}^3$
  - $0.05 \text{ kg/m}^3$

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The SI unit for liquid volume is the kilogram.
- \_\_\_\_\_ 7. The volume of a liquid depends on the volume of its container.
- \_\_\_\_\_ 8. Physical properties include the ability to conduct heat.

\_\_\_\_\_ 9. Density is a physical property of matter.

\_\_\_\_\_ 10. Weight is measured with a scale.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Anything that has mass and takes up space is \_\_\_\_\_.

12. Matter that can burn has the chemical property of \_\_\_\_\_.

13. The amount of matter in a substance or object is its \_\_\_\_\_.

14. The amount of space taken up by matter is its \_\_\_\_\_.

15. \_\_\_\_\_ is how closely packed the particles of matter are.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe how you could measure the space taken up by a small stone.

17. Explain how an object's weight is related to its mass.

## 3.2 Types of Matter

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The most common element in Earth's crust is
  - water.
  - iron.
  - hydrogen.
  - oxygen.
- The smallest particle of an element that still has the element's properties is a(n)
  - crystal.
  - compound.
  - atom.
  - molecule.
- Aristotle thought there were four elements, including
  - air.
  - earth.
  - water.
  - all of the above.
- Whenever elements combine physically, they form
  - mixtures.
  - solutions.
  - compounds.
  - suspensions.
- Which of the following is the best example of a heterogeneous mixture?
  - raisin bran
  - milk
  - orange juice
  - water

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Atoms of the same element are all alike.
- \_\_\_\_\_ 7. Each compound has a unique set of properties.
- \_\_\_\_\_ 8. Atoms can be seen with a hand lens.

\_\_\_\_\_ 9. There are millions of different elements in the universe.

\_\_\_\_\_ 10. A crystal consists of molecules that are bonded together.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. A pure substance that cannot be separated into any other substances is a(n) \_\_\_\_\_.

12. A(n) \_\_\_\_\_ is a unique substance that forms when two or more elements combine chemically.

13. A combination of two or more substances in any proportions is a(n) \_\_\_\_\_.

14. Gelatin is an example of a type of mixture called a(n) \_\_\_\_\_.

15. A homogeneous mixture in which particles are too small to be seen is a(n) \_\_\_\_\_.

### Short Answer

*Answer the following questions in complete sentences.*

16. Compare and contrast elements and compounds.

17. If you shake together oil and water they temporarily mix. However, after you stop shaking them, the oil eventually floats to the top because it is less dense than water. Explain how you could use this difference in density to separate oil and water.

## 3.3 Changes in Matter

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following is a physical change?
  - baking a cake
  - lighting a match
  - tying a shoelace
  - burning a candle
- After a chemical change has occurred, matter
  - has less mass than before.
  - is the same substance as before.
  - has different chemical properties than before.
  - all of the above
- A sign that a chemical change has occurred is a change in
  - color.
  - shape.
  - size.
  - all of the above.
- An example of a chemical change is
  - cutting hair.
  - washing hair.
  - bleaching hair.
  - none of the above.
- Matter cannot be created or destroyed according to the law of
  - equal matter.
  - changes in matter.
  - conservation of mass.
  - volume and mass.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Making ice cubes with tap water is an example of a chemical change.
- \_\_\_\_\_ 7. All changes in matter can be reversed.
- \_\_\_\_\_ 8. Melting metal changes it into an entirely different substance.

\_\_\_\_\_ 9. The release of gas bubbles is a sign of a chemical change.

\_\_\_\_\_ 10. After a physical change, matter still has the same chemical properties.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A change in which matter becomes an entirely different substances is a(n) \_\_\_\_\_ change.

12. Tearing paper is an example of a(n) \_\_\_\_\_ change in matter.

13. Production of an odor is a sign that a(n) \_\_\_\_\_ change has occurred.

14. A physical change is a change in a(n) \_\_\_\_\_ property of matter.

15. Iron rusting is an example of a(n) \_\_\_\_\_ change in matter.

**Short Answer**

*Answer the following questions in complete sentences.*

16. A dog has greater mass as an adult than she did as a puppy. Has matter been created? Why or why not?

17. A puddle on pavement evaporates in the sun. Explain whether this is a chemical or physical change.



## 3.4 Introduction to Matter

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Examples of matter include
  - light.
  - sound.
  - air.
  - all of the above.
- The amount of space matter takes up is its
  - density.
  - mass.
  - weight.
  - volume.
- Which of the following is a chemical property of matter?
  - ability to conduct heat
  - freezing point
  - boiling point
  - reactivity
- The displacement method could be used to find the
  - mass of an object.
  - weight of a gas.
  - volume of a liquid.
  - volume of a solid.
- Which statement is true about any element?
  - It has a unique set of properties.
  - It is different from all other elements.
  - It can be identified on the basis of its properties.
  - all of the above
- A unique substance that forms when two or more elements combine chemically is a(n)
  - mixture.
  - colloid.
  - compound.
  - solution.
- An example of a chemical change in matter is a(n)
  - twig breaking.

- b. egg frying.
- c. ice cube melting.
- d. plate cracking.

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. The SI unit for mass is the Newton.
- \_\_\_\_\_ 9. A given mass weighs less on the moon than on Earth.
- \_\_\_\_\_ 10. The ability to dissolve in another substance is a chemical property.
- \_\_\_\_\_ 11. Density is the amount of mass in a given volume of matter.
- \_\_\_\_\_ 12. Oxygen is the element that is most common in living things.
- \_\_\_\_\_ 13. Dalton's theory of the atom is basically the same as modern ideas about the atom.
- \_\_\_\_\_ 14. A heterogeneous mixture has the same composition throughout.
- \_\_\_\_\_ 15. The type of mixture with the smallest particles is a suspension.
- \_\_\_\_\_ 16. Physical changes form entirely different substances.
- \_\_\_\_\_ 17. A sign of a chemical change is a change in shape.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. The ability of a substance to combine chemically with other substances is called \_\_\_\_\_.
- 19. All \_\_\_\_\_ has properties of mass and volume.
- 20. The ability of matter to conduct electricity is a(n) \_\_\_\_\_ property of matter.
- 21. A 20-kg object with a volume of 2 m<sup>3</sup> has a density of \_\_\_\_\_.
- 22. \_\_\_\_\_ properties of matter can be measured only when matter changes to different substances.
- 23. The ability of matter to be attracted by a magnet is a(n) \_\_\_\_\_ property of matter.
- 24. A change in the size or shape of matter is a \_\_\_\_\_ change in matter.
- 25. A log burning is an example of a \_\_\_\_\_ change in matter.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Compare and contrast physical and chemical properties of matter.

- 27. Identify types of mixtures, explain how they differ, and give an example of each type.

28. A certain cold remedy is a large tablet that is added to a glass of water. While the tablet dissolves in water, it releases a lot of bubbles. Is a chemical change occurring? How can you tell?

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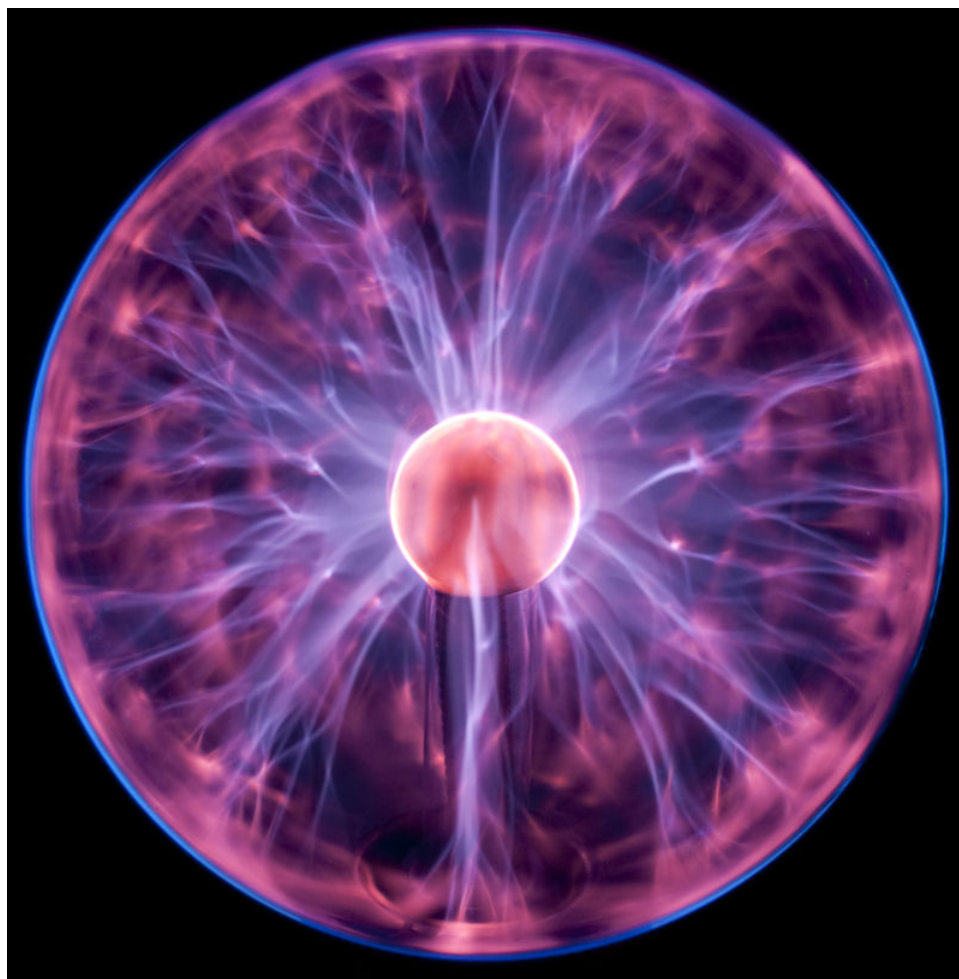
CHAPTER **4**

# States of Matter Assessments

## Chapter Outline

---

- 4.1 SOLIDS, LIQUIDS, GASES, AND PLASMAS
  - 4.2 BEHAVIOR OF GASES
  - 4.3 CHANGES OF STATE
  - 4.4 STATES OF MATTER
- 



## 4.1 Solids, Liquids, Gases, and Plasmas

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. In which state does most of the matter in the universe occur?
  - a. gas
  - b. liquid
  - c. solid
  - d. plasma
2. Which statement is true about crystalline solids?
  - a. Their particles are not arranged in a pattern.
  - b. They take the shape of their container.
  - c. Their particles have a regular repeating pattern.
  - d. Examples include cellulose and candle wax.
3. Honey pours more slowly than vinegar because honey has greater
  - a. surface tension.
  - b. kinetic energy.
  - c. magnetism.
  - d. viscosity.
4. Which of the following states of matter takes the volume of its container?
  - a. gas
  - b. liquid
  - c. solid
  - d. two of the above
5. Matter in the plasma state
  - a. responds to magnetism.
  - b. conducts electricity.
  - c. glows with light.
  - d. all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Particles with the greatest kinetic energy occur in liquids.
- \_\_\_\_\_ 7. Water forms droplets because of surface tension.
- \_\_\_\_\_ 8. When matter changes state, its chemical properties change.

\_\_\_\_\_ 9. Table salt is an amorphous solid.

\_\_\_\_\_ 10. Kinetic energy is energy that moves matter.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Matter with a fixed volume and fixed shape is in the \_\_\_\_\_ state.

12. \_\_\_\_\_ is defined as the ability to cause changes in matter.

13. The state of matter that consists of ions is \_\_\_\_\_.

14. A(n) \_\_\_\_\_ is matter that has a fixed volume but not a fixed shape.

15. A(n) \_\_\_\_\_ has neither a fixed volume nor a fixed shape.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Identify and describe the three states of water that exist on Earth.

17. What is the kinetic theory of matter? How is the theory related to states of matter?

## 4.2 Behavior of Gases

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The pressure of Earth's atmosphere is
  - the same everywhere on Earth's surface.
  - greater at higher altitudes.
  - 14.7 lb/in<sup>2</sup> at sea level.
  - none of the above
- The gas laws describe relationships among the gas properties of pressure, temperature, and
  - mass.
  - shape.
  - energy.
  - volume.
- If you increase the temperature of a gas in a sealed container, particles of the gas will
  - have more energy
  - move more quickly.
  - exert greater pressure.
  - all of the above
- Which law states how the temperature and pressure of a gas are related?
  - Boyle's law
  - Charles's law
  - Amontons's law
  - Kinetic law
- To decrease the pressure exerted by a gas, you could
  - increase its temperature.
  - increase its volume.
  - increase its energy.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. If particles of a gas have room to spread out, they exert greater pressure.
- \_\_\_\_\_ 7. Air pressure is lowest at sea level.
- \_\_\_\_\_ 8. There is an inverse relationship between gas pressure and temperature.

\_\_\_\_\_ 9. A gas will take up less space if its temperature falls.

\_\_\_\_\_ 10. As the volume of a gas increases, its pressure decreases.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the amount of force pushing against a given area.

12. For gas at a given temperature, decreasing its volume \_\_\_\_\_ its pressure.

13. The gas law relating temperature and volume is \_\_\_\_\_ law.

14. If the volume of a gas is held constant, increasing the gas's temperature \_\_\_\_\_ its pressure.

15. Boyle's law states the relationship between the \_\_\_\_\_ and pressure of gases.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain why gases exert pressure.

17. Why do the gas laws apply only to gases? Why don't they apply to solids or liquids?



## 4.3 Changes of State

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What is the scientific definition of temperature?
  - a. average kinetic energy of particles
  - b. amount of heat given off by objects
  - c. melting and boiling points of substances
  - d. none of the above
2. For liquid water to change to water vapor, the water must
  - a. lose energy.
  - b. gain energy.
  - c. boil.
  - d. two of the above
3. What happens when you make ice cubes by putting a tray of water in the freezer?
  - a. The water gains cold from the freezer.
  - b. The particles of water stop moving.
  - c. The temperature of the water falls.
  - d. The water vaporizes.
4. Fog forms by the process of
  - a. evaporation.
  - b. freezing.
  - c. condensation.
  - d. deposition.
5. Snow sublimates to form
  - a. ice.
  - b. liquid water.
  - c. water vapor.
  - d. plasma.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Changes of state occur because matter loses or gains energy.
- \_\_\_\_\_ 7. The boiling point of water is 100 °F.
- \_\_\_\_\_ 8. Changes of state are chemical changes in matter.

\_\_\_\_\_ 9. Water in a mud puddle disappears because it vaporizes.

\_\_\_\_\_ 10. Freezing changes a liquid to a solid.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the process in which a gas changes to a liquid.

12. Water boils and changes to water vapor in the process of \_\_\_\_\_.

13. A gas changes directly to a solid in the process of \_\_\_\_\_

14. Snow changes to water vapor without melting when it undergoes \_\_\_\_\_.

15. \_\_\_\_\_ is the process in which a liquid changes to a gas without boiling.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Identify and compare the two ways water can change to water vapor. Give an example of each.

17. Explain how the energy of matter changes when it melts.

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## 4.4 States of Matter

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### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Matter in the plasma state is found in
  - air.
  - water.
  - lightning.
  - none of the above
- The theory that all matter consists of constantly moving particles is known as the
  - physical theory of matter.
  - attraction theory of matter.
  - theory of states of matter.
  - kinetic theory of matter.
- The state of matter that can change shape but not volume is
  - gas.
  - liquid.
  - solid.
  - plasma.
- A gas exerts less pressure when it has a
  - smaller volume.
  - lower temperature.
  - higher temperature.
  - two of the above
- The process in which dew drops form is
  - evaporation.
  - deposition.
  - condensation.
  - melting.
- Liquid water can change to water vapor by
  - vaporization.
  - sublimation.
  - evaporation.
  - two of the above
- Which statement is true about deposition?
  - It involves a loss of energy.

- b. It is the same thing as freezing.
- c. It occurs when a solid changes to a gas.
- d. It occurs more quickly at higher temperatures.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. Particles with the least kinetic energy occur in solids.
- \_\_\_\_\_ 9. Changes of state are chemical changes in matter.
- \_\_\_\_\_ 10. Surface tension is a property of gases.
- \_\_\_\_\_ 11. Cellulose is an example of a crystalline solid.
- \_\_\_\_\_ 12. Charles's law states how the temperature and volume of gases are related.
- \_\_\_\_\_ 13. Increasing the volume of a gas increases its pressure.
- \_\_\_\_\_ 14. Water in a tea kettle changes to steam in the process of evaporation.
- \_\_\_\_\_ 15. Temperature is a measure of the average kinetic energy of particles of matter.
- \_\_\_\_\_ 16. The process that causes icicles to form is melting.
- \_\_\_\_\_ 17. Changes of state involve changes in the kinetic energy of matter.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. The particles of a(n) \_\_\_\_\_ solid have no definite pattern.
- 19. A(n) \_\_\_\_\_ consists of atoms or molecules that spread out to fill their container.
- 20. The sun and other stars consist of matter in the \_\_\_\_\_ state.
- 21. Amontons's law describes the relationship between the temperature and \_\_\_\_\_ of gases.
- 22. The law relating the volume and pressure of gases is \_\_\_\_\_ law.
- 23. The temperature at which a solid changes to a liquid is its \_\_\_\_\_.
- 24. A solid changes directly to a gas in the process of \_\_\_\_\_.
- 25. The boiling point of water is \_\_\_\_\_ °C.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Compare and contrast matter in the gaseous and plasma states.

- 27. Describe the relationship between the volume and pressure of a gas at a fixed temperature. What type of relationship is it?

28. When you take a hot shower, the bathroom mirror may “steam up.” Explain why this happens.

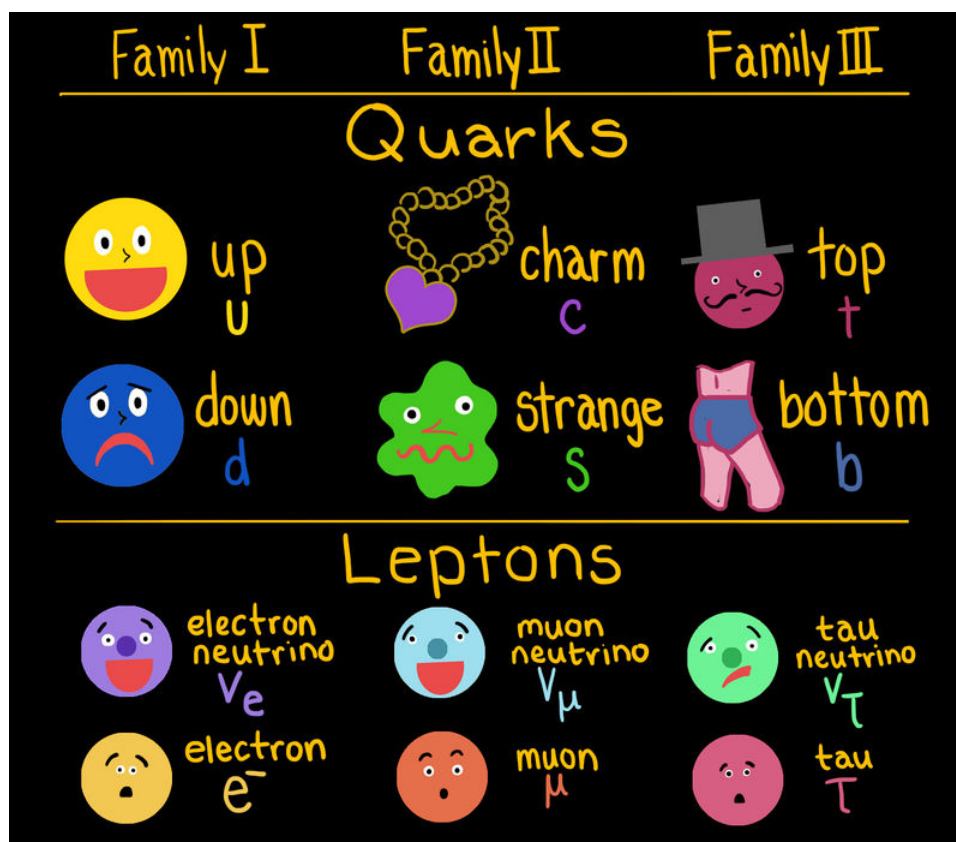
## CHAPTER

## 5

## Atoms Assessments

## Chapter Outline

- 5.1 INSIDE THE ATOM
- 5.2 HISTORY OF THE ATOM
- 5.3 MODERN ATOMIC THEORY
- 5.4 ATOMS



## 5.1 Inside the Atom

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. The smallest particles of an element that still have the element's properties are
  - a. quarks.
  - b. gluons.
  - c. protons.
  - d. atoms.
2. Which statement is true about the nucleus of an atom?
  - a. It makes up most of the atom's volume.
  - b. It makes up most of the atom's mass.
  - c. It contains protons and electrons.
  - d. It is neutral in electric charge.
3. The strong force explains why
  - a. electrons are attracted to the nucleus.
  - b. the nucleus does not fly apart.
  - c. electrons are smaller than protons.
  - d. none of the above
4. The mass number of an atom is its number of
  - a. electrons.
  - b. protons.
  - c. neutrons.
  - d. protons plus neutrons.
5. When a fluorine atom gains an electron, it becomes a(n)
  - a. positive ion.
  - b. isotope.
  - c. cation.
  - d. anion.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. All protons are exactly the same.
- \_\_\_\_\_ 7. Electrons have the same mass as protons.
- \_\_\_\_\_ 8. Atoms may be positive or negative in charge.

\_\_\_\_\_ 9. All atoms of a given element have the same number of electrons.

\_\_\_\_\_ 10. There are three quarks in each neutron.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Neutral particles inside the nucleus of an atom are \_\_\_\_\_.

12. Protons consist of smaller particles called \_\_\_\_\_.

13. Negatively charged particles in atoms are \_\_\_\_\_.

14. An atom with a different number of neutrons than other atoms of the same element is called a(n) \_\_\_\_\_.

15. The atomic number of an atom is its number of \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. The atomic number of an atom is 10 and its mass number is 21. How many protons, neutrons, and electrons does the atom have? Explain your reasoning.

17. Compare and contrast isotopes and ions.



## 5.2 History of the Atom

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement is not part of the original atomic theory?
  - Atoms consist of smaller particles of matter.
  - Atoms cannot be created or destroyed.
  - All atoms of the same element have the same mass.
  - Atoms join together to form compounds.
- John Dalton thought that an atom is like a(n)
  - plum pudding.
  - solar system.
  - hard solid ball.
  - vacuum tube.
- The scientist who discovered protons was
  - John Dalton.
  - J. J. Thomson.
  - Ernest Rutherford.
  - James Chadwick.
- Aristotle thought that
  - atoms exist.
  - atoms are uncuttable.
  - all matter consists of atoms.
  - the idea of atoms is ridiculous.
- Rutherford concluded from his experiments that
  - all the positive charge of an atom is concentrated in the center.
  - positive charge is spread evenly throughout an atom.
  - electrons orbit the positively charged nucleus.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Thomson aimed a beam of alpha particles at gold foil.
- \_\_\_\_\_ 7. The plums in the plum pudding model represent protons.
- \_\_\_\_\_ 8. The planets in the planetary model represent electrons.

\_\_\_\_\_ 9. The first subatomic particle to be discovered was the proton.

\_\_\_\_\_ 10. Dalton thought that all substances are made of atoms.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The scientist who discovered electrons was \_\_\_\_\_.

12. The philosopher who first introduced the idea of the atom was \_\_\_\_\_.

13. The scientist who discovered the nucleus of the atom was \_\_\_\_\_.

14. The scientist who developed atomic theory was \_\_\_\_\_.

15. The plum pudding model of the atom was proposed by \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how electrons were discovered.

17. Create a table to compare and contrast Thomson's and Rutherford's models of the atom.

## 5.3 Modern Atomic Theory

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement about energy levels is false?
  - They are located at fixed distances from the nucleus of the atom.
  - They are the only places where electrons can be found.
  - They have more energy when they are farther from the nucleus.
  - They all have the same number of electrons.
- What are orbitals?
  - regions in the electron cloud where electrons are most likely to be
  - fixed paths in which electrons orbit the nucleus
  - places where electron waves are unstable
  - none of the above
- An electron emits energy when it jumps from
  - a proton to a neutron.
  - an electron cloud to an orbital.
  - an orbital to the atomic nucleus.
  - a higher energy level to a lower energy level.
- How many electrons can there be in energy level 1?
  - 0
  - 1
  - 2
  - 3
- Bohr's model of the atom differs from Rutherford's model in the
  - placement of the nucleus.
  - charge of the nucleus.
  - number of electrons.
  - location of electrons.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The focus of Bohr's research was the nucleus.
- \_\_\_\_\_ 7. Bohr rejected modern atomic theory.
- \_\_\_\_\_ 8. There is a maximum of two energy levels in an atom.

\_\_\_\_\_ 9. Electrons fall toward the nucleus because they behave like waves.

\_\_\_\_\_ 10. Energy levels are located between the orbitals of atoms.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The scientist who discovered energy levels was \_\_\_\_\_.

12. \_\_\_\_\_ are wavelike particles that move around the nucleus of an atom.

13. The maximum number of electrons per orbital is \_\_\_\_\_.

14. The number of orbitals at the second energy level is \_\_\_\_\_.

15. Electrons can change energy levels if they gain or lose \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Make a labeled sketch to illustrate energy levels.

17. Relate orbitals to the electron cloud concept.

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## 5.4 Atoms

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### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following particles of matter are the smallest?
  - atoms
  - protons
  - neutrons
  - quarks
- Atoms of a given element all have the same number of
  - protons.
  - neutrons.
  - electrons.
  - two of the above
- The strong force is strongest
  - outside the nucleus.
  - over very short distances.
  - when the nucleus is very large.
  - between protons and electrons.
- Atomic theory was introduced around
  - 450 BC.
  - 1800 AD.
  - 1900 AD.
  - 1920 AD.
- J. J. Thomson discovered the
  - nucleus.
  - proton.
  - neutron.
  - electron.
- Rutherford's research involved
  - electric current and a vacuum tube.
  - alpha particles and gold foil.
  - electrons and energy levels.
  - none of the above
- Which energy level has the least energy?
  - 1

- b. 2
- c. 3
- d. 4

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. The SI unit of atomic mass is the gram.
- \_\_\_\_\_ 9. Protons and neutrons have the same mass.
- \_\_\_\_\_ 10. Positive and negative charges in an atom always “cancel out.”
- \_\_\_\_\_ 11. An atom with 2 protons and 2 neutrons has an atomic number of 4.
- \_\_\_\_\_ 12. Many isotopes occur naturally
- \_\_\_\_\_ 13. Most of Dalton’s atomic theory is still accepted today.
- \_\_\_\_\_ 14. Atoms could not be seen until scanning tunneling microscopes were invented.
- \_\_\_\_\_ 15. Thomson thought that atoms are similar to solid wooden balls.
- \_\_\_\_\_ 16. The first atomic model to add the nucleus was Bohr’s model.
- \_\_\_\_\_ 17. An electron emits energy when it jumps to a higher energy level.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Positively charged particles in an atom are known as \_\_\_\_\_.
- 19. An ion with a negative electric charge is called a(n) \_\_\_\_\_.
- 20. The strong force holds together protons and \_\_\_\_\_.
- 21. Tritium is a(n) \_\_\_\_\_ of hydrogen.
- 22. Quarks are held together by \_\_\_\_\_.
- 23. Dalton developed a theory of the \_\_\_\_\_.
- 24. In Rutherford’s experiments, alpha particles were back scattered by \_\_\_\_\_ of gold atoms.
- 25. Subatomic particles called \_\_\_\_\_ have a dual wave and particle nature.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Compare and contrast protons, neutrons, and electrons.

- 27. What were John Dalton’s contributions to knowledge of the atom?

28. Outline how models of the atom changed from Dalton to the present.

# CHAPTER 6

# Periodic Table Assessments

## Chapter Outline

- 6.1 HOW ELEMENTS ARE ORGANIZED
- 6.2 CLASSES OF ELEMENTS
- 6.3 GROUPS OF ELEMENTS
- 6.4 PERIODIC TABLE





## 6.1 How Elements Are Organized

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Mendeleev organized the elements based on their
  - atomic number.
  - number of protons.
  - atomic mass.
  - number of neutrons.
- In the modern periodic table, atomic number
  - increases from top to bottom within each period.
  - increases from left to right within each group.
  - is the same within each group but not between groups.
  - none of the above
- The shortest period in the periodic table is period
  - 18
  - 7
  - 6
  - 1
- All but one of the elements on the left side of the periodic table are
  - metalloids.
  - liquids.
  - metals.
  - gases.
- Which statement is true about any group in the periodic table?
  - It includes metals, metalloids, and nonmetals.
  - It includes elements with similar properties.
  - It includes gases, liquids, and solids.
  - It contains 18 different elements.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Mendeleev left spaces in his periodic table for unknown elements.
- \_\_\_\_\_ 7. The modern periodic table is the same as Mendeleev's table but with more elements.
- \_\_\_\_\_ 8. The modern periodic table has more than 100 elements.

- \_\_\_\_\_ 9. Elements called actinides are in period 7 of the periodic table.
- \_\_\_\_\_ 10. Elements in the same period of the periodic table have similar properties.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A row in the periodic table of the elements is called a(n) \_\_\_\_\_.
12. A column in the periodic table of the elements is called a(n) \_\_\_\_\_.
13. The classes of elements in the periodic table are metals, nonmetals, and \_\_\_\_\_.
14. Cr is the \_\_\_\_\_ for the element chromium.
15. All the elements in group 18 of the periodic table are in the class \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. For two elements in the same group of the periodic table, what is one way they are the same and one way they are different?

17. For most periods of the periodic table, how do elements change from left to right across the period?

## 6.2 Classes of Elements

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Most metals are
  - dull.
  - brittle.
  - ductile.
  - all of the above
- A nonmetal is an element that
  - exists only as a gas or liquid.
  - is completely unreactive.
  - cannot conduct electricity.
  - is shiny and malleable.
- Which of the following elements is a metal?
  - phosphorus
  - selenium
  - lithium
  - boron
- Which statement about valence electrons is true?
  - They are located in the outer energy level of an atom.
  - They are potentially involved in chemical reactions.
  - They determine whether an element can conduct electricity.
  - all of the above
- If an element is malleable, this means that it can
  - be formed into long thin shapes like wires.
  - be formed into thin sheets without breaking.
  - be used to conduct electric current.
  - be used as an electric insulator.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. All metalloids are solids at room temperature.
- \_\_\_\_\_ 7. Nonmetals are the second largest class of elements.
- \_\_\_\_\_ 8. Elements with eight valence electrons are unreactive.

\_\_\_\_\_ 9. Fluorine is an example of a metalloid.

\_\_\_\_\_ 10. Nonmetals tend to give up electrons.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. The class of elements that are good conductors of electricity is the \_\_\_\_\_.

12. The smallest class of elements is the \_\_\_\_\_.

13. Almost all metals are in the \_\_\_\_\_ state at room temperature.

14. Carbon and oxygen are elements in the \_\_\_\_\_ class.

15. Some elements in the \_\_\_\_\_ class are semiconductors.

### Short Answer

*Answer the following questions in complete sentences.*

16. A certain element is a gas at room temperature and extremely reactive with other elements. In which class of elements do you think the element should be placed? Why?

17. Explain why metals are used to make objects such as frying pans and electric wires.

## 6.3 Groups of Elements

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Hydrogen is in the same group as the alkali metals because
  - it is a metal.
  - it is unreactive.
  - it has one valence electron.
  - it is in period 1 of the periodic table.
- Alkaline Earth metals are less reactive than
  - noble gases.
  - transition metals.
  - alkali metals.
  - all of the above
- Which groups of the periodic table contain one or more metalloids?
  - groups 1–2
  - groups 3–12
  - groups 13–16
  - groups 17–18
- The most reactive nonmetals are elements in the
  - boron group.
  - nitrogen group.
  - oxygen group.
  - halogen group.
- All elements in the carbon group
  - are solids at room temperature.
  - have four valence electrons.
  - are not very reactive.
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The most reactive metals are the transition metals.
- \_\_\_\_\_ 7. Alkaline Earth metals have three valence electrons.
- \_\_\_\_\_ 8. Mercury is the only metal that is a liquid at room temperature.

\_\_\_\_\_ 9. Boron is an example of an element in the metalloids class.

\_\_\_\_\_ 10. Helium is an element in the group called the halogens.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Most elements with one valence electron are known as \_\_\_\_\_ metals.

12. Elements in groups 3–12 of the periodic table are called \_\_\_\_\_ metals.

13. Elements with seven valence electrons are referred to as \_\_\_\_\_.

14. Elements in group 18 of the periodic table are called \_\_\_\_\_.

15. The actinide elements are known as \_\_\_\_\_ metals.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Element X is in group 18 of the periodic table. Based on its position in the periodic table, what can you infer about its properties?

17. Compare and contrast the reactivity of alkali metals and halogens. Explain any similarities and differences.

## 6.4 Periodic Table

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement is true about Mendeleev's periodic table?
  - It was not useful.
  - It was based on atomic number.
  - It contained 18 families.
  - none of the above
- Which statement is true about the modern periodic table?
  - Its periods vary in how many elements they contain.
  - It has more groups than Mendeleev's table.
  - It includes more than 100 elements represented.
  - all of the above
- Within any group of the periodic table, there are elements
  - in all three states at room temperature.
  - in all three classes of elements.
  - with the same number of valence electrons.
  - with the same number of protons.
- Which of the following elements is a metalloid?
  - silicon
  - silver
  - sulfur
  - selenium
- A certain element is a malleable solid at room temperature. Which of the following elements could it be?
  - aluminum
  - boron
  - carbon
  - none of the above
- The only metalloid in the boron group is
  - boron.
  - gallium.
  - indium.
  - thallium.
- Which statement about the halogens is false?
  - They are the elements in group 17.

- b. They are the least reactive elements.
- c. They have seven valence electrons.
- d. They include fluorine and chlorine.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. The modern periodic table is similar to Mendeleev's periodic table.
- \_\_\_\_\_ 9. All chemical symbols have two letters.
- \_\_\_\_\_ 10. Atomic number increases from left to right across the periodic table.
- \_\_\_\_\_ 11. Period 4 is the longest period in the modern periodic table.
- \_\_\_\_\_ 12. Metals are good conductors of heat.
- \_\_\_\_\_ 13. Metalloids are the smallest class of elements.
- \_\_\_\_\_ 14. All nonmetals are gases at room temperature.
- \_\_\_\_\_ 15. Alkali metals are always found in nature combined with other elements.
- \_\_\_\_\_ 16. Transition metals have more valence electrons than alkaline Earth metals.
- \_\_\_\_\_ 17. Noble gases are used in light bulbs because they are very reactive.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. The \_\_\_\_\_ number of elements is the basis of the modern periodic table.
- 19. There are a total of \_\_\_\_\_ groups in the modern periodic table.
- 20. All the elements in group 2 of the periodic table are in the \_\_\_\_\_ class of elements.
- 21. The class of elements that cannot conduct electricity is the \_\_\_\_\_ class.
- 22. The only class of elements that are all solids at room temperature is the \_\_\_\_\_ class.
- 23. \_\_\_\_\_ electrons determine how reactive an element is.
- 24. Elements in group 17 of the periodic table are called the \_\_\_\_\_.
- 25. Lithium is an example of a(n) \_\_\_\_\_ metal.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Describe Mendeleev's periodic table of the elements, and explain why it was a good model.

- 27. Compare and contrast metals, metalloids, and nonmetals.



28. A certain element reacts explosively with chlorine and forms a salt. In which group does the element most likely belong? Explain your answer.

# CHAPTER 7

# Chemical Bonding Assessments

## Chapter Outline

- 7.1 INTRODUCTION TO CHEMICAL BONDS
- 7.2 IONIC BONDS
- 7.3 COVALENT BONDS
- 7.4 METALLIC BONDS
- 7.5 CHEMICAL BONDING



## 7.1 Introduction to Chemical Bonds

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. There are millions of unique substances in the universe because elements can combine in many different ways to form
  - a. mixtures.
  - b. solutions.
  - c. compounds.
  - d. ions.
2. Water is an example of a(n)
  - a. unique substance.
  - b. chemical compound.
  - c. covalent compound.
  - d. all of the above
3. Which statement is true about water and hydrogen peroxide?
  - a. Both substances have the same properties.
  - b. Both substances have the same chemical formula.
  - c. Both substances consist of hydrogen and oxygen.
  - d. Both substances are mixtures of elements.
4. Chemical bonds always involve
  - a. ions.
  - b. atoms.
  - c. metals.
  - d. electrons.
5. The ratio of elements in a given compound
  - a. is always 2 to 1.
  - b. is always the same.
  - c. may vary.
  - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. An oxygen atom has eight valence electrons.
- \_\_\_\_\_ 7. A molecule of carbon monoxide has two carbon atoms and one oxygen atom.
- \_\_\_\_\_ 8. The types of bonds in chemical compounds determine many of their properties.

\_\_\_\_\_ 9. The same elements may form different compounds.

\_\_\_\_\_ 10. The chemical formula for carbon dioxide is CO<sub>2</sub>.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ is a force of attraction between atoms or ions that share or transfer electrons.

12. A unique substance that forms when elements combine chemically is called a(n) \_\_\_\_\_.

13. The symbol used to represent a chemical compound is referred to as a(n) \_\_\_\_\_.

14. The smallest particle of a compound that still has the compound's properties is a(n) \_\_\_\_\_.

15. H<sub>2</sub>O is the chemical formula for \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe the role of valence electrons in chemical bonding.

17. How are molecules and atoms related?

## 7.2 Ionic Bonds

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- When halogens form ions they
  - become positive in charge.
  - become negative in charge.
  - gain two electrons.
  - two of the above
- Which two elements would not form ionic bonds?
  - calcium and lithium
  - calcium and oxygen
  - lithium and oxygen
  - calcium and carbon
- Energy is released when
  - valence electrons are removed from an atom.
  - valence electrons are gained by an atom.
  - a positive ion forms.
  - two of the above
- A sodium ion has a charge of
  - 1
  - 2
  - +1
  - +2
- In a given metals group of the periodic table, compared with elements closer to the top of the table, elements closer to the bottom
  - have valence electrons that are farther from the nucleus.
  - have valence electrons that are harder to remove from the atom.
  - need more energy to form positive ions.
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. An ionic bond forms when atoms of a nonmetal give up electrons to atoms of a metal.
- \_\_\_\_\_ 7. Sodium and chloride ions have equal but opposite charges.
- \_\_\_\_\_ 8. Metals need energy in order to become ions.

- \_\_\_\_\_ 9. The bonds of crystals are very weak.
- \_\_\_\_\_ 10. Solid ionic compounds are good conductors of electricity.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A charged particle that forms when an atom gains or loses electrons is a(n) \_\_\_\_\_.
12. The force of attraction that holds together oppositely charged ions is a(n) \_\_\_\_\_.
13. When positive and negative ions combine chemically, the unique substance that results is a(n) \_\_\_\_\_.
14. A(n) \_\_\_\_\_ is a structure that forms when many positive and negative ions bond together.
15. A dissolved ionic compound is called a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. An unknown compound is an ionic compound. Describe its properties.

17. Why do ionic compounds always include a metal and a nonmetal?

## 7.3 Covalent Bonds

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Two hydrogen atoms may bond together to form a hydrogen
  - ion.
  - molecule.
  - compound.
  - two of the above
- An example of a covalent compound is
  - sodium fluoride.
  - calcium chloride.
  - carbon dioxide.
  - all of the above
- In all covalent bonds, valence electrons are
  - lost.
  - gained.
  - shared equally.
  - shared.
- The compound that contains two oxygen atoms and one nitrogen atom is named
  - oxygen nitride.
  - dioxygen nitride.
  - nitrogen dioxide.
  - nitrogen monoxide.
- What is the chemical formula for the compound in question 4?
  - $O_2N$
  - $N_2O$
  - NO
  - $NO_2$

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Covalent bonds form only between atoms of different elements.
- \_\_\_\_\_ 7. A single covalent bond involves just one valence electron.
- \_\_\_\_\_ 8. Sharing electrons allows atoms to have a full outer energy level.

- \_\_\_\_\_ 9. Each hydrogen atom can form two covalent bonds.
- \_\_\_\_\_ 10. The hydrogen end of a water molecule is slightly negative in charge.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The force of attraction that holds together atoms that share electrons is a(n) \_\_\_\_\_ bond.
12. A(n) \_\_\_\_\_ bond is a weak bond that forms between oppositely charged ends of nearby molecules.
13. A covalent bond in which one atom has a stronger attraction for the valence electrons is called a(n) \_\_\_\_\_ -  
\_ bond.
14. A covalent compound in which molecules have oppositely charged ends is called a(n) \_\_\_\_\_ compound.
15. Any compound consisting of two or more nonmetals is a(n) \_\_\_\_\_ compound.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain why covalent compounds have lower melting points than ionic compounds.

17. How is the boiling point of water related to the polarity of water molecules?



## 7.4 Metallic Bonds

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. Metallic bonds form because metals
  - a. “want” to give up valence electrons.
  - b. always share valence electrons.
  - c. have many valence electrons.
  - d. always gain valence electrons.
2. In metallic bonds, the force of attraction is between
  - a. positive and negative ions.
  - b. ions and electrons.
  - c. two different metals.
  - d. neutrons and electrons.
3. Metals are used to make electric wires because metals
  - a. are ductile.
  - b. are malleable.
  - c. have freely moving electrons.
  - d. two of the above
4. How does a metallic lattice differ from an ionic crystal?
  - a. A metallic lattice is less flexible.
  - b. A metallic lattice can change shape without breaking.
  - c. A metallic lattice shatters when struck.
  - d. all of the above
5. An alloy of iron and carbon is
  - a. more likely to rust than pure iron.
  - b. weaker than pure iron.
  - c. a mixture of two metals.
  - d. known as steel.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A metallic bond may form between a metal and any other element.
- \_\_\_\_\_ 7. Metals can be shaped into thin sheets.
- \_\_\_\_\_ 8. Metal ions are surrounded by a “sea” of positive charge.

\_\_\_\_\_ 9. Bronze has been used for thousands of years.

\_\_\_\_\_ 10. Brass is an alloy of iron and copper.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Elements that can conduct electricity are classified as \_\_\_\_\_.

12. A structure formed by metallic bonding is known as a(n) \_\_\_\_\_.

13. The force of attraction between a metal ion and surrounding electrons is a(n) \_\_\_\_\_.

14. A solid solution of a metal with one or more other elements is a(n) \_\_\_\_\_.

15. A metal ion has a(n) \_\_\_\_\_ electric charge.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe how alloys are made.

17. Explain why metals are good conductors of electricity.

## 7.5 Chemical Bonding

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Chemical bonds form when atoms
  - gain protons.
  - combine nuclei.
  - give up neutrons.
  - share or transfer electrons.
- A mystery substance is known to be a chemical compound. What can you infer about the substance?
  - It is composed of just two elements.
  - It has a fixed composition.
  - It consists of molecules.
  - It forms crystals.
- Ionic bonds form between
  - two metals.
  - two nonmetals.
  - any two elements.
  - a metal and a nonmetal.
- Which of the following is not a property of an ionic compound?
  - ability to dissolve in water
  - high boiling point
  - high melting point
  - malleability
- Water is a(n)
  - chemical compound.
  - ionic compound.
  - nonpolar compound.
  - all of the above
- All covalent compounds
  - contain ions.
  - have high boiling points.
  - are solids at room temperature.
  - consist of nonmetallic elements.
- Which alloy was made first?
  - steel.

- b. brass.
- c. bronze.
- d. none of the above

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. All chemical bonds involve two atoms sharing electrons.
- \_\_\_\_\_ 9. Chemical compounds are represented by chemical formulas.
- \_\_\_\_\_ 10. The “3” in  $\text{NH}_3$  is the atomic number of hydrogen.
- \_\_\_\_\_ 11. Positive ions form when atoms lose electrons.
- \_\_\_\_\_ 12. Electrolytes are good conductors of electricity.
- \_\_\_\_\_ 13. Metals release energy when they become ions.
- \_\_\_\_\_ 14. All compounds containing polar bonds are polar compounds.
- \_\_\_\_\_ 15. An example of a covalent compound is carbon dioxide.
- \_\_\_\_\_ 16. Metallic bonds form between metals and nonmetals.
- \_\_\_\_\_ 17. Metallic bonds explain why metals are good conductors of electricity.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. A unique substance that forms when elements combine chemically is a(n) \_\_\_\_\_.
- 19. Atoms in compounds are held together by \_\_\_\_\_.
- 20. Sodium chloride is an example of a(n) \_\_\_\_\_ compound.
- 21. An ionic bond forms when atoms \_\_\_\_\_ electrons.
- 22. Bonds that form between two nonmetals are called \_\_\_\_\_ bonds.
- 23. Bonds that form between water molecules are called \_\_\_\_\_ bonds.
- 24. A(n) \_\_\_\_\_ is formed by melting a metal and dissolving other elements in it.
- 25. A metallic lattice consists of positive metal \_\_\_\_\_ in a “sea” of electrons.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Why does chemical bonding occur?

- 27. Compare and contrast ionic and covalent bonds.

28. Explain why metals can be shaped without breaking.

**CHAPTER 8****Chemical Reactions Assessments****Chapter Outline**

- 8.1 INTRODUCTION TO CHEMICAL REACTIONS**
- 8.2 CHEMICAL EQUATIONS**
- 8.3 TYPES OF CHEMICAL REACTIONS**
- 8.4 CHEMICAL REACTIONS AND ENERGY**
- 8.5 CHEMICAL REACTIONS**



# 8.1 Introduction to Chemical Reactions

## Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following changes is a chemical change?
  - ice melting
  - wax melting
  - water boiling
  - wax burning
- Which statement is true of all chemical reactions?
  - They can go in just one direction.
  - They occur only in science labs.
  - They break and reform bonds.
  - They create new elements.
- Reactants and products in chemical reactions may be
  - elements.
  - compounds.
  - exactly the same compounds.
  - two of the above
- All chemical changes in matter involve
  - changes of state.
  - chemical reactions.
  - changes in color.
  - two of the above
- Which statement is true about a precipitate?
  - It is a solid.
  - It settles out of a liquid solution.
  - It is evidence of a chemical reaction.
  - all of the above

### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The products and reactants of a chemical reaction have different atoms.
- \_\_\_\_\_ 7. All chemical reactions are reversible.
- \_\_\_\_\_ 8. Rusting is an example of a chemical change.

\_\_\_\_\_ 9. Condensation is a type of chemical reaction.

\_\_\_\_\_ 10. A change in temperature is a common sign of a chemical reaction.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. The process in which some substances change chemically into others is a(n) \_\_\_\_\_.

12. In chemical reactions, chemical bonds break in the \_\_\_\_\_.

13. The substances at the start of a chemical reaction that change to other substances are known as \_\_\_\_\_.

14. Any substance that is produced in a chemical reaction is called a(n) \_\_\_\_\_.

15. A chemical reaction has reached \_\_\_\_\_ when forward and reverse reactions occur at the same rate.

### Short Answer

*Answer the following questions in complete sentences.*

16. When a certain chemical reaction starts, the amounts of reactants decrease while the amounts of products increase. Soon a point is reached where the amounts of products and reactants stop changing. Can you conclude that the reaction has stopped at this point? Why or why not?

17. Create a sketch to show how hydrogen and oxygen react to form water. Label the reactants and products, and use an arrow to show the direction of the reaction.



## 8.2 Chemical Equations

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- In chemical equations, reactants and products are represented by
  - plus signs and arrows.
  - elements and compounds.
  - coefficients and subscripts.
  - chemical symbols and chemical formulas.
- Which chemical equation is not balanced?
  - $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$
  - $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
  - $\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$
  - $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- If there is more than one product in a chemical equation, the products are separated by
  - plus signs.
  - minus signs.
  - equals signs.
  - two-way arrows.
- What is the missing coefficient in the following chemical equation?  $\text{CH}_4 + ?\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ 
  - 3
  - 2
  - 1
  - 0
- Which chemical equation correctly represents the reaction in which carbon combines with oxygen?
  - $\text{C}_2 + \text{O}_2 \rightarrow 2\text{CO}$
  - $\text{C}_2 + 2\text{O} \rightarrow \text{C}_2\text{O}_2$
  - $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
  - $2\text{C} + \text{O} \rightarrow \text{C}_2\text{O}$

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. The symbol  $2\text{O}_2$  represents two molecules of oxygen.
- \_\_\_\_\_ 7. A coefficient of 1 usually is not written.
- \_\_\_\_\_ 8. Subscripts are used to balance chemical equations.

\_\_\_\_\_ 9. The first step in balancing a chemical equation is counting atoms.

\_\_\_\_\_ 10. A chemical equation must balance only when the reaction reversible.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ is a symbolic representation of a chemical reaction.

12. The research of \_\_\_\_\_ showed that mass is conserved in chemical reactions.

13. Water is the \_\_\_\_\_ in the chemical reaction  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

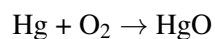
14. A(n) \_\_\_\_\_ shows the number of atoms or molecules of a substance in a chemical equation.

15. A(n) \_\_\_\_\_ shows the number of atoms of a substance in a chemical formula.

### Short Answer

*Answer the following questions in complete sentences.*

16. Explain how to balance a chemical equation using the following example:



17. Why was it important for Lavoisier to carry out his chemical reactions in a sealed container? If the container had not been sealed, could he have shown that matter is conserved? Why or why not?

## 8.3 Types of Chemical Reactions

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- The general equation for a synthesis reaction is
  - $AB \rightarrow A + B$
  - $A + BC \rightarrow B + AC$
  - $A + B \rightarrow C$
  - $AB + C \rightarrow A + BC$
- Which of the following is a decomposition reaction?
  - $2Na + Cl_2 \rightarrow 2NaCl$
  - $2H_2O \rightarrow 2H_2 + O_2$
  - $CH_4 + O_2 \rightarrow CO_2 + H_2O$
  - $NaCl + AgF \rightarrow NaF + AgCl$
- Which type of reaction is represented by the following chemical equation?  $2K + 2H_2O \rightarrow 2KOH + H_2$ 
  - double replacement
  - single replacement
  - decomposition
  - synthesis
- Which of the following is always a product of a combustion reaction?
  - water
  - ashes
  - smoke
  - oxygen
- In living cells, energy is produced by the process called
  - photosynthesis.
  - sugar synthesis.
  - cellular respiration.
  - glucose decomposition.

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. A synthesis reaction occurs when two or more reactants combine to form a single product.
- \_\_\_\_\_ 7. Another term for a combustion reaction is decomposition.
- \_\_\_\_\_ 8. Fossil fuels such as oil and natural gas consist of hydrocarbons.

\_\_\_\_\_ 9. The fuel that cells use for energy is oxygen.

\_\_\_\_\_ 10. Plants combine carbon dioxide and water to form glucose.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. In a(n) \_\_\_\_\_ reaction, one ion takes the place of another in a compound.

12. A(n) \_\_\_\_\_ reaction occurs when a substance reacts quickly with oxygen.

13. One reactant breaks down into two or more products in a(n) \_\_\_\_\_ reaction.

14. The opposite of a decomposition reaction is a(n) \_\_\_\_\_ reaction.

15. During a(n) \_\_\_\_\_ reaction, ions change places in two compounds.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain what happens when a substance burns.

17. Write the general equation for a double replacement reaction. Explain what each part of the equation represents.

## 8.4 Chemical Reactions and Energy

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- All chemical reactions need energy to
  - form bonds in products.
  - break bonds in reactants.
  - get started.
  - two of the above
- Which statement about exothermic reactions is false?
  - They need activation energy.
  - They include combustion.
  - They give off energy.
  - They take in heat.
- A constant input of energy is needed in
  - exothermic reactions.
  - endothermic reactions.
  - all chemical reactions.
  - none of the above
- You can increase the rate of a chemical reaction by
  - increasing the temperature of reactants.
  - decreasing the surface area of reactants.
  - decreasing the concentration of reactants.
  - all of the above
- A catalyst
  - can catalyze just one chemical reaction.
  - is always changed in a chemical reaction.
  - becomes a product in a chemical reaction.
  - helps reactants come together in a chemical reaction.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. An endothermic chemical reaction is a reaction that releases energy.
- \_\_\_\_\_ 7. The general equation for an exothermic reaction is Reactants + Energy  $\rightarrow$  Products.
- \_\_\_\_\_ 8. Plants synthesize glucose in an endothermic chemical reaction.

- \_\_\_\_\_ 9. The law of conservation of energy does not apply to chemical reactions.
- \_\_\_\_\_ 10. Any factor that helps reactants come together lowers the activation energy.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Energy that is stored in the bonds of reactants or products is \_\_\_\_\_ energy.
12. A(n) \_\_\_\_\_ is a substance that increases the rate of chemical reactions.
13. The \_\_\_\_\_ is how fast a chemical reaction occurs.
14. \_\_\_\_\_ is the number of particles of a substance in a given volume.
15. A(n) \_\_\_\_\_ chemical reaction absorbs energy.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Outline the role of energy in endothermic chemical reactions.
17. Explain how catalysts work.

## 8.5 Chemical Reactions

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- All of the following involve chemical reactions except
  - metal rusting.
  - wood burning.
  - snow melting.
  - fruit rotting.
- Which of the following is evidence of a chemical reaction?
  - release of gas bubbles
  - absorption of heat
  - change in color
  - all of the above
- Which of these chemical equations is balanced?
  - $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
  - $2\text{Mg} + \text{Mn}_2\text{O}_3 \rightarrow 3\text{MgO} + 2\text{Mn}$
  - $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
  - $\text{NaCl} + \text{BeF}_2 \rightarrow 2\text{NaF} + \text{BeCl}_2$
- Which atoms are not balanced in this chemical equation?  $\text{C}_2\text{H}_4\text{O}_2 + \text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$ 
  - carbon (C) atoms
  - hydrogen (H) atoms
  - oxygen (O) atoms
  - two of the above
- Which type of chemical reaction is represented by this general equation?  $\text{A} + \text{BC} \rightarrow \text{B} + \text{AC}$ 
  - decomposition
  - replacement
  - combustion
  - synthesis
- Which of these chemicals reaction is not a synthesis reaction?
  - $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
  - $2\text{P} + 3\text{Cl}_2 \rightarrow 2\text{PCl}_3$
  - $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$
  - $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- Which type of reaction is the answer to question 6?
  - combustion

- b. decomposition
- c. single replacement
- d. double replacement

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Chemical reactions are necessary for life.
- \_\_\_\_\_ 9. The formation of water from hydrogen and oxygen is a reversible reaction.
- \_\_\_\_\_ 10. A change in state is a common sign of a chemical reaction.
- \_\_\_\_\_ 11. The mass of products always equals the mass of reactants in a chemical reaction.
- \_\_\_\_\_ 12. The same molecules must be present on both sides of a chemical equation.
- \_\_\_\_\_ 13. The reaction  $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$  is a double replacement reaction.
- \_\_\_\_\_ 14. In a combustion reaction, a fuel combines quickly with oxygen.
- \_\_\_\_\_ 15. Wood burning is an example of an endothermic reaction.
- \_\_\_\_\_ 16. All chemical reactions need energy to get started.
- \_\_\_\_\_ 17. A greater concentration of reactants slows down a chemical reaction.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Chemical changes occur because of chemical \_\_\_\_\_.
- 19. New substances that form in a chemical reaction are called \_\_\_\_\_.
- 20. In a balanced chemical equation, the number of \_\_\_\_\_ of each type must be the same on both sides of the arrow.
- 21. \_\_\_\_\_ are changed in a chemical equation in order to balance it.
- 22. During a(n) \_\_\_\_\_ reaction, two or more reactants combine to form a single product.
- 23. The products of a combustion reaction include water and \_\_\_\_\_.
- 24. A chemical reaction that absorbs energy is called a(n) \_\_\_\_\_ reaction.
- 25. Energy needed to get a chemical reaction started is known as \_\_\_\_\_ energy.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Write a short paragraph that correctly relates all of the following terms: chemical bond, chemical symbol, chemical formula, chemical reaction, and chemical equation.



27. Explain why a decomposition reaction is the reverse of a synthesis reaction.

28. The products of a certain chemical reaction have a lower temperature than the reactants. Is the reaction endothermic or exothermic? Explain your answer.

# CHAPTER 9

# Chemistry of Carbon Assessments

## Chapter Outline

- 9.1 PROPERTIES OF CARBON
- 9.2 HYDROCARBONS
- 9.3 CARBON AND LIVING THINGS
- 9.4 BIOCHEMICAL REACTIONS
- 9.5 CHEMISTRY OF CARBON



## 9.1 Properties of Carbon

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Cellulose is
  - one of the most common compounds on Earth.
  - made by the cells of plants and animals.
  - a monomer of carbon.
  - all of the above
- How many bonds can each carbon atom form?
  - 1
  - 2
  - 3
  - 4
- The plastic called polythene consists of
  - repeating monomers of ethene.
  - only carbon and hydrogen atoms.
  - many fullerenes joined by covalent bonds.
  - two of the above
- Forms of crystalline carbon include
  - cotton.
  - graphite.
  - charcoal.
  - methane.
- Which statement about carbon is false?
  - It has four valence electrons.
  - It forms covalent bonds with other nonmetals.
  - It is found in the majority of known compounds.
  - It rarely forms large compounds called polymers.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Carbon is a nonmetal in group 12 of the periodic table.
- \_\_\_\_\_ 7. A structural formula uses dots to represent electrons.
- \_\_\_\_\_ 8. All carbon polymers are made in labs or factories.

- \_\_\_\_\_ 9. Graphite is used as a lubricant because it is slippery.
- \_\_\_\_\_ 10. Each molecule of methane contains four atoms of carbon.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The form of carbon that is the hardest substance in nature is \_\_\_\_\_.
12. When monomers bond together with covalent bonds, they form \_\_\_\_\_.
13. Carbon atoms may bond together to form a hollow sphere called a(n) \_\_\_\_\_.
14. Pencil “lead” is made of a form of carbon known as \_\_\_\_\_.
15. Two carbon atoms that share a total of two valence electrons with each other have a(n) \_\_\_\_\_ covalent bond.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe single, double, and triple bonds. Draw a sketch to show how each type of bond is represented in a structural formula.

17. Relate the valence electrons of carbon to its ability to form compounds.

## 9.2 Hydrocarbons

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement about hydrocarbons is false?
  - All of them are polar compounds.
  - Most of them are obtained from fossil fuels.
  - Some of them are solids at room temperature.
  - They are the simplest type of carbon compounds.
- The last part of the name of a hydrocarbon compound indicates
  - the number of bonds between carbon atoms.
  - the number of carbon atoms per molecule.
  - the shape of the hydrocarbon compound.
  - none of the above
- Hydrocarbons are used in floor wax because they
  - resist scratches.
  - tend to repel water.
  - dissolve well in water.
  - have high melting points.
- Which of the following is an example of an unsaturated hydrocarbon?
  - methene
  - pentane
  - propane
  - ethene
- Dead organisms in ancient seas gradually formed deposits of
  - coal.
  - petroleum.
  - natural gas.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Hydrocarbons are compounds that contain only carbon and hydrogen.
- \_\_\_\_\_ 7. The simplest hydrocarbons are the aromatic hydrocarbons.
- \_\_\_\_\_ 8. Butane and iso-butane differ in their number of hydrogen atoms.

- \_\_\_\_\_ 9. Alkenes may form straight or branched chains but not rings.
- \_\_\_\_\_ 10. Hydrocarbons are used to make synthetic fabrics such as polyester.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Saturated hydrocarbons are given the general name of \_\_\_\_\_.
12. Alkenes and alkynes are classified as \_\_\_\_\_ hydrocarbons.
13. Molecules with the same chemical formulas but different structural formulas are called \_\_\_\_\_.
14. Unsaturated cyclic hydrocarbons are known as \_\_\_\_\_ hydrocarbons.
15. The name of the smallest alkyne is \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Ethane, ethene, and ethyne are hydrocarbons with molecules that contain two carbon atoms each. How do the three molecules differ? What is the chemical formula for each compound?

17. Contrast straight-chain, branched-chain, and cyclic hydrocarbon molecules.

## 9.3 Carbon and Living Things

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Classes of biochemical compounds include all of the following except
  - lipids.
  - proteins.
  - phosphates.
  - nucleic acids.
- Living things use lipids for
  - energy.
  - enzymes.
  - cell membranes.
  - two of the above
- Functions of proteins include
  - coding genetic information.
  - storing energy in animals.
  - regulating life processes.
  - making up cell walls.
- Which statement about RNA is true?
  - It has a double helix shape.
  - It consists of two chains of nucleotides.
  - It is needed for the synthesis of proteins.
  - It contains the nitrogen base called thymine.
- A nucleotide consists of a
  - phosphate group.
  - nitrogen base.
  - sugar.
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Biochemical compounds are carbon-based compounds found in living things.
- \_\_\_\_\_ 7. The main function of simple carbohydrates is to store energy in animals.
- \_\_\_\_\_ 8. The only biochemical compounds that contains sulfur are nucleic acids.

\_\_\_\_\_ 9. The most abundant biochemical compound is cellulose.

\_\_\_\_\_ 10. Hemoglobin transports oxygen through the blood.

*Fill in the Blank*

*Fill in the blank with the appropriate term.*

11. Complex carbohydrates include starches and \_\_\_\_\_.

12. Chains of small molecules called \_\_\_\_\_ make up proteins.

13. Fatty acids that are \_\_\_\_\_ found in animal fats.

14. Biochemical compounds that contain nitrogen include nucleic acids and \_\_\_\_\_.

15. In DNA molecules, the nitrogen base adenine always bonds with \_\_\_\_\_.

### **Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast saturated and unsaturated fatty acids.

17. Outline the structure and function of starches. What are some good food sources of starches?



## 9.4 Biochemical Reactions

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- Reactants in cellular respiration include
  - oxygen.
  - water.
  - carbon dioxide.
  - two of the above
- The human enzyme named pepsin catalyzes the digestion of
  - nucleic acids.
  - fatty acids.
  - proteins.
  - sugars.
- The compound that cells break down to release energy is
  - chlorophyll.
  - carbon dioxide.
  - water.
  - glucose.
- Energy for photosynthesis comes from
  - water.
  - soil.
  - light.
  - chemicals.
- Which equation correctly represents photosynthesis?
  - $C_6H_{12}O_6 + 6O_2 + \text{energy} \rightarrow 6CO_2 + 6H_2O$
  - $6CO_2 + 6O_2 + \text{energy} \rightarrow C_6H_{12}O_6 + 6H_2O$
  - $C_6H_{12}O_6 + 6CO_2 + \text{energy} \rightarrow 6O_2 + 6H_2O$
  - $6CO_2 + 6H_2O + \text{energy} \rightarrow C_6H_{12}O_6 + 6O_2$

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. All living things need energy just to stay alive.
- \_\_\_\_\_ 7. Cellular respiration is an endothermic, or energy-absorbing, process.
- \_\_\_\_\_ 8. Only plants can carry out photosynthesis.



## 9.5 Chemistry of Carbon

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following statements about carbon is true?
  - Carbon is found only in living things.
  - Plastics are polymers of carbon.
  - Graphite is a carbon compound.
  - Carbon forms ionic bonds.
- All alkenes have
  - saturated carbon atoms.
  - at least one double bond.
  - at least one carbon atom.
  - the same arrangement of atoms.
- Which of the following statements about aromatic hydrocarbons is false?
  - They have a strong scent.
  - They are shaped like rings.
  - They have only double bonds.
  - They contain at least six carbon atoms.
- Hydrocarbons are used
  - as fuels.
  - to make plastics.
  - to make synthetic fabrics.
  - all of the above
- Elements that make up proteins include
  - sulfur.
  - calcium.
  - phosphorus.
  - two of the above
- The main function of deoxyribonucleic acid is to
  - form the walls of cells.
  - provide energy to cells.
  - store the genetic code in cells.
  - speed up chemical reactions of cells.
- Products of photosynthesis include
  - water.

- b. oxygen.
- c. carbon dioxide.
- d. chlorophyll.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. A carbon atom has two valence electrons.
- \_\_\_\_\_ 9. Diamond is the hardest natural substance.
- \_\_\_\_\_ 10. Forms of pure carbon include cellulose.
- \_\_\_\_\_ 11. The carbon atoms in ethyne form only single bonds with the hydrogen atoms.
- \_\_\_\_\_ 12. Ethene cannot take a branched-chain shape.
- \_\_\_\_\_ 13. Carbon compounds in living things are called hydrocarbons.
- \_\_\_\_\_ 14. Antibodies are proteins that help defend against infections.
- \_\_\_\_\_ 15. The phosphate groups in nucleic acids encode genetic information.
- \_\_\_\_\_ 16. The products of cellular respiration are the reactants of photosynthesis.
- \_\_\_\_\_ 17. Cellular respiration releases energy in the form of light.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. A crystal of carbon in which each carbon atom is bonded with three others is a(n) \_\_\_\_\_.
- 19. Carbon atoms that have double bonds share \_\_\_\_\_ valence electrons.
- 20. Both ethene and ethyne are classified as \_\_\_\_\_ hydrocarbons.
- 21. Methane has a(n) \_\_\_\_\_ boiling point than does propane.
- 22. \_\_\_\_\_ are biochemical molecules that include sugars, starches, and cellulose.
- 23. Lipids known as \_\_\_\_\_ make up the cell membranes of living things.
- 24. \_\_\_\_\_ are proteins that increase the rate of biochemical reactions.
- 25. Reactants in cellular respiration are glucose and \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Carbon dioxide consists of one carbon atom and two oxygen atoms. How many bonds does the carbon atom form with each oxygen atom in a molecule of carbon dioxide? Draw the structural formula for carbon dioxide.

- 27. Protein molecules can take many different complex shapes. How might this be related to the diversity of

functions of proteins?

28. Compare and contrast photosynthesis and cellular respiration.

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**CHAPTER 10****Chemistry of Solutions Assessments****Chapter Outline**

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- 10.1 INTRODUCTION TO SOLUTIONS**
  - 10.2 SOLUBILITY AND CONCENTRATION**
  - 10.3 ACIDS AND BASES**
  - 10.4 CHEMISTRY OF SOLUTIONS**
- 



## 10.1 Introduction to Solutions

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement about solvents is true?
  - They change to the same state as their solutes.
  - They may be in any state of matter.
  - They are always in the liquid state.
  - They cannot be in the solid state.
- What happens when an ionic solute dissolves?
  - It becomes negatively charged.
  - It breaks down into individual atoms.
  - It forms chemical bonds with the solvent.
  - It separates into positive and negative ions.
- Sugar dissolves easily in water because, like water, its molecules have
  - oppositely charged ends.
  - a lot of surface area.
  - ionic bonds.
  - all of the above
- Road crews sprinkle salt on an icy road because the salt
  - prevents snow from falling on the road.
  - provides better traction than the ice.
  - lowers the melting point of the ice.
  - dissolves the ice.
- Which statement about solutes is false?
  - They may be in any state of matter.
  - They make up most of any solution.
  - They are too small to settle out of a solution.
  - They are mixed evenly throughout a solution.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Paint thinner dissolves well in water.
- \_\_\_\_\_ 7. Bronze is a solution of copper dissolved in brass.
- \_\_\_\_\_ 8. The solute in carbonated water is a gas.





## 10.2 Solubility and Concentration

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement about solubility is true?
  - Solubility is the same for all solutes in a given solvent.
  - Solubility depends on the temperature of the solvent.
  - Solubility always increases when temperature increases.
  - two of the above
- Pressure affects the solubility of
  - gases.
  - solids.
  - liquids.
  - all of the above
- Carbon dioxide is least soluble in ocean water
  - at the equator.
  - near the South Pole.
  - in the Arctic Ocean.
  - in the North Atlantic Ocean.
- How much solute is there in a 100-gram solution if the concentration is 5 percent?
  - 5 grams
  - 20 grams
  - 95 grams
  - 100 grams
- Baking soda has a solubility of 96 gram per liter of 20 °C water. How much baking soda must you add to 2 liters of water at this temperature to make a saturated solution?
  - 48 grams
  - 96 grams
  - 192 grams
  - 1000 grams

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Epsom salt is more soluble in water than is sugar.
- \_\_\_\_\_ 7. You can increase the solubility of a solute by adding more of it to a solution.
- \_\_\_\_\_ 8. You can dissolve more of a liquid solute if you heat the solution.

\_\_\_\_\_ 9. Concentration is the amount of solute in a given amount of solvent.

\_\_\_\_\_ 10. A saturated solution always has a very high concentration.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A dilute solution has a low concentration of \_\_\_\_\_.

12. Decreasing the pressure on a gas \_\_\_\_\_ its solubility.

13. \_\_\_\_\_ is the amount of solute that can dissolve in a given amount of solvent at a given temperature.

14. A(n) \_\_\_\_\_ solution contains less solute than can dissolve at a given temperature.

15. A solution with a high concentration of solute is called a(n) \_\_\_\_\_ solution.

**Short Answer**

*Answer the following questions in complete sentences.*

16. The solubility of sodium chloride is 359 g per 1 L of 20 °C water. Describe a saturated and an unsaturated solution of sodium chloride in water.

17. Explain how to calculate the concentration of a solution. Give an example.

## 10.3 Acids and Bases

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following substances has a pH greater than 7?
  - normal (clean) rain
  - orange juice
  - bananas
  - soap
- Acids produce hydrogen gas when they react with
  - salts.
  - bases.
  - water.
  - metals.
- Properties of bases include
  - a sour taste.
  - a slippery feel.
  - the ability to conduct electricity.
  - two of the above.
- Which of the following acids is strongest?
  - sulfuric acid
  - lemon juice
  - acid rain
  - vinegar
- Products of a neutralization reaction include
  - hydroxide ions.
  - hydrogen ions.
  - water.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Litmus is the only indicator for detecting acids and bases.
- \_\_\_\_\_ 7. Acids have many important uses in industry.
- \_\_\_\_\_ 8. When sodium hydroxide dissolves in water it forms hydrogen ions.

\_\_\_\_\_ 9. A neutral substance has a pH of 7.

\_\_\_\_\_ 10. A salt forms when an acid and base react.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ is an ionic compound that produces hydrogen ions when dissolved in water.

12. A(n) \_\_\_\_\_ turns red litmus paper blue.

13. Acidity is measured on a scale called \_\_\_\_\_.

14. The reaction of an acid and a base is called a(n) \_\_\_\_\_ reaction.

15. A bitter taste is a property of ionic compounds known as \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. An unknown substance has a pH of 3. What are some of its properties? How do you know?

17. Explain what determines the strength of an acid or a base.

## 10.4 Chemistry of Solutions

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following substances does not dissolve in water?
  - antifreeze
  - acetic acid
  - paint thinner
  - two of the above
- What happens when a sugar crystal dissolves in water?
  - Water pulls sugar molecules away from the sugar crystal.
  - Water divides the sugar crystal into separate atoms.
  - Water weakens bonds inside sugar molecules.
  - Water separates the sugar molecules into ions.
- Which properties of the solvent are changed by the solute?
  - chemical properties
  - physical properties
  - atomic properties
  - nuclear properties
- You can increase the solubility of salt in water by
  - increasing the pressure on the water.
  - stirring the salt into the water.
  - heating the water.
  - all of the above
- The upper limit on how much of a certain solute can dissolve in a given solvent is the solute's
  - concentration.
  - saturation.
  - solubility.
  - dilution.
- Which of the following ionic compounds is a base when dissolved in water?
  - HCl
  - KCl
  - NaCl
  - NaOH
- Which of the following products contain acids?
  - laundry detergents



28. Define acidity, and explain how it is measured.

# CHAPTER 11

# Nuclear Chemistry Assessments

## Chapter Outline

- 11.1 RADIOACTIVITY
- 11.2 RADIOACTIVE DECAY
- 11.3 NUCLEAR ENERGY
- 11.4 NUCLEAR CHEMISTRY





# 11.1 Radioactivity

## Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

*Circle the letter of the correct choice.*

- The scientist who discovered radioactivity was
  - Curie.
  - Geiger.
  - Becquerel.
  - none of the above
- All nuclei that emit radiation are
  - radioactive.
  - very large.
  - unstable.
  - two of the above
- The radioactive isotope of carbon is
  - carbon-12.
  - carbon-13.
  - carbon-14.
  - none of the above
- Which combination of protons and neutrons would most likely result in a stable nucleus?
  - 4 protons and 2 neutrons
  - 4 protons and 4 neutrons
  - 4 protons and 6 neutrons
  - 4 protons and 8 neutrons
- Rocks may release radiation due to
  - formation of radioactive gas in the rocks.
  - radioactive elements in the rocks.
  - carbon-12 in the rocks.
  - two of the above

### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Radon gas is harmful when it burns and causes pollution.
- \_\_\_\_\_ 7. There is no way to detect radiation.
- \_\_\_\_\_ 8. Radioactive isotopes can be used to determine the ages of fossils.

\_\_\_\_\_ 9. A single large exposure to radiation can burn the skin.

\_\_\_\_\_ 10. Human activities are responsible for almost all the radiation in the environment.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the ability of a nucleus to emit radiation.

12. An isotope that emits charged particles and energy is called a(n) \_\_\_\_\_.

13. No two elements have the same number of \_\_\_\_\_.

14. The general term for charged particles and energy emitted by a nucleus is \_\_\_\_\_.

15. Low-level radiation that occurs naturally in the environment is called \_\_\_\_\_ radiation.

**Short Answer**

*Answer the following questions in complete sentences.*

16. What makes an isotope radioactive?

17. Explain how radiation can harm living things.

## 11.2 Radioactive Decay

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- How does a nucleus change when it undergoes beta decay?
  - Its atomic number increases.
  - Its mass number increases.
  - It has more neutrons.
  - It has fewer protons.
- Which of the following nuclear equations represents alpha decay?
  - ${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + {}^0_{-1}e + \text{Energy}$
  - ${}^{210}_{84}\text{Po} \rightarrow {}^{210}_{85}\text{At} + {}^0_{-1}e + \text{Energy}$
  - ${}^{238}_{92}\text{U} \rightarrow {}^{234}_{90}\text{Th} + {}^4_2\text{He} + \text{Energy}$
  - two of the above
- For a nuclear equation to be balanced, both sides of the equation must have the same number of
  - protons.
  - neutrons.
  - electrons.
  - protons plus neutrons.
- Charged particles are emitted from a nucleus during
  - beta decay.
  - alpha decay.
  - gamma decay.
  - two of the above
- Which of the following radioisotopes has the longest half-life?
  - uranium-238
  - carbon-14
  - hydrogen-3
  - radon-222

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. In all three types of radioactive decay, nuclei emit energy.
- \_\_\_\_\_ 7. During gamma decay, one element changes into another.
- \_\_\_\_\_ 8. Most of Earth's helium formed when alpha particles picked up electrons.

\_\_\_\_\_ 9. Carbon-14 forms when cosmic rays strike atoms of carbon-12.

\_\_\_\_\_ 10. Carbon-14 dating can be used to estimate the age of any fossil.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ particle consists of two protons and two neutrons.

12. A(n) \_\_\_\_\_ particle is represented by the symbol  ${}_{-1}^0e$ .

13. The most penetrating type of radiation is a(n) \_\_\_\_\_.

14. The rate of decay of radioisotopes is measured in a unit called the \_\_\_\_\_.

15. \_\_\_\_\_ is the process in which a radioactive nucleus emits only energy.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Define radioactive decay and explain why it occurs.

17. How are alpha and beta decay similar? How are they different?

# 11.3 Nuclear Energy

## Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

- Which equation represents a nuclear fusion reaction?
  - ${}_{27}^{60}\text{Co} \rightarrow {}_{28}^{60}\text{Ni} + 1 \text{ Electron} + \text{Energy}$
  - ${}_{1}^{2}\text{H} + {}_{1}^{3}\text{H} \rightarrow {}_{2}^{4}\text{He} + 1 \text{ Neutron} + \text{Energy}$
  - ${}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Th} + {}_{2}^{4}\text{He} + 1 \text{ Proton} + \text{Energy}$
  - ${}_{92}^{235}\text{U} + 1 \text{ Neutron} \rightarrow {}_{36}^{92}\text{Kr} + {}_{56}^{141}\text{Ba} + 3 \text{ Neutrons} + \text{Energy}$
- A nuclear fission reaction occurs when a nucleus absorbs
  - a proton.
  - radiation.
  - a neutron.
  - light energy.
- Which of the following is a drawback of using nuclear fission for energy?
  - It adds carbon to the atmosphere.
  - It produces radioactive waste.
  - It releases very little energy.
  - two of the above
- If a successful nuclear fusion reactor could be built, the fuel it would use would be
  - water.
  - helium.
  - uranium.
  - hydrogen.
- Which statement describes a way that matter and energy are related?
  - Matter and energy are two forms of the same thing.
  - Matter can be converted to energy in chemical reactions.
  - A large amount of matter contains a small amount of energy.
  - all of the above

### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. Nuclear fusion is the opposite of nuclear fission.
- \_\_\_\_\_ 7. An atom bomb explosion is an uncontrolled nuclear chain reaction
- \_\_\_\_\_ 8. Waste from nuclear fission is no longer harmful after a couple of years.

\_\_\_\_\_ 9. In the U.S., most electrical energy is produced in nuclear power plants.

\_\_\_\_\_ 10. The fuel needed for nuclear fission is very plentiful.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the splitting of the nucleus of an atom into two smaller nuclei.

12. In a nuclear power plant, energy from nuclear fission is converted to \_\_\_\_\_.

13. When two hydrogen nuclei fuse, they form a(n) \_\_\_\_\_ nucleus.

14. The energy of stars is produced by \_\_\_\_\_.

15. In the equation  $E = mc^2$ , the letter  $E$  stands for \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe a nuclear chain reaction and explain why it occurs.

17. Explain why nuclear fusion is not yet used to produce electricity.

## 11.4 Nuclear Chemistry

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The only elements that can naturally change into other elements are
  - radioactive elements.
  - metallic elements.
  - uranium and radium.
  - gases such as radon.
- Unstable nuclei may emit
  - energy.
  - charged particles.
  - radiation.
  - all of the above
- When a nucleus undergoes gamma decay, it emits
  - an alpha particle.
  - a beta particle.
  - energy.
  - two of the above
- In beta decay, an unstable nucleus gains a proton when a(n)
  - proton divides and becomes two protons.
  - neutron develops a positive electric charge.
  - neutron breaks down to a proton and an electron.
  - electron reverses its charge and becomes a proton.
- An alpha particle can penetrate
  - a sheet of paper.
  - a thin layer of cloth.
  - a sheet of aluminum.
  - none of the above
- What happens when a uranium nucleus absorbs a neutron?
  - It undergoes nuclear fusion.
  - It releases three protons.
  - It splits into two nuclei.
  - all of the above
- Which element is used as fuel in nuclear fission power plants?
  - uranium





28. Compare and contrast nuclear fission and nuclear fusion reactions.

# CHAPTER 12

# Motion Assessments

## Chapter Outline

- 12.1 DISTANCE AND DIRECTION
- 12.2 SPEED AND VELOCITY
- 12.3 ACCELERATION
- 12.4 MOTION



## 12.1 Distance and Direction

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. If motion is represented by an arrow, what does the head of the arrow show?
  - a. speed
  - b. position
  - c. distance
  - d. direction
2. If you were riding in a car down a city street, which frame of reference would not allow you to detect that the car was moving?
  - a. the driver of the car
  - b. buildings along the street
  - c. traffic lights at intersections
  - d. cars parked on the sides of the street
3. What SI unit would be most appropriate for measuring the distance between Earth and the moon?
  - a. kilometer
  - b. meter
  - c. yard
  - d. mile
4. Which word could be used to describe the direction of a moving object?
  - a. far
  - b. fast
  - c. forever
  - d. forward
5. Frame of reference is
  - a. something that affects perception of motion.
  - b. a way to represent distance and direction.
  - c. the line along which something moves.
  - d. any change of location.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Short distances may be measured in centimeters.
- \_\_\_\_\_ 7. You can use a map to measure the distance between two points.
- \_\_\_\_\_ 8. You can measure the distance an object travels only if it does not change direction.

- \_\_\_\_\_ 9. Speed is one way to measure motion.
- \_\_\_\_\_ 10. The length of a vector arrow represents direction.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is defined as a change in position.
12. Motion includes both distance and \_\_\_\_\_.
13. The SI unit for distance is the \_\_\_\_\_.
14. Any quantity that includes both size and direction is called a(n) \_\_\_\_\_.
15. \_\_\_\_\_ is the length of the route between two points.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how to use a map to find the straight-line distance between two points.

17. Describe an original example that shows how frame of reference affects the perception of motion.

## 12.2 Speed and Velocity

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- Speed depends on how far something travels and
  - how steep its route is.
  - which direction it travels.
  - how much time it takes to travel that far.
  - none of the above
- What is the SI unit for speed?
  - s
  - m
  - m/s
  - s/m
- If the slope of a distance-time graph is steep, then the speed of the object must be
  - slow.
  - rapid.
  - constant.
  - changing.
- If you travel 500 kilometers in 5 hours, your average speed is
  - 5 km/h
  - 50 km/h
  - 100 km/h
  - 250 km/h
- Objects moving at the same velocity have the same
  - size.
  - speed.
  - direction.
  - two of the above

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. Both speed and velocity are vectors.
- \_\_\_\_\_ 7. The symbol  $\Delta t$  represents a change in time.
- \_\_\_\_\_ 8. The length of a velocity arrow represents distance.

\_\_\_\_\_ 9. A straight line on a distance-time graph means that speed is zero.

\_\_\_\_\_ 10. Speed is negative when an object moves backward.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. How quickly something moves is its \_\_\_\_\_.

12. \_\_\_\_\_ is a measure of the speed and direction of motion.

13. Speed is represented by the slope of a(n) \_\_\_\_\_ graph.

14. Speed at a given moment in time is called \_\_\_\_\_ speed.

15. Speed multiplied by time yields \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how two moving objects could have the same speed but different velocities. Use examples in your answer.

17. Assume you are taking a trip with your family and you want to make a distance-time graph for the trip. Describe the data you would need to collect for your graph, how you would collect it, and how you would display it in the graph.

## 12.3 Acceleration

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- Acceleration occurs whenever an object
  - moves.
  - changes position.
  - changes direction.
  - two of the above
- Which of the following is an example of acceleration?
  - a top spinning at a constant speed
  - a car slowing down through an intersection
  - a train going a steady 80 km/h along a straight track
  - two of the above
- What is the acceleration of a bicycle that goes from 3 m/s to 1 m/s in 2 seconds?
  - $0.5 \text{ m/s}^2$
  - $1.0 \text{ m/s}^2$
  - $1.5 \text{ m/s}^2$
  - $-1.0 \text{ m/s}^2$
- If the line of a velocity-time graph slopes upward, then acceleration must be
  - zero.
  - positive.
  - negative.
  - changing.
- The x-axis of a velocity-time graph represents
  - speed.
  - velocity.
  - direction.
  - none of the above

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. Acceleration is a vector.
- \_\_\_\_\_ 7. Acceleration shows how quickly velocity changes.
- \_\_\_\_\_ 8. A change in direction without a change in speed is not acceleration.

\_\_\_\_\_ 9. A velocity-time graph shows how velocity changes over time.

\_\_\_\_\_ 10. Acceleration is always greater than or equal to zero.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ measures changes in velocity.

12. Deceleration refers to a(n) \_\_\_\_\_ change in velocity.

13. The SI unit for acceleration is \_\_\_\_\_.

14. The slope of a(n) \_\_\_\_\_ graph represents acceleration.

15. If velocity is not changing, then acceleration is \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how to calculate acceleration when direction does not change. Illustrate your answer with an example.

17. Thomas thinks that acceleration means “speeding up.” Explain why this is incorrect.



## 12.4 Motion

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The SI unit for distance is the
  - acre.
  - meter.
  - kilogram.
  - centiliter.
- What is the average speed of a boat that travels 57 kilometers in 3 hours?
  - 171 km/h
  - 60 km/h
  - 54 km/h
  - 19 km/h
- How far will the boat in question 3 travel if it maintains this speed for 5 hours?
  - 89 km
  - 95 km
  - 114 km
  - 117 km
- If you use an arrow to represent velocity, what does the head of the arrow show?
  - speed
  - distance
  - direction
  - none of the above
- What does  $\Delta v/\Delta t$  represent?
  - speed
  - velocity
  - acceleration
  - none of the above
- Which of the following is the best definition of deceleration?
  - zero acceleration
  - constant acceleration
  - changing acceleration
  - negative acceleration
- Acceleration always involves a change in
  - speed.

- b. velocity.
- c. direction.
- d. all of the above

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Very short distances should be measured in kilometers.
- \_\_\_\_\_ 9. Distance is less important than direction in describing motion.
- \_\_\_\_\_ 10. Words that describe direction include back and forth.
- \_\_\_\_\_ 11. Speed is an example of a vector.
- \_\_\_\_\_ 12. A horizontal line on a distance-graph represents a speed of zero.
- \_\_\_\_\_ 13. Distance equals speed divided by time.
- \_\_\_\_\_ 14. If an object's speed changes so does its velocity.
- \_\_\_\_\_ 15. Calculating acceleration is complicated when both speed and direction are changing.
- \_\_\_\_\_ 16. You are accelerating when you jump up and down on a trampoline.
- \_\_\_\_\_ 17. The SI unit for acceleration is  $\text{km/s}^2$ .

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Motion is defined as a change in \_\_\_\_\_.
- 19. Motion is a(n) \_\_\_\_\_ when both distance and direction are included.
- 20. \_\_\_\_\_ is something an observer uses to perceive motion.
- 21. How far you travel in a given amount of time can be used to calculate your \_\_\_\_\_.
- 22. The \_\_\_\_\_ of a distance-time graph represents speed.
- 23. Meters per second is the SI unit for \_\_\_\_\_.
- 24. Any change in velocity is referred to as \_\_\_\_\_.
- 25. The slope of a velocity-time graph represents \_\_\_\_\_.

**Short Answer**

Answer the following questions in complete sentences.

- 26. What are vectors? How are arrows used to represent them? Which measures of motion are vectors?

- 27. Explain how to calculate average speed. Use an example to illustrate your answer.

28. Explain why acceleration, but not speed, can have a negative value.

# CHAPTER 13

# Forces Assessments

## Chapter Outline

- 13.1 WHAT IS FORCE?
- 13.2 FRICTION
- 13.3 GRAVITY
- 13.4 ELASTIC FORCE
- 13.5 FORCES



## 13.1 What is Force?

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

1. How much an object's motion changes when force is applied to it depends on the strength of the force and the object's
  - a. size.
  - b. mass.
  - c. volume.
  - d. velocity.
2. Why is force a vector?
  - a. It causes objects to move.
  - b. It has size and direction.
  - c. It can be measured.
  - d. two of the above
3. One newton is defined as the amount of force that causes
  - a. a weight of 1 pound to reach a speed of 1 m/s.
  - b. a mass of 1 kilogram to accelerate at  $1 \text{ m/s}^2$ .
  - c. an object to increase its velocity to  $1 \text{ m/s}^2$ .
  - d. any stationary object to start moving.
4. What is the net force acting on the object pictured below?



- a. 7 N to the right
  - b. 7 N to the left
  - c. 2 N to the right
  - d. 3 N to the left
5. If two forces act on an object in the same direction
    - a. the net force is greater than either of the two forces.
    - b. the net force equals the sum of the two forces.
    - c. the two forces are always balanced.
    - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The force of gravity acting on an object is measured by weight.
- \_\_\_\_\_ 7. Examples of forces include friction, gravity, and velocity.
- \_\_\_\_\_ 8. Equal but opposite forces pushing on the same object produce a net force of zero on the object.
- \_\_\_\_\_ 9. The length of a force arrow represents the direction of the force.
- \_\_\_\_\_ 10. Force can cause a moving object to stop moving.

### **Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Any push or pull acting on an object is a(n) \_\_\_\_\_.
12. The force that a person or thing exerts on an object is called \_\_\_\_\_ force.
13. The SI unit for force is the \_\_\_\_\_.
14. The combination of all the forces acting on an object is known as the \_\_\_\_\_ force.
15. When opposing forces are not equal in strength, the forces are said to be \_\_\_\_\_.

### **Short Answer**

*Answer the following questions in complete sentences.*

16. Identify the forces acting on you when you are standing still. Explain why the forces do not cause you to move.

17. Compare and contrast balanced and unbalanced forces.

## 13.2 Friction

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Friction is greater when surfaces are
  - rougher.
  - smoother.
  - smaller.
  - two of the above
- Rubbing your hands together makes them warmer because
  - friction causes molecules to move faster.
  - rubbing causes chemical reactions.
  - rubbing causes skin cells to release enzymes.
  - none of the above
- Which way of moving a box produces no friction?
  - sliding the box across the floor
  - rolling the box on a dolly
  - picking up the box and carrying it
  - none of the above
- Why do ball bearings reduce friction in a wheel?
  - Ball bearings prevent the wheel from sliding on the road.
  - Rolling friction is less than sliding friction.
  - Ball bearings roll instead of slide.
  - two of the above
- Fluid friction is greater when the object moving through the fluid is
  - larger.
  - smaller.
  - faster.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Friction is a force that opposes motion.
- \_\_\_\_\_ 7. The force of friction between surfaces is always useful.
- \_\_\_\_\_ 8. Sliding friction is greater when the sliding object is heavier.

\_\_\_\_\_ 9. Sliding friction is stronger than static friction.

\_\_\_\_\_ 10. Rolling friction is weaker than sliding friction.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The type of friction that occurs between an object and the fluid it moves through is called \_\_\_\_\_ friction.

12. The type of friction that occurs between the wheels of a car and the road is called \_\_\_\_\_ friction.

13. Friction always produces energy in the form of \_\_\_\_\_.

14. You can stand on the floor without slipping because of \_\_\_\_\_ friction.

15. Fluid friction with air is called \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Identify a type of friction that opposes the forward motion of a runner.

17. Explain how you might reduce the sliding friction between two surfaces.



## 13.3 Gravity

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The SI unit for weight is the
  - gram.
  - kilogram.
  - newton.
  - pound.
- Newton's law of universal gravitation states that the force of gravity
  - affects all objects in the universe.
  - is stronger for objects with more mass.
  - is stronger for objects that are closer together.
  - all of the above
- Gravity causes all objects to
  - attract one another.
  - have projectile motion.
  - accelerate when they fall toward Earth.
  - two of the above
- The only reason that a leaf falls to the ground more slowly than an acorn is that the leaf has
  - less mass.
  - more air resistance.
  - a weaker force of gravity.
  - less acceleration due to gravity.
- On Earth, a mass of 1 kilogram exerts a downward force due to gravity of about
  - 1 N.
  - 5 N.
  - 10 N.
  - 15 N.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. All of the solar systems in the universe formed because of gravity.
- \_\_\_\_\_ 7. Gravity acts only between objects that are close together or touching.
- \_\_\_\_\_ 8. Earth has stronger gravity than the moon.

\_\_\_\_\_ 9. Weight is measured with a balance.

\_\_\_\_\_ 10. People have known about gravity for thousands of years.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The force of attraction between two masses is known as \_\_\_\_\_.

12. \_\_\_\_\_ measures the force of gravity pulling on an object.

13. The law of universal gravitation was proposed by \_\_\_\_\_.

14. \_\_\_\_\_ showed that gravity is an effect of curves in space and time.

15. The moon's path around Earth is called a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Assume that you drop a rock from the top of a tall cliff and it takes 3 seconds for the rock to fall to the bottom of the cliff. What is the rock's velocity when it reaches the bottom? How do you know?

17. When you shoot an arrow at a target, why should you aim above the bull's eye if you want the arrow to hit the bull's eye?

## 13.4 Elastic Force

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following items has the property of elasticity?
  - rubber band
  - paper clip
  - toothpick
  - iron nail
- When does an elastic material exert elastic force?
  - before it is stretched
  - as it is stretched
  - when it is released
  - two of the above
- What happens when you pull on a bungee cord?
  - It stretches.
  - It resists the change in shape.
  - It exerts force in the opposite direction.
  - all of the above
- When you jump on a trampoline, the surface of the trampoline
  - changes shape.
  - exerts elastic force.
  - pushes you up into the air.
  - all of the above
- Elastic force causes an elastic material to
  - push back when pulled.
  - return to its original shape.
  - take the shape of its container.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. When you compress a spring, it resists the change in shape.
- \_\_\_\_\_ 7. Paper is an example of an elastic material.
- \_\_\_\_\_ 8. As you stretch a bungee cord, its elastic force gets stronger.

\_\_\_\_\_ 9. When you release a stretched bungee cord, it returns to its original shape because of gravity.

\_\_\_\_\_ 10. Something that is elastic returns to its original shape after being compressed.

### **Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The counter force exerted by an elastic material that is stretched is called \_\_\_\_\_.

12. \_\_\_\_\_ is the ability of a material to return to its original shape after being stretched or compressed.

13. A bungee cord can stretch without breaking because it is \_\_\_\_\_.

14. When you use a resistance band, the resistance you feel is \_\_\_\_\_.

15. An elastic material resists changes in \_\_\_\_\_.

### **Short Answer**

*Answer the following questions in complete sentences.*

16. Changes in shape that occur because of elastic force are physical changes in matter. Explain why.

17. A pogo stick contains a spring. What happens to the spring when you jump on it? Why does the pogo stick allow you to jump higher than you could without it?

# 13.5 Forces

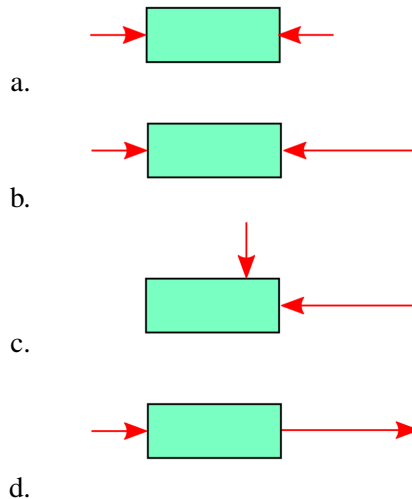
## Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

1. Which diagram represents balanced forces?



2. Which pair of forces in question 1 will cause the object to move to the right?

- a. a  
b. b  
c. c  
d. d
3. Which type of friction do you use when you put on the brakes to stop a bike?
- a. static friction  
b. stopping friction  
c. rolling friction  
d. sliding friction
4. Why does engine oil help prevent an engine from overheating?
- a. It causes chemical reactions that absorb energy.  
b. It reduces friction between moving parts.  
c. It has a higher melting point than metal.  
d. It makes the engine run more slowly.
5. You would weigh less on the moon than on Earth because
- a. you would have less mass on the moon.  
b. the moon has weaker gravity than Earth.

- c. the moon has a thinner atmosphere than Earth.
  - d. two of the above
6. Albert Einstein was the first person to show that gravity is
- a. exerted by all objects on all other objects.
  - b. stronger between objects with greater mass.
  - c. stronger between objects that are closer together.
  - d. caused by curves in space and time around massive objects.
7. Examples of objects that make use of elastic force include
- a. hair scrunchies.
  - b. pogo sticks.
  - c. trampolines.
  - d. all of the above

### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. The SI unit for weight is the pound.
- \_\_\_\_\_ 9. Forces acting in the same direction are subtracted to yield the net force.
- \_\_\_\_\_ 10. Stationary objects generally have at least two forces acting on them.
- \_\_\_\_\_ 11. Static friction is weaker than sliding friction.
- \_\_\_\_\_ 12. Fluid friction is stronger when an object moves more slowly through a fluid.
- \_\_\_\_\_ 13. A pebble falls to the ground more quickly than a sheet of paper because the pebble has greater mass.
- \_\_\_\_\_ 14. The law of universal gravitation was proposed by Isaac Newton.
- \_\_\_\_\_ 15. Both arrows and cannon balls have projectile motion.
- \_\_\_\_\_ 16. When you stretch a spring, it resists the change in shape.
- \_\_\_\_\_ 17. Rubber is an example of an elastic material.

### Fill in the Blank

Fill in the blank with the appropriate term.

18. The newton is the SI unit for \_\_\_\_\_.
19. The difference between two opposing forces is called the \_\_\_\_\_ force.
20. The force that opposes motion between any two surfaces is \_\_\_\_\_.
21. \_\_\_\_\_ friction makes it possible to walk on a sidewalk without slipping.
22. Anything that has mass exerts a force of \_\_\_\_\_ on any other mass.
23. After falling toward Earth for 2 seconds, an object ideally has a velocity of \_\_\_\_\_.
24. Gas molecules are attracted toward each other because of the force of \_\_\_\_\_.
25. A stretched bungee cord returns to its original shape because it has the property of \_\_\_\_\_.

### Short Answer

Answer the following questions in complete sentences.

26. Outline the relationships between forces and motion.

27. Explain why it is easier to move a heavy box on a dolly than it is to slide the box over the ground.

28. Identify two forces that come into play when you jump on a trampoline. Explain how the forces work.

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# CHAPTER **14** Newton's Laws of Motion Assessments

## Chapter Outline

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- 14.1 NEWTON'S FIRST LAW
  - 14.2 NEWTON'S SECOND LAW
  - 14.3 NEWTON'S THIRD LAW
  - 14.4 NEWTON'S LAWS OF MOTION
- 





## 14.1 Newton's First Law

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Newton's first law of motion is also called the law of
  - mass.
  - inertia.
  - velocity.
  - unbalanced forces.
- Once an applied force causes an object to start moving, the object keeps moving because
  - the force continues to be applied to it.
  - no other force is acting on it.
  - it has inertia.
  - none of the above
- If the net force acting on any object is zero, the object will
  - not move.
  - change its motion.
  - have zero velocity.
  - none of the above
- If you run into a curb on your bike, you might fly forward over the handlebars because of
  - air resistance.
  - inertia.
  - friction.
  - gravity.
- Inertia causes a stationary object to
  - start moving.
  - remain stationary.
  - have an increase in velocity.
  - change its speed or direction.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Newton's first law relates motion to balanced and unbalanced forces.
- \_\_\_\_\_ 7. An object with greater mass has greater inertia.
- \_\_\_\_\_ 8. Balanced forces are needed to change an object's motion.

\_\_\_\_\_ 9. A rolling ball will roll forever unless it runs into another object.

\_\_\_\_\_ 10. The tendency of an object to resist a change in its motion depends on the object's size.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the tendency of an object to resist a change in its motion.

12. An object's motion will change only if a(n) \_\_\_\_\_ force acts on the object.

13. The force of \_\_\_\_\_ opposes the movement of objects.

14. The inertia of an object depends on the object's \_\_\_\_\_.

15. \_\_\_\_\_ force is the combination of all the forces acting on an object.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Define inertia and relate the concept of inertia to the motion of objects.

17. Apply Newton's first law of motion to a sprinter in a race.

## 14.2 Newton's Second Law

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- Which two factors have an inverse relationship?
  - force and acceleration
  - force and mass
  - mass and gravity
  - mass and acceleration
- Any change in the motion of an object is called
  - speed.
  - velocity.
  - direction.
  - acceleration.
- In the equation  $F = m \times a$ , if  $a$  is the acceleration due to gravity, what is  $F$ ?
  - mass
  - weight
  - friction
  - frequency
- If you push a 20-kg box with a force of 10 N, what is its acceleration?
  - $20 \text{ m/s}^2$
  - $10 \text{ m/s}^2$
  - $2 \text{ m/s}^2$
  - $0.5 \text{ m/s}^2$
- Newton determined that the acceleration of an object depends on the net force acting on the object and the object's
  - size.
  - mass.
  - weight.
  - velocity.

*True or False?*

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Newton's second law shows that there is a direct relationship between net force and acceleration.
- \_\_\_\_\_ 7. Doubling the mass of an object doubles its weight.
- \_\_\_\_\_ 8. Force can be expressed as  $\text{kg} \cdot \text{m/s}$ .

\_\_\_\_\_ 9. Any object that is accelerating is changing its speed.

\_\_\_\_\_ 10. If a balanced force acts on an object, the object will accelerate.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Acceleration is a measure of the change in \_\_\_\_\_ of an object.

12. Newton's second law shows that there is a(n) \_\_\_\_\_ relationship between the acceleration of an object and its mass.

13. Increasing the net force on a given object \_\_\_\_\_ the object's acceleration.

14. \_\_\_\_\_ is a measure of the force of gravity pulling on an object of a given mass.

15. The acceleration of any object due to gravity is \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. People often think that mass and weight measure the same thing. Explain why this is incorrect.

17. Explain how the following factors are related to one another for a given object: net force, mass, and acceleration.

## 14.3 Newton's Third Law

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What happens when a boater pushes against the water with an oar?
  - a. The water pushes back.
  - b. The boat moves in the opposite direction.
  - c. The oar moves the boat.
  - d. two of the above
2. Action and reaction forces are not balanced because they
  - a. are unequal in strength.
  - b. act in the same direction.
  - c. act on different objects.
  - d. cancel each other out.
3. An object has greater momentum if it has
  - a. smaller size.
  - b. greater mass.
  - c. greater velocity.
  - d. two of the above
4. Which statement about momentum is false?
  - a. Momentum is a force.
  - b. Momentum may be transferred.
  - c. Momentum is always conserved.
  - d. Momentum is a property only of moving objects.
5. The momentum of a 50-kg object moving at a velocity of 2 m/s is
  - a.  $100 \text{ kg} \cdot \text{m/s}$
  - b.  $50 \text{ kg} \cdot \text{m/s}$
  - c.  $25 \text{ kg} \cdot \text{m/s}$
  - d.  $2 \text{ kg} \cdot \text{m/s}$

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Momentum is a measure of an object's velocity.
- \_\_\_\_\_ 7. If you double the velocity of an object, its momentum also doubles.
- \_\_\_\_\_ 8. The law of conservation of momentum applies to actions and reactions.

- \_\_\_\_\_ 9. After two objects collide, their combined momentum is always zero.
- \_\_\_\_\_ 10. A bowling ball has greater momentum than a softball if both have the same velocity.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is a property of a moving object that makes the object hard to stop.
12. An object's momentum equals its mass multiplied by its \_\_\_\_\_.
13. Equal and opposite forces that act on the same object are called \_\_\_\_\_ forces.
14. According to Newton's third law of motion, \_\_\_\_\_ always act in pairs.
15. A reaction force is always \_\_\_\_\_ and opposite to the action force.

*Short Answer'*

*Answer the following questions in complete sentences.*

16. Momentum is a property of an object, but it is not always the same for a given object. Explain why.

17. Apply Newton's third law of motion to the action of serving a volleyball.

## 14.4 Newton's Laws of Motion

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What is always required to overcome inertia?
  - a. force of friction
  - b. force of gravity
  - c. unbalanced force
  - d. two of the above
2. An object at rest will stay at rest as long as the net force acting on it is
  - a. positive.
  - b. strong.
  - c. stable.
  - d. zero.
3. Inertia causes a moving object to
  - a. keep moving.
  - b. stop moving.
  - c. slow down.
  - d. speed up.
4. The inertia of an object depends on its
  - a. mass.
  - b. speed.
  - c. velocity.
  - d. direction.
5. The acceleration of an object is inversely related to its
  - a. mass.
  - b. speed.
  - c. weight.
  - d. velocity.
6. If you apply 10 N of force to a 10-kg object, what will be the object's acceleration?
  - a.  $10 \text{ m/s}^2$
  - b.  $10 \text{ N/kg}$
  - c.  $1 \text{ m/s}^2$
  - d.  $1 \text{ kg/N}$
7. What is the SI unit for momentum?
  - a.  $\text{kg/s}^2$

- b.  $\text{kg} \cdot \text{m/s}^2$
- c.  $\text{kg} \cdot \text{s/m}$
- d. none of the above

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Newton's first law of motion applies only to stationary objects.
- \_\_\_\_\_ 9. It takes more force to start running than to keep running.
- \_\_\_\_\_ 10. It is harder to stop a 60-kg football player than a 40-kg football player if they have the same velocity.
- \_\_\_\_\_ 11. An object's acceleration depends on its mass and speed.
- \_\_\_\_\_ 12. If you increase the net force acting on an object, its acceleration also increases.
- \_\_\_\_\_ 13. Newton's second law of motion applies only to objects that are moving.
- \_\_\_\_\_ 14. If you know an object's mass, you also know its weight because mass and weight measure the same thing.
- \_\_\_\_\_ 15. Newton's third law of motion describes how forces act in pairs.
- \_\_\_\_\_ 16. When objects collide, momentum is usually lost.
- \_\_\_\_\_ 17. Momentum is a type of force.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Newton's \_\_\_\_\_ law of motion is also known as the law of inertia.
- 19. A stationary object resists movement because of \_\_\_\_\_
- 20. Inertia is greater when objects have greater \_\_\_\_\_.
- 21. Newton's \_\_\_\_\_ law of motion relates acceleration to force and mass.
- 22. An object will accelerate only if the net force acting on the object is greater than \_\_\_\_\_.
- 23. The \_\_\_\_\_ of an object is equal to its mass multiplied by the acceleration due to gravity.
- 24. According to Newton's \_\_\_\_\_ law of motion, every action has an equal and opposite reaction.
- 25. Two objects with the same velocity have the same momentum only if they also have the same \_\_\_\_\_.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Explain this statement: Because of inertia, seatbelts save lives.

- 27. How does Newton's second law of motion explain the weight of an object?



28. Describe an example of Newton's third law of motion.

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# CHAPTER 15 Fluid Forces Assessments

## Chapter Outline

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15.1 PRESSURE OF FLUIDS

15.2 BUOYANCY OF FLUIDS

15.3 FLUID FORCES

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# 15.1 Pressure of Fluids

## Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

- Why can you fill a balloon with air by blowing air into it through a single small opening?
  - Particles of a fluid always spread out to fill their container.
  - Pressure of a fluid is greater when the same force is applied to a larger area.
  - Particles of a fluid always move from an area of lower pressure to an area of higher pressure.
  - two of the above
- Assume that you apply 10 Pa of pressure to the head of a thumbtack. How much pressure will the point of the tack apply to a corkboard?
  - 0 Pa
  - less than 10 Pa
  - exactly 10 Pa
  - more than 10 Pa
- Which of the following is the SI unit for pressure?
  - N
  - N/m
  - N/m<sup>2</sup>
  - none of the above
- If you know how much pressure is applied to a given area, you can calculate the force exerted on the area by
  - multiplying pressure by area.
  - subtracting pressure from area.
  - dividing pressure by area.
  - adding pressure to area.
- It is harder for people to breathe in adequate oxygen at high altitudes because
  - there is a smaller percentage of oxygen in high-altitude air.
  - the atmosphere is denser high above sea level.
  - air pressure is lower at high altitudes.
  - none of the above

### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. Pressure is a force that is exerted only by fluids.
- \_\_\_\_\_ 7. Bernoulli's law explains why ketchup squirts out of a packet when pressure is applied to the other end.
- \_\_\_\_\_ 8. Pascal's law explains how a hydraulic lift works.

\_\_\_\_\_ 9. Particles of a fluid exert pressure in all directions.

\_\_\_\_\_ 10. The spoiler on a racecar causes air pressure to push the car down toward the track.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ law states that a change in pressure is transmitted equally throughout a fluid.

12. Denser fluids exert \_\_\_\_\_ pressure than less dense fluids.

13. \_\_\_\_\_ law states that pressure in a moving fluid is less when the fluid is moving more quickly.

14. The upward force that allows birds and airplanes to fly is called \_\_\_\_\_.

15. The pressure of ocean water is \_\_\_\_\_ at the bottom of the ocean than it is at the surface.

### Short Answer

*Answer the following questions in complete sentences.*

16. Does a gymnast exert more pressure on the floor when she does a handstand or when she does a split? Explain your answer.

17. Describe how a hydraulic lift transmits pressure and increases the force applied to the hydraulic fluid.

## 15.2 Buoyancy of Fluids

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement is true about weight and buoyant force?
  - They work in opposite directions.
  - They are always equal in strength.
  - They determine whether an object floats.
  - two of the above
- Some objects float in water because the objects
  - weigh less than the weight of the water they displace.
  - have less mass when they are placed in water.
  - have greater density than water.
  - have the property of buoyancy.
- The amount of water that is displaced when you submerge yourself in a swimming pool is equal to your body's
  - surface area.
  - volume.
  - weight.
  - mass.
- The weight of the displaced water in question 3 equals the
  - force of gravity acting on your body.
  - buoyant force acting on your body.
  - weight of your body.
  - two of the above
- What happens if an object is placed in water and its density is greater than water?
  - The object always sinks.
  - The object always floats.
  - The object may sink or float.
  - The object's density decreases.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Objects float because fluids exert only upward pressure.
- \_\_\_\_\_ 7. Buoyancy is a property of some objects when placed in fluids.
- \_\_\_\_\_ 8. If two objects have the same volume but differ in density, the denser object will weigh more.

\_\_\_\_\_ 9. Archimedes' law explains why heavy objects can float if they displace enough water.

\_\_\_\_\_ 10. The buoyant force acting on an object in a fluid depends on the total volume of the fluid.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The ability of a fluid to exert an upward force on any object placed in the fluid is called \_\_\_\_\_.

12. If an object's weight is less than the buoyant force acting on the object, then the object will \_\_\_\_\_.

13. \_\_\_\_\_ determined that the amount of fluid displaced by an object equals the object's volume.

14. The buoyant force acting on an object equals the \_\_\_\_\_ of the fluid displaced by the object.

15. Buoyant force occurs because a fluid exerts greater \_\_\_\_\_ at greater depth.

**Short Answer**

*Answer the following questions in complete sentences.*

16. What explains buoyant force?

17. Why do icebergs float on ocean water?

## 15.3 Fluid Forces

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- When a fluid fills a closed container, it exerts pressure
  - only on the bottom of the container.
  - only on the sides of the container.
  - only on particles within the fluid.
  - everywhere inside the container.
- Fluids exert pressure because they
  - contain force particles.
  - are confined to a small area.
  - have constantly moving particles.
  - all of the above
- The SI unit for pressure is named for the scientist who discovered that pressure is
  - transmitted equally throughout an enclosed fluid.
  - greater on Mount Everest than at sea level.
  - transmitted only from gases to liquids.
  - greater in a faster moving fluid.
- To find the pressure exerted by a force on a given area, you should
  - multiply the force by the area.
  - divide the force by the area.
  - add the force to the area.
  - none of the above
- Ice floats on water because water has greater
  - mass.
  - density.
  - volume.
  - movement.
- The ability of a fluid to exert upward force on objects placed in the fluid is known as
  - weight.
  - floating.
  - buoyancy.
  - buoyant force.
- The buoyant force acting on an object in a fluid equals the
  - weight of the object.

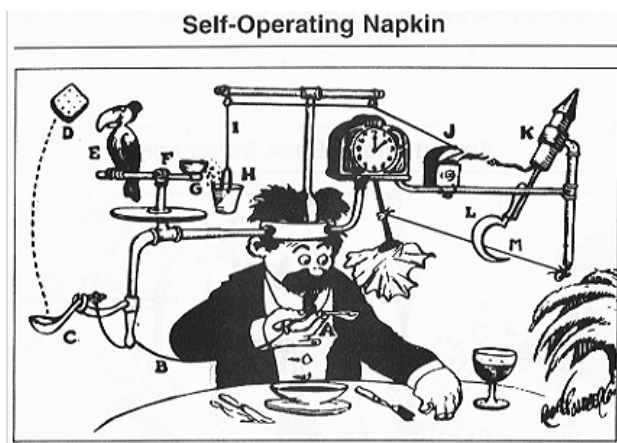




28. Some very heavy objects float on water. Explain how.

**CHAPTER 16****Work and Machines Assessments****Chapter Outline**

- 16.1 WORK**
- 16.2 MACHINES**
- 16.3 SIMPLE MACHINES**
- 16.4 COMPOUND MACHINES**
- 16.5 WORK AND MACHINES**

**How the Self-Operating Napkin Works:**

1. The man raises the soup spoon (A) to his mouth. This movement pulls the string (B), which jerks the ladle (C).
2. The ladle throws the cracker (D) past the parrot (E), which jumps for the cracker, causing the perch (F) to tilt.
3. When the perch tilts, it upsets the seeds (G) into the pail (H). The extra weight in the pail pulls the cord (I), which opens and lights the lighter (J).
4. The lighter sets off the skyrocket (K), which causes the sickle (L) to cut the string (M).
5. When the string is cut, it allows the pendulum with the attached napkin to swing back and forth, thereby wiping the man's chin.

## 16.1 Work

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. Assume that a friend hands you a 15-newton box to hold for her. If you hold the box without moving it at a height of 1.5 meters above the ground, how much work do you do?
  - a. 22.5 J
  - b. 15 J
  - c. 10 J
  - d. none of the above
2. Which weight lifter described below does the most work?
  - a. Tom lifts 195 N a distance of 2.0 m.
  - b. Ted lifts 190 N a distance of 2.1 m.
  - c. Tad lifts 185 N a distance of 2.2 m.
  - d. Tim lifts 180 N a distance of 2.3 m.
3. Another way of writing 1 joule is
  - a.  $1 \text{ N} \cdot \text{m}$ .
  - b.  $1 \text{ N/m}$ .
  - c.  $1 \text{ N} \cdot \text{m}^2$ .
  - d.  $1 \text{ N/m}^2$ .
4. One horsepower is about equal to
  - a. 1 watt.
  - b. 75 watts.
  - c. 745 watts.
  - d. 1 kilowatt.
5. How much work is done by a 1000-watt hairdryer in 40 seconds?
  - a. 0.4 J
  - b. 25 J
  - c. 960 J
  - d. 40,000 J

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Every time you apply a force you do work
- \_\_\_\_\_ 7. A more powerful device can do more work in the same amount of time than a less powerful device.
- \_\_\_\_\_ 8. The power of a machine equals the work it does multiplied by the time it takes to do that work.

\_\_\_\_\_ 9. The steam engine invented by James Watt had the power of one horse.

\_\_\_\_\_ 10. The most powerful engines today can produce more than 100,000 horsepower.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The use of force to move an object is called \_\_\_\_\_.

12. The SI unit for work is the \_\_\_\_\_.

13. \_\_\_\_\_ is a measure of the amount of work that can be done in a given amount of time.

14. The SI unit for power is the \_\_\_\_\_.

15. Work can be calculated as power multiplied by \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Contrast how the term work is used in physics with its use in everyday language.

17. When Suri uses a 2000-watt hairdryer, she can dry her hair in 2 or 3 minutes. When she uses a 1000-watt hairdryer, it takes about 5 minutes to dry her hair. Explain why.

## 16.2 Machines

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Machines that increase the distance over which force is applied include
  - hammers.
  - doorknobs.
  - nutcrackers.
  - pry bars.
- Ways that machines make work easier include
  - increasing force.
  - increasing work.
  - increasing efficiency.
  - all of the above
- If you apply 20 N of force to the handle end of a canoe paddle, how much force might the paddle end apply to the water?
  - 40 N
  - 30 N
  - 20 N
  - 10 N
- If the output work of a machine is 3000 J and the input work is 4000 J, what is the efficiency of the machine?
  - 133%
  - 100%
  - 75%
  - 66%
- If the ideal mechanical advantage of a machine equals 1, then the actual mechanical advantage of the machine must be
  - greater than 1.
  - equal to 1.
  - less than 1.
  - less than zero.

#### True or False

*Write true if the statement is true or false if the statement is false.*

\_\_\_\_\_ 6. The output force of a machine is always less than the input force.

\_\_\_\_\_ 7. A machine changes the way that work is done.

- \_\_\_\_\_ 8. All machines change the direction in which force is applied.
- \_\_\_\_\_ 9. A machine that applies force over a longer distance also increases the strength of the force.
- \_\_\_\_\_ 10. A pry bar changes the strength, distance, and direction of the input force.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Any device that makes work easier by changing a force is a(n) \_\_\_\_\_.
12. The percent of work put into a machine that becomes output work is the machine's \_\_\_\_\_.
13. The number of times a machine multiplies the force applied to the machine is the machine's \_\_\_\_\_.
14. The distance over which the force is applied by a machine is called the \_\_\_\_\_ distance.
15. The efficiency of a machine is reduced when there is more \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. A heavy object can be pushed up a ramp or wheeled up a ramp on a dolly. Which way of moving the object up the ramp is more efficient? Explain your answer.

17. Compare and contrast the actual and ideal mechanical advantage of machines.

## 16.3 Simple Machines

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

1. Which type of simple machine is the head of an axe?
  - a. wedge
  - b. lever
  - c. screw
  - d. none of the above
2. Which of the following is a second-class lever?
  - a. seesaw
  - b. chisel
  - c. wheelbarrow
  - d. hockey stick
3. The ideal mechanical advantage of a pulley equals the
  - a. number of rope segments lifting up on the object.
  - b. length of the rope segments between the pulley and the object.
  - c. height of the pulley above the surface of the ground.
  - d. number of rope segments between the pulley and the beam.
4. Which statement about a wheel and axle is true?
  - a. It consists of two simple machines.
  - b. It changes the direction of the applied force.
  - c. It changes the distance over which the force is applied.
  - d. two of the above
5. The ideal mechanical advantage of an inclined plane is always
  - a. less than one.
  - b. equal to one.
  - c. greater than one.
  - d. less than zero.

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. The center of a wheel and axle is called the fulcrum.
- \_\_\_\_\_ 7. A wedge is used to cut or split objects.
- \_\_\_\_\_ 8. When you turn a screw, you apply force along its inclined plane.

\_\_\_\_\_ 9. A lever may or may not change the strength of the applied force.

\_\_\_\_\_ 10. The wheel of a wheel and axle turns more slowly than the axle.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Two types of simple machines that contain inclined planes are wedges and \_\_\_\_\_.

12. The type of simple machine you would use to pry a nail out of a board is a(n) \_\_\_\_\_.

13. A \_\_\_\_\_ class lever changes the direction of the input force.

14. The \_\_\_\_\_ is the smaller of the two rings in a wheel and axle.

15. A grooved wheel and rope make up the simple machine called a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. A hammer is a lever that can be used to pound a nail into a board or to pry a nail out of a board. Which class of lever is the hammer in each case? Explain your answer.

17. Describe how force changes when it is applied to the axle of a wheel and axle.



## 16.4 Compound Machines

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Simple machines in a pair of scissors include
  - two levers.
  - two wedges.
  - one wheel and axle.
  - two of the above
- Compound machines include all of the following except a(n)
  - chisel.
  - bicycle.
  - automobile.
  - wheelbarrow.
- An axe is a compound machine that consists of a wedge and a(n)
  - screw.
  - inclined plane.
  - first class lever.
  - third class lever.
- A compound machine tends to be less efficient than a simple machine because a compound machine
  - produces more work.
  - exerts a greater force.
  - has more moving parts.
  - none of the above
- Which of the following machines has the greatest mechanical advantage?
  - mountain bike
  - inline skate
  - roller skate
  - tricycle

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A wheel and axle is an example of a compound machine.
- \_\_\_\_\_ 7. A pulley system that contains a fixed and a moveable pulley is a compound machine.
- \_\_\_\_\_ 8. A single pulley is less efficient than a pulley system that consists of two or more pulleys.

\_\_\_\_\_ 9. The mechanical advantage of a compound machine is generally less than that of a simple machine.

\_\_\_\_\_ 10. Friction tends to be a bigger problem in a compound machine than in a simple machine.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. Any machine that consists of at least two simple machines is called a(n) \_\_\_\_\_ machine.

12. Simple machines in a wheelbarrow are a wheel and axle and a(n) \_\_\_\_\_.

13. A fishing rod is a \_\_\_\_\_ class lever.

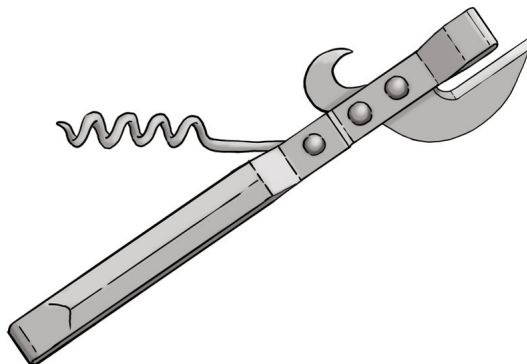
14. A fishing reel is a wheel and axle that acts as a(n) \_\_\_\_\_.

15. The mechanical advantage of a compound machine equals the \_\_\_\_\_ of the mechanical advantages of all of its component simple machines.

### Short Answer

*Answer the following questions in complete sentences.*

16. Identify three simple machines in the hand-held can and bottle opener pictured below. What does each simple machine do?



17. How might the efficiency of a compound machine be increased? Why would this be advantageous?



## 16.5 Work and Machines

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- You do work whenever you
  - apply a force of at least 1 newton to an object.
  - move an object over a distance of at least 1 meter.
  - move an object in the same direction that you apply force.
  - two of the above
- Assume that you push a 50-newton box over a distance of 2 meters. How much work have you done?
  - 100 J
  - 50 J
  - 25 J
  - 2 J
- An example of a machine that changes the direction of the applied force is a
  - flagpole pulley.
  - doorknob.
  - nutcracker.
  - hammer.
- What is the ideal mechanical advantage of a machine that has an input distance of 5 meters and an output distance of 10 meters?
  - $\frac{1}{2}$
  - 1
  - 2
  - 5
- For the machine in question 4, the actual mechanical advantage must be
  - less than  $\frac{1}{2}$ .
  - greater than  $\frac{1}{2}$ .
  - greater than 1.
  - greater than 2.
- Simple machines that have an ideal mechanical advantage greater than 1 include
  - screws.
  - inclined planes.
  - wedges.
  - all of the above
- Which statement about compound machines is false?

- a. They have a greater mechanical advantage than simple machines.
- b. They may consist of hundreds of simple machines.
- c. They are more efficient than simple machines.
- d. They include scissors and bicycles.

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. In physics, work is done only when something moves.
- \_\_\_\_\_ 9. The SI unit for power is the watt.
- \_\_\_\_\_ 10. A 1000-watt device does 1000 joules of work in 10 seconds.
- \_\_\_\_\_ 11. Watt's invention of a powerful steam engine ended the industrial revolution.
- \_\_\_\_\_ 12. No machine is 100% efficient.
- \_\_\_\_\_ 13. Efficiency is calculated by dividing the output force by the input force.
- \_\_\_\_\_ 14. The input force of an inclined plane is always greater than the output force.
- \_\_\_\_\_ 15. The wheel and axle of a wheel and axle turn in opposite directions.
- \_\_\_\_\_ 16. A screw with more threads has a shorter inclined plane.
- \_\_\_\_\_ 17. A second class lever changes the direction of the applied force.

**Fill in the Blank**

Fill in the blank with the appropriate term.

18. One joule equals the amount of work done when 1 newton of force moves an object over a distance of \_\_\_\_\_ - \_\_\_\_\_.
19. Power is calculated by dividing \_\_\_\_\_ by time.
20. A machine that changes only the direction of force has a mechanical advantage of \_\_\_\_\_.
21. The force you apply to any machine when you use it is called the \_\_\_\_\_ force.
22. The type of simple machine that consists of an inclined plane wrapped around a cylinder is the \_\_\_\_\_.
23. In a \_\_\_\_\_ class lever, the fulcrum is located between the input force and output force.
24. Simple machines that contain a wheel include the wheel and axle and the \_\_\_\_\_.
25. A wheelbarrow is a compound machine consisting of a wheel and axle and a(n) \_\_\_\_\_.

**Short Answer**

Answer the following questions in complete sentences.

26. Explain how the following five terms are related: force, distance, work, time, power.

27. A broom is a type of lever that you hold with two hands. The top hand forms the fulcrum and the other hand applies the input force. Which type of lever is a broom? How does it change the input force and where is the output force applied? What is the broom's ideal mechanical advantage?

28. Assume you have invented a machine that consists of a single fixed pulley, a single moveable pulley, and a first class lever. The fulcrum of the lever is midway between the input and output points. What is the mechanical advantage of your invention? Explain your answer.

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CHAPTER **17**

# Introduction to Energy Assessments

## Chapter Outline

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- 17.1 TYPES OF ENERGY
  - 17.2 FORMS OF ENERGY
  - 17.3 ENERGY RESOURCES
  - 17.4 INTRODUCTION TO ENERGY
- 



## 17.1 Types of Energy

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. A leaf hanging motionless on a tree has
  - a. no energy.
  - b. elastic energy.
  - c. kinetic energy.
  - d. potential energy.
2. When a moving bat hits a ball, what happens to the kinetic energy of the bat?
  - a. All of it becomes potential energy.
  - b. Most of it is transferred to the ball.
  - c. All of it is used up and gone.
  - d. Most of it changes to heat.
3. A 40-kilogram boy is running at a velocity of 3 m/s. What is his kinetic energy?
  - a. 180 J
  - b. 120 J
  - c. 43 J
  - d. 13 J
4. Lana, who weighs 400 newtons, is about to dive from a 10-meter diving board. Her gravitational potential energy is
  - a. 40 J
  - b. 2000 J
  - c. 4000 J
  - d. 40,000 J
5. Energy is converted from kinetic energy to potential energy when you
  - a. ski down a hill.
  - b. climb a mountain.
  - c. run around a level track.
  - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The atoms of matter have kinetic energy.
- \_\_\_\_\_ 7. An object's velocity affects its kinetic energy more than its mass does.
- \_\_\_\_\_ 8. A heavier object has less gravitational potential energy than a lighter object at the same height.



\_\_\_\_\_ 9. Compressing a spring gives it potential energy.

\_\_\_\_\_ 10. Energy conversions cannot be reversed.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ can be defined as the ability to do work.

12. The process in which energy changes form is called energy \_\_\_\_\_.

13. The energy of moving matter is known as \_\_\_\_\_ energy.

14. Energy that is stored in matter is called \_\_\_\_\_ energy.

15. Kinetic energy is directly related to velocity and \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast kinetic energy and potential energy.

17. Describe how energy changes on a trampoline.

## 17.2 Forms of Energy

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The sum of an object's kinetic and potential energy is its
  - thermal energy.
  - chemical energy.
  - mechanical energy.
  - none of the above
- Which form of energy travels in waves through empty space?
  - sound energy
  - electrical energy
  - electromagnetic energy
  - two of the above
- Which energy conversion occurs in a battery?
  - electrical energy → chemical energy
  - electromagnetic energy → light energy
  - chemical energy → light energy
  - chemical energy → electrical energy
- Energy stored in the nucleus of an atom is called
  - electromagnetic energy.
  - electrical energy.
  - thermal energy.
  - nuclear energy.
- If two objects have the same mass, which object has greater thermal energy?
  - The object with larger atomic nuclei.
  - The object with faster-moving atoms.
  - The object with faster-moving electrons.
  - The object with stronger chemical bonds.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Stars release electromagnetic energy into space.
- \_\_\_\_\_ 7. The energy stored in food is chemical energy.
- \_\_\_\_\_ 8. During photosynthesis, plants change thermal energy to chemical energy.

\_\_\_\_\_ 9. A stretched rubber band has mechanical energy.

\_\_\_\_\_ 10. When you plug in a lamp, electromagnetic energy is converted to light energy.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The energy released when two atomic nuclei fuse together is \_\_\_\_\_ energy.

12. \_\_\_\_\_ energy is the energy of an object that is moving or has the potential to move.

13. The kinetic energy of moving electrons is referred to as \_\_\_\_\_ energy.

14. \_\_\_\_\_ energy is the total kinetic energy of all the atoms in an object.

15. Energy that travels in waves through matter from a vibrating object is \_\_\_\_\_ energy.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast electromagnetic energy and sound energy.

17. Identify at least three forms of energy involved when a musician plays an electric keyboard.

## 17.3 Energy Resources

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- All of the following energy resources are fossil fuels except
  - oil.
  - coal.
  - biomass.
  - natural gas.
- Petroleum is used to make
  - heating oil.
  - kerosene.
  - gasoline.
  - all of the above
- Which statement about uranium is true?
  - It is nearly limitless in supply.
  - It is a renewable energy resource.
  - It is not as safe to use as solar energy.
  - Using it for energy creates air pollution.
- What is the function of a wind turbine?
  - changing the kinetic energy of wind to electrical energy
  - capturing wind energy and using it to pump water
  - slowing down the wind so it causes less erosion
  - storing the energy of wind as thermal energy
- Geothermal energy
  - comes from heat below Earth's surface.
  - cannot be used to produce electricity.
  - is only used to heat homes.
  - is nonrenewable.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. All natural resources need to be conserved so they are not used up.
- \_\_\_\_\_ 7. Most of the electricity in the U.S. is generated by burning petroleum.
- \_\_\_\_\_ 8. The use of fossil fuels is a major cause of global warming.

\_\_\_\_\_ 9. Nuclear energy is a renewable energy resource.

\_\_\_\_\_ 10. Natural gas formed when the remains of swamp plants were pressed beneath layers of sediments.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Natural resources that are limited in supply and cannot be replaced except over millions of years are called \_\_\_\_\_ resources.

12. Mixtures of hydrocarbons that formed over millions of years from dead organisms are known as \_\_\_\_\_.

13. Natural resources that are limitless in supply or can be replaced quickly are called \_\_\_\_\_ resources.

14. The stored chemical energy of trees and other plants is referred to as \_\_\_\_\_ energy.

15. \_\_\_\_\_ means saving resources by using them more efficiently or not using them at all.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Outline the problems caused by the use of fossil fuels for energy.

17. How can people conserve energy resources in their daily lives? Identify and describe at least three different ways.

## 17.4 Introduction to Energy

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The energy of moving objects is called
  - motion energy.
  - kinetic energy.
  - potential energy.
  - gravitational energy.
- Which of the following objects has potential energy?
  - a ball that is thrown into the air
  - a bungee cord that is stretched
  - a spring that is compressed
  - all of the above
- The gravitational potential energy of an object depends on its height above Earth and its
  - air resistance.
  - elasticity.
  - velocity.
  - weight.
- Which statement about forms of energy is false?
  - Energy is constantly changing form.
  - There are a total of five different forms of energy.
  - Any form of energy can change into any other form.
  - A change in form of energy is called energy conversion.
- Which change in energy occurs in a regular incandescent light bulb?
  - mechanical energy → light energy
  - electrical energy → light energy
  - electrical energy → thermal energy
  - two of the above
- Petroleum formed over millions of years from the remains of dead
  - marine organisms.
  - giant tree ferns.
  - swamp plants.
  - two of the above
- Harmful effects of using fossil fuels for energy include
  - air pollution.

- b. acid rain.
- c. smog.
- d. all of the above

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Energy is the ability to cause changes in matter.
- \_\_\_\_\_ 9. An object with greater velocity always has more kinetic energy than an object with lesser velocity.
- \_\_\_\_\_ 10. Energy is always conserved when it changes from one form to another.
- \_\_\_\_\_ 11. An object with more mass always has more thermal energy than an object with less mass.
- \_\_\_\_\_ 12. An object has mechanical energy only when it is moving.
- \_\_\_\_\_ 13. Burning changes chemical energy to thermal and light energy.
- \_\_\_\_\_ 14. Electrical energy is a form of potential energy.
- \_\_\_\_\_ 15. Natural gas is used to make gasoline.
- \_\_\_\_\_ 16. There are no drawbacks in using renewable energy resources.
- \_\_\_\_\_ 17. Of all fossil fuels, coal releases the most air pollution when burned.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Using force to move matter is the definition of \_\_\_\_\_ in physics.
- 19. The SI unit for work and energy is the \_\_\_\_\_.
- 20. An object has potential energy because of its shape or \_\_\_\_\_.
- 21. Energy stored in bonds between atoms is \_\_\_\_\_ energy.
- 22. A lightning bolt is a powerful discharge of \_\_\_\_\_ energy.
- 23. Radio waves are an example of \_\_\_\_\_ energy.
- 24. Anything people can use that comes from nature is a(n) \_\_\_\_\_.
- 25. Heat from below Earth's surface that can be used for energy is called \_\_\_\_\_ energy.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Describe an example of energy changing back and forth between kinetic and potential energy.

- 27. Describe an activity in which your body converts chemical energy to two or more different forms of energy. Identify the other forms of energy.

28. Explain why using renewable resources for energy is better for the environment than using nonrenewable resources.



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CHAPTER **18**

# Thermal Energy Assessments

## Chapter Outline

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- 18.1 TEMPERATURE AND HEAT
  - 18.2 TRANSFER OF THERMAL ENERGY
  - 18.3 USING THERMAL ENERGY
  - 18.4 THERMAL ENERGY
- 



## 18.1 Temperature and Heat

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What happens to water when you heat it?
  - a. The particles of the water gain kinetic energy.
  - b. The thermal energy of the water increases.
  - c. The temperature of the water rises.
  - d. all of the above
2. What causes the liquid in a thermometer to rise?
  - a. The liquid expands.
  - b. The liquid turns to a gas.
  - c. The liquid increases in mass.
  - d. The liquid has greater specific heat.
3. When heat is transferred between objects of different temperatures, what is the end result?
  - a. Both objects have a higher temperature.
  - b. Both objects have a lower temperature.
  - c. Both objects have the same temperature.
  - d. The difference in temperature is greater.
4. Why does the sand on a beach get so much warmer than the water on a sunny day?
  - a. The particles of sand are smaller.
  - b. The sand has higher specific heat.
  - c. The water has less thermal energy.
  - d. The water has greater specific heat.
5. Specific heat is measured in
  - a. grams.
  - b. degrees.
  - c. joules.
  - d. newtons.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The particles of all matter are in constant random motion.
- \_\_\_\_\_ 7. Objects with the same temperature always have the same total kinetic energy.
- \_\_\_\_\_ 8. A thermometer measures temperature relative to two reference temperatures.

\_\_\_\_\_ 9. Heat is always transferred from a larger object to a smaller object.

\_\_\_\_\_ 10. Differences in the specific heat of land and water affect climate.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The total kinetic energy of the particles of an object is the object's \_\_\_\_\_.

12. The average kinetic energy of the particles of an object is the object's \_\_\_\_\_.

13. The transfer of thermal energy between objects with different temperatures is called \_\_\_\_\_.

14. \_\_\_\_\_ is the amount of energy needed to raise the temperature of 1 gram of a substance by 1 °C.

15. The thermal energy of an object depends on its temperature and its \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how a thermometer works.

17. Compare and contrast thermal energy and temperature.

## 18.2 Transfer of Thermal Energy

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Conduction is usually slowest in
  - gases.
  - solids.
  - liquids.
  - flames.
- Which of the following materials is a thermal insulator?
  - plastic
  - iron
  - copper
  - steel
- In which substance can thermal energy be transferred by convection?
  - air
  - sand
  - wood
  - two of the above
- Thermal energy is transferred through the ocean by
  - currents.
  - waves.
  - winds.
  - tides.
- Matter is not needed for the transfer of thermal energy by
  - conduction.
  - convection.
  - radiation.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Conduction occurs when particles of matter flow.
- \_\_\_\_\_ 7. Insulation can keep a house cool on a hot day.
- \_\_\_\_\_ 8. Thermal energy is always transferred from cooler to warmer objects.

\_\_\_\_\_ 9. Land and sea breezes are examples of convection currents.

\_\_\_\_\_ 10. Only hot objects radiate thermal energy.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The transfer of thermal energy by waves that can travel through space is called \_\_\_\_\_.

12. A material that is good at conducting thermal energy is referred to as a thermal \_\_\_\_\_.

13. The transfer of thermal energy by particles moving through a fluid is known as \_\_\_\_\_.

14. The flow of particles in a fluid due to differences in temperature and density is called a(n) \_\_\_\_\_.

15. \_\_\_\_\_ is the transfer of thermal energy between particles of matter that are touching.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast conduction and convection.

17. Explain how energy from the sun travels to Earth and warms it.

## 18.3 Using Thermal Energy

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What happens to hot water as it moves through a home's hot-water heating system?
  - a. It transfers thermal energy to the rooms of the house.
  - b. It cools down and returns to the boiler.
  - c. It turns to steam, which runs the fan.
  - d. two of the above
2. In a warm-air heating system, cold air in each room
  - a. enters an intake vent near the ceiling.
  - b. blows out of a vent and across the room.
  - c. leaves the house through the chimney.
  - d. transfers thermal energy to the furnace.
3. What happens when the refrigerant of a cooling system absorbs thermal energy?
  - a. It melts.
  - b. It thaws.
  - c. It condenses.
  - d. It evaporates.
4. How are internal and external combustion engines similar?
  - a. Both burn fuel in a cylinder.
  - b. Both produce thermal energy.
  - c. Both have a piston that moves in a cylinder.
  - d. two of the above
5. In a functioning combustion engine, the piston has
  - a. kinetic energy.
  - b. electrical energy.
  - c. chemical energy.
  - d. thermal energy.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The purpose of a radiator in a heating system is to produce thermal energy.
- \_\_\_\_\_ 7. Warm air moves through the ducts of heating system because of gravity.
- \_\_\_\_\_ 8. The transfer of thermal energy can be used to keep things cool.

\_\_\_\_\_ 9. Thermal energy naturally moves from a warmer area to a cooler area.

\_\_\_\_\_ 10. The piston of a combustion engine moves because the crankshaft turns.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ heating system includes a boiler, pipes, and radiators.

12. A(n) \_\_\_\_\_ is a device that controls a heating system.

13. A(n) \_\_\_\_\_ combustion engine burns fuel inside the engine.

14. The type of heating system that includes a furnace is a(n) \_\_\_\_\_ heating system.

15. The substance that transfers thermal energy in a cooling system is called a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast hot-water and warm-air heating systems.

17. Outline how an internal combustion engine works.

## 18.4 Thermal Energy

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. If you place a piece of iron and a piece of wood in the sun, the iron heats up more quickly because it has
  - a. lower specific heat.
  - b. particles that move more slowly.
  - c. particles with less density.
  - d. less thermal energy.
2. What does a thermometer measure?
  - a. average kinetic energy
  - b. thermal energy
  - c. specific heat
  - d. heat
3. Thermal energy is transferred between objects when they have
  - a. the same mass.
  - b. different masses.
  - c. different temperatures.
  - d. the same total kinetic energy.
4. The transfer of thermal energy between particles of matter that are touching is called
  - a. radiation.
  - b. insulation.
  - c. convection.
  - d. conduction.
5. Convection currents occur because of differences in
  - a. density.
  - b. temperature.
  - c. state of matter.
  - d. two of the above
6. What happens to warm air as it moves through a home's warm-air heating system?
  - a. It blows out of vents into rooms of the house.
  - b. It flows through pipes and radiators in each room.
  - c. It produces thermal energy that heats the house.
  - d. It transfers thermal energy to the furnace.
7. The refrigerant in a cooling system releases its thermal energy when it
  - a. evaporates.



- b. condenses.
- c. freezes.
- d. melts.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. All matter has thermal energy.
- \_\_\_\_\_ 9. Temperature is a measure of heat.
- \_\_\_\_\_ 10. Heat is the total thermal energy of an object.
- \_\_\_\_\_ 11. Water has higher specific heat than sand.
- \_\_\_\_\_ 12. Convection is the transfer of thermal energy by waves.
- \_\_\_\_\_ 13. Convection currents in the atmosphere create wind.
- \_\_\_\_\_ 14. All solids are good conductors of thermal energy.
- \_\_\_\_\_ 15. A furnace is controlled by a device called a thermometer.
- \_\_\_\_\_ 16. Warm-air vents in a heating system are placed near the floor.
- \_\_\_\_\_ 17. Both internal and external combustion engines contain a cylinder and piston.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. Temperature is defined as the \_\_\_\_\_ kinetic energy of the particles of an object.
- 19. A substance with higher specific heat warms up \_\_\_\_\_ slowly than a substance with lower specific heat.
- 20. A thermometer measures temperature relative to the freezing and boiling points of \_\_\_\_\_.
- 21. Thermal energy moves in currents through the atmosphere by the process of \_\_\_\_\_.
- 22. Fluffy home insulation and down feathers are good thermal insulators because they trap \_\_\_\_\_.
- 23. Thermal energy can travel through empty space only by the process of \_\_\_\_\_.
- 24. Thermal energy is carried throughout a hot-water heating system by \_\_\_\_\_.
- 25. Cooling systems include air conditioners and \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Explain why a cool boulder in the woods is likely to have greater thermal energy than a hot pebble on the beach.

- 27. Assume that a room is heated by a single radiator. Explain how thermal energy in the radiator is transferred to the air throughout the room.

28. Explain how a refrigerator transfers thermal energy in a direction opposite to the normal direction of heat flow.

CHAPTER

**19**

# Waves Assessments

## Chapter Outline

- 19.1 CHARACTERISTICS OF WAVES
- 19.2 MEASURING WAVES
- 19.3 WAVE INTERACTIONS AND INTERFERENCE
- 19.4 WAVES



## 19.1 Characteristics of Waves

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- You can start a surface wave by
  - pushing and pulling on a spring.
  - shaking a rope up and down.
  - dropping a pebble in a pond.
  - all of the above
- What is required for a mechanical wave to occur?
  - a disturbance in matter
  - a source of energy
  - particles of matter
  - all of the above
- The parts of a longitudinal wave where particles of matter are spread farthest apart are called
  - crests.
  - vibrations.
  - rarefactions.
  - compressions.
- The lowest parts of a transverse wave is are known as
  - valleys.
  - troughs.
  - bottoms.
  - media.
- What is an S wave?
  - any transverse wave
  - a type of longitudinal wave
  - a wave generated by an earthquake
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Ocean waves travel deep below the surface of the water.
- \_\_\_\_\_ 7. The medium of a mechanical wave must be a solid or liquid.
- \_\_\_\_\_ 8. In a surface wave, particles of matter move in a circular motion.

\_\_\_\_\_ 9. A primary (P) wave is a longitudinal wave.

\_\_\_\_\_ 10. All waves must travel through matter.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ wave is a disturbance in matter that transfers energy from place to place.

12. The matter through which a mechanical wave travels is called the \_\_\_\_\_.

13. In a(n) \_\_\_\_\_ wave, particles of the medium vibrate in the same direction that the wave travels.

14. In a(n) \_\_\_\_\_ wave, particles of the medium vibrate at right angles to the direction that the wave travels.

15. A combined transverse and longitudinal wave is called a(n) \_\_\_\_\_ wave.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast transverse and longitudinal waves.

17. Explain how energy travels in a mechanical wave.

## 19.2 Measuring Waves

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- In a longitudinal wave, amplitude is a measure of
  - how many waves pass a fixed point each second.
  - how close together particles of the medium become.
  - how quickly the wave travels a given distance.
  - how far apart adjacent compressions are.
- If two waves have the same amplitude, the wave with more energy is the wave with the
  - shorter wavelength.
  - lower frequency.
  - denser medium.
  - slower speed.
- If two waves have the same speed, the wave with a higher frequency must have a
  - shorter wavelength.
  - longer wavelength.
  - greater amplitude.
  - two of the above
- Wave speed is a product of
  - wavelength and frequency.
  - wavelength and amplitude.
  - frequency and amplitude.
  - none of the above
- What is the frequency of a wave that has a wavelength of 2 m and a speed of 2 m/s?
  - 4 Hz
  - 2 Hz
  - 1 Hz
  - $\frac{1}{2}$  Hz

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. One measure of wave size is wave frequency.
- \_\_\_\_\_ 7. The resting position of a transverse wave is called a trough.
- \_\_\_\_\_ 8. If you know only a wave's amplitude and wavelength, you can calculate its speed.

\_\_\_\_\_ 9. Wave speed and wavelength have an inverse relationship.

\_\_\_\_\_ 10. A tsunami is an ocean wave with an unusually great amplitude.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The distance between two adjacent troughs of a transverse wave is the \_\_\_\_\_.

12. The number of waves that pass a fixed point in a given amount of time is the \_\_\_\_\_ of the waves.

13. How far a wave travels in a given amount of time is its \_\_\_\_\_.

14. The SI unit for wave frequency is the \_\_\_\_\_.

15. The maximum distance particles of a medium move from their resting position is the \_\_\_\_\_ of the wave.

**Short Answer**

*Answer the following questions in complete sentences.*

16. How is wave speed related to wavelength and wave frequency?

17. Which wave measures reflect how much energy a wave has?

## 19.3 Wave Interactions and Interference

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- An echo occurs because of wave
  - interference.
  - diffraction.
  - refraction.
  - reflection.
- If a wave strikes a barrier at a  $45^\circ$  angle, what is the angle of reflection?
  - $180^\circ$
  - $120^\circ$
  - $90^\circ$
  - $45^\circ$
- Light is refracted when it
  - strikes a barrier it cannot pass through.
  - spreads around an obstacle such as a wall.
  - passes from air to water at an angle.
  - interferes with other waves.
- What happens when a wave passes around a barrier that is shorter than its wavelength?
  - The wave has a large angle of incidence.
  - The wave spreads out around the barrier.
  - The wave is refracted.
  - none of the above
- Constructive interference occurs when two waves pass through each other and the
  - crests of both waves cancel each other out.
  - crests of both waves have a smaller amplitude.
  - crests of one wave overlap crests of the other wave.
  - crests of one wave cancel out troughs of the other wave.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Reflected waves have the same speed as the original waves before they were reflected.
- \_\_\_\_\_ 7. Diffraction occurs because waves travel at different speeds in different media.
- \_\_\_\_\_ 8. You can hear sounds around the corner of a building because the sound waves are refracted.



\_\_\_\_\_ 9. Destructive interference decreases the amplitude of waves.

\_\_\_\_\_ 10. A standing wave forms when a wave is refracted.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Waves may bend as they enter a new medium at an angle because of \_\_\_\_\_.

12. The spreading out of waves around an obstacle is referred to as \_\_\_\_\_.

13. The bouncing back of waves from a barrier is known as \_\_\_\_\_.

14. The angle at which waves bounce back from a barrier is called the angle of \_\_\_\_\_.

15. Any interaction of waves with other waves is called wave \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast constructive and destructive interference.

17. Explain what a standing wave is and when it occurs.

## 19.4 Waves

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- How are transverse and longitudinal waves similar?
  - Both require a medium.
  - Both are mechanical waves.
  - Both transfer energy by vibrating particles.
  - all of the above
- The compressions of a longitudinal wave are like the
  - rarefactions of a transverse wave.
  - low points of a transverse wave.
  - troughs of a transverse wave.
  - crests of a transverse wave.
- What is a primary wave?
  - any longitudinal wave
  - a type of transverse wave
  - a wave that travels through underground rocks.
  - two of the above
- If two waves have the same frequency and speed, they must also have the same
  - height.
  - medium.
  - amplitude.
  - wavelength.
- When you make waves in a rope by shaking one end up and down, you can increase the amplitude of the waves by moving the rope
  - more slowly.
  - more quickly.
  - over a longer distance.
  - over a shorter distance.
- Waves interact with matter in all of the following ways except
  - refraction.
  - reflection.
  - diffraction.
  - interference.
- When a wave is reflected, the angle of reflection equals the

- a. wavelength.
- b. wave frequency.
- c. wave amplitude.
- d. angle of incidence.

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Mechanical waves include ocean waves and electromagnetic waves.
- \_\_\_\_\_ 9. You can start a longitudinal wave by shaking a rope up and down.
- \_\_\_\_\_ 10. An earthquake generates both transverse and longitudinal waves.
- \_\_\_\_\_ 11. Ocean waves carry particles of water over long distances.
- \_\_\_\_\_ 12. Wave amplitude is the only measure of wave size.
- \_\_\_\_\_ 13. A lower-frequency wave has less energy than a higher-frequency wave of the same amplitude.
- \_\_\_\_\_ 14. A wave is likely to slow down when it passes from a gas to a solid.
- \_\_\_\_\_ 15. Constructive interference decreases the amplitude of waves.
- \_\_\_\_\_ 16. When a wave is reflected, its frequency increases.
- \_\_\_\_\_ 17. A wave diffracts when it enters a new medium at an angle.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Any wave that requires matter in order to transfer energy is called a(n) \_\_\_\_\_ wave.
- 19. The parts of a longitudinal wave where particles of the medium are farthest apart are called \_\_\_\_\_.
- 20. A(n) \_\_\_\_\_ wave travels along the surface of a medium.
- 21. Wave speed equals wave frequency multiplied by \_\_\_\_\_.
- 22. The \_\_\_\_\_ of a longitudinal wave is where particles of the medium are neither compressed nor rarefied.
- 23. A wave has a frequency of 1 hertz if one wave passes a fixed point each \_\_\_\_\_.
- 24. \_\_\_\_\_ interference occurs when the crests of two interfering waves overlap.
- 25. A standing wave occurs because of wave \_\_\_\_\_ between a wave and its reflected wave.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Give an example of a surface wave, and describe how particles of the medium move when the energy of a surface wave passes through them.

27. How does the state of the medium of a wave affect the wave's speed?

28. Explain how refraction of a wave occurs.

# CHAPTER 20

# Sound Assessments

## Chapter Outline

- 20.1 CHARACTERISTICS OF SOUND
- 20.2 HEARING SOUND
- 20.3 USING SOUND
- 20.4 SOUND



## 20.1 Characteristics of Sound

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. Sound waves travel most rapidly through
  - a. air.
  - b. water.
  - c. glass.
  - d. aluminum.
2. Assume that a sound has an intensity of 50 decibels. A sound one-tenth as intense as this sound would have an intensity of
  - a. 5 decibels.
  - b. 10 decibels.
  - c. 40 decibels.
  - d. 49 decibels.
3. Which property of sound is affected by distance from the sound source?
  - a. pitch
  - b. frequency
  - c. intensity
  - d. wavelength
4. The pitch of a sound depends on the sound wave's
  - a. medium.
  - b. frequency.
  - c. speed.
  - d. amplitude.
5. Which properties of the medium affect the speed of sound waves?
  - a. state
  - b. density
  - c. temperature
  - d. all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Sound waves are longitudinal waves.
- \_\_\_\_\_ 7. Human beings can hear higher sounds than any other species.
- \_\_\_\_\_ 8. Sound waves travel more quickly in air than in most other media.

\_\_\_\_\_ 9. The frequency of sound waves is measured in decibels.

\_\_\_\_\_ 10. Sound always travels more slowly than light.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. \_\_\_\_\_ is the transfer of energy from a vibrating object in waves that travel through matter.

12. Sound intensity is measured in a unit called the \_\_\_\_\_.

13. How high or low a sound seems to a listener is its \_\_\_\_\_.

14. Sound with a frequency above 20,000 hertz is known as \_\_\_\_\_.

15. Sound that is too low for human beings to hear is called \_\_\_\_\_.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

16. How is loudness of sound related to the energy of sound waves?

17. Describe and explain the Doppler effect.

## 20.2 Hearing Sound

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which choice shows the correct sequence in which sound waves travel through the ear?
  - ear canal → eardrum → hammer
  - anvil → oval window → ear canal
  - stirrup → pinna → eardrum
  - eardrum → ear canal → cochlea
- In which structure of the ear are sound waves changed to nerve impulses?
  - eardrum
  - stirrup
  - oval window
  - cochlea
- Which structures are found in the outer ear?
  - anvil, pinna, eardrum
  - pinna, ear canal, eardrum
  - ear canal, cochlea, stirrup
  - hammer, pinna, ear canal
- Functions of the ossicles include
  - amplifying sound waves.
  - transferring sound waves.
  - catching sound waves.
  - two of the above
- Which decibel level of sound has the longest permissible exposure time?
  - 85 dB
  - 100 dB
  - 106 dB
  - 115 dB

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The brain plays an essential role in hearing.
- \_\_\_\_\_ 7. The most common cause of hearing loss is damage to the eardrum.
- \_\_\_\_\_ 8. The role of hearing protectors is to keep foreign objects out of the ears.



\_\_\_\_\_ 9. The eardrum is the first structure of the ear to vibrate when sound waves strike it.

\_\_\_\_\_ 10. Waves in cochlear fluid bend the hair-like projections of hair cells.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Sound waves travel through the \_\_\_\_\_ to reach the eardrum.

12. The three tiny bones of the middle ear are called \_\_\_\_\_.

13. The \_\_\_\_\_ is a fluid-filled structure in the inner ear.

14. The \_\_\_\_\_ is a thin membrane that vibrates when sound waves strike it.

15. The only part of the ear that extends outward from the head is the \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. If there were no middle ear and vibrations passed directly from the eardrum to the inner ear, how do you think hearing would be affected? (*Hint: How does the middle ear change sound waves?*)

17. Explain the role of hair cells in hearing.

## 20.3 Using Sound

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Resonance is used in musical instruments to increase the
  - frequency of sound waves.
  - amplitude of sound waves.
  - wavelength of sound waves.
  - two of the above
- You can raise the pitch of the sound produced by a violin string by
  - shortening the part of the string that vibrates.
  - plucking instead of bowing the string.
  - applying more pressure with the bow.
  - none of the above
- Uses of ultrasound include
  - creating images of organs inside the body.
  - making music with musical instruments.
  - communicating with the human voice.
  - all of the above
- What does sonar stand for?
  - source of naval resistance
  - source of noise and resonance
  - sound navigation and ranging
  - submarine navigation and resolution
- Increasing the amplitude of sound waves produced by a musical instrument makes the sound
  - lower.
  - higher.
  - softer.
  - louder.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. All musical instruments create sound by causing a reed to vibrate.
- \_\_\_\_\_ 7. Smaller drums produce higher-frequency sound waves than larger drums.
- \_\_\_\_\_ 8. Ultrasound has frequencies lower than 20 hertz.

\_\_\_\_\_ 9. Ultrasonography has been used to determine the depth of the ocean.

\_\_\_\_\_ 10. Animals that use echolocation include bats and whales.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. The vibration of an object in response to sound waves of a certain frequency is called \_\_\_\_\_.

12. \_\_\_\_\_ is the use of reflected sound waves by certain animals to locate objects they cannot see.

13. A(n) \_\_\_\_\_ device uses of reflected sound waves to locate underwater objects.

14. The category of musical instruments that includes the saxophone is \_\_\_\_\_ instruments.

15. Any sound that is too high in pitch for human beings to hear is known as \_\_\_\_\_.

### Short Answer

*Answer the following questions in complete sentences.*

16. When you press down on the keys of a piano, tiny hammers strike metal strings inside the piano. This causes the strings to vibrate and make sounds. In which basic category of musical instruments would you place a piano? Justify your answer.

17. A certain animal species lives in open areas of land and is active during daylight hours. Would you expect this species to have the ability to use echolocation to find prey? Why or why not?

## 20.4 Sound

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- A 60-decibel sound is 1000 times louder than a sound of
  - 20 decibels.
  - 30 decibels.
  - 40 decibels.
  - 50 decibels.
- In his ticking clock experiment, Robert Boyle demonstrated that
  - sounds more intense than 130 decibels can damage hearing.
  - sound waves cannot travel through empty space.
  - sound waves travel at a speed of 3430 m/s.
  - sound waves cannot travel through water.
- If you increase the frequency of sound waves, how does a listener perceive the change?
  - The sound is higher.
  - The sound is lower.
  - The sound is louder.
  - The sound is softer.
- The most common cause of permanent hearing loss is
  - broken bones in the middle ear.
  - blockage of the ear canal.
  - puncture of the eardrum.
  - damage to hair cells.
- Electronic hearing protectors decrease the amplitude of loud sounds by
  - causing destructive interference.
  - keeping sound waves out of the ears.
  - preventing the eardrum from vibrating.
  - decreasing the frequency of sound waves.
- All of the following instruments make a column of air vibrate except a
  - tuba.
  - drum.
  - clarinet.
  - saxophone.
- Echolocation is based on the
  - refraction of sound waves.

- b. reflection of sound waves.
- c. diffraction of sound waves.
- d. interference of sound waves.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. The speed of sound is constant.
- \_\_\_\_\_ 9. You would experience the Doppler effect if you rode in a police car with its siren on.
- \_\_\_\_\_ 10. Sound waves transfer particles of the medium to the listener's ears.
- \_\_\_\_\_ 11. The main function of the outer ear is to change sound waves to nerve impulses.
- \_\_\_\_\_ 12. Ossicles are tiny bones that transfer sound waves to the inner ear.
- \_\_\_\_\_ 13. Only construction workers need to wear hearing protectors.
- \_\_\_\_\_ 14. The eardrum is located in the outer ear.
- \_\_\_\_\_ 15. Sonar could be used to find the location of a sunken ship.
- \_\_\_\_\_ 16. Most musical instruments have a way to change the frequency of sound waves.
- \_\_\_\_\_ 17. Ultrasonography can be used to create images only of bones and teeth.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. Any sound with a frequency below 20 hertz is called \_\_\_\_\_.
- 19. Sound waves are mechanical waves because they must travel through a(n) \_\_\_\_\_.
- 20. The \_\_\_\_\_ of sound to a listener depends on the intensity of the sound waves.
- 21. Sound waves travel \_\_\_\_\_ slowly through warm air than cool air.
- 22. The \_\_\_\_\_ of sound is measured in decibels.
- 23. The part of the ear that amplifies sound waves is the \_\_\_\_\_ ear.
- 24. The category of musical instruments that includes the violin is \_\_\_\_\_ instruments.
- 25. Most musical instruments use \_\_\_\_\_ to amplify sound waves.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Discuss how the speed of sound is related to the medium of the sound waves.

- 27. Explain how the ear and brain work together to allow us to hear sounds.

28. Why does resonance in a musical instrument make it sound louder?

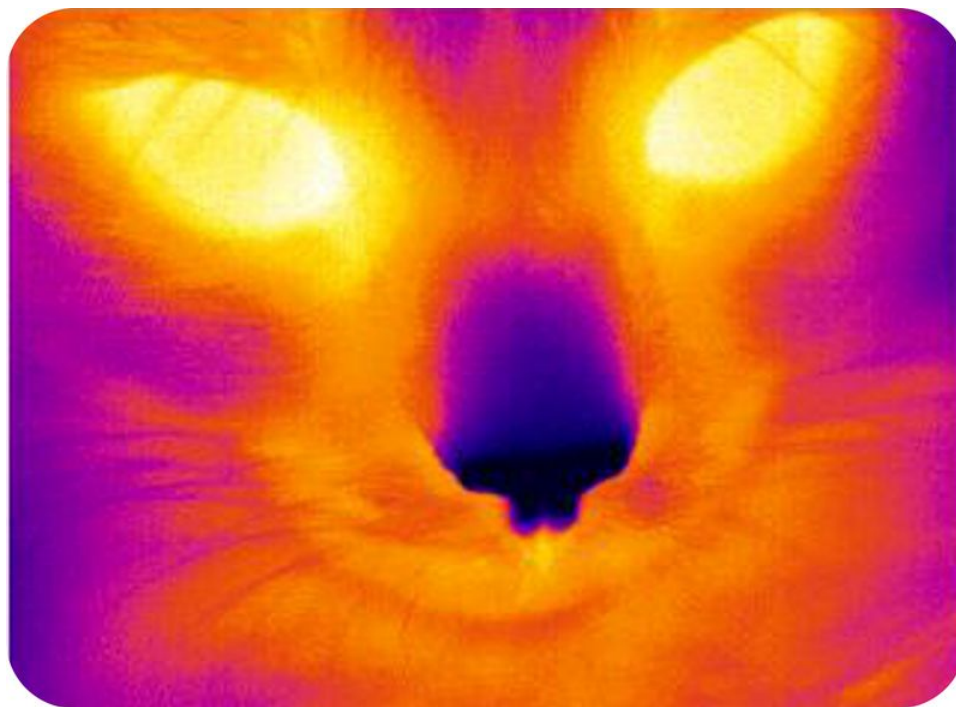
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# CHAPTER **21** Electromagnetic Radiation Assessments

## Chapter Outline

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- 21.1 ELECTROMAGNETIC WAVES
  - 21.2 PROPERTIES OF ELECTROMAGNETIC WAVES
  - 21.3 THE ELECTROMAGNETIC SPECTRUM
  - 21.4 ELECTROMAGNETIC RADIATION
- 



## 21.1 Electromagnetic Waves

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- All of the following are examples of electromagnetic waves except
  - sound waves.
  - microwaves.
  - gamma rays.
  - infrared light.
- An electromagnetic wave begins when a(n)
  - atom loses an electron.
  - magnet is connected to a battery.
  - charged particle vibrates.
  - electron is magnetized.
- Which of the following waves does not require a medium?
  - ocean waves
  - earthquake waves
  - sound waves
  - radio waves
- Most of the electromagnetic radiation on Earth comes from
  - the sun.
  - radio towers.
  - X ray machines.
  - microwave ovens.
- Uses of electromagnetic radiation include
  - cooking.
  - communications.
  - medicine.
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. The wave-particle theory explains the difference between electromagnetic and mechanical waves.
- \_\_\_\_\_ 7. A vibrating electric field generates a charged particle.
- \_\_\_\_\_ 8. All electromagnetic radiation is dangerous except for light.





## 21.2 Properties of Electromagnetic Waves

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- How long does it take electromagnetic radiation to reach Earth from the sun?
  - 1 second
  - 7.5 seconds
  - 8 minutes
  - 93 minutes
- What happens to light when it passes from water to air?
  - Its speed decreases.
  - Its frequency increases.
  - Its wavelength decreases.
  - none of the above
- If the frequency of an electromagnetic wave is  $6.0 \times 10^8$  hertz, what is its wavelength?
  - 0.5 m
  - 1.0 m
  - 1.5 m
  - 2.0 m
- Electromagnetic waves with the lowest frequencies may have wavelengths as long as
  - many kilometers.
  - a few meters.
  - a couple of centimeters.
  - a fraction of a millimeter.
- Which statement about electromagnetic waves is true?
  - An electromagnetic wave with a shorter wavelength has a lower frequency.
  - All electromagnetic waves travel at the same speed across space.
  - All electromagnetic waves are harmful.
  - none of the above

#### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. Electromagnetic waves travel more quickly through a medium than they do across space.
- \_\_\_\_\_ 7. The highest-frequency electromagnetic waves may have frequencies of trillions of hertz.
- \_\_\_\_\_ 8. Light is diffracted when it passes from air to water at an angle.

\_\_\_\_\_ 9. Light has a faster speed across space than do any other wavelengths of electromagnetic radiation.

\_\_\_\_\_ 10. If you know only the wavelength of an electromagnetic wave, you can calculate its frequency.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The fastest known speed in the universe is the speed of \_\_\_\_\_.

12. The frequency of an electromagnetic wave is inversely related to its \_\_\_\_\_.

13. A shorter-wavelength electromagnetic wave has \_\_\_\_\_ energy than a longer-wavelength electromagnetic wave.

14. The speed of an electromagnetic wave is a product of its wavelength and \_\_\_\_\_.

15. The speed of the highest-frequency electromagnetic waves when they travel through space is \_\_\_\_\_ m/s.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain the relationships among speed, wavelength, and frequency of electromagnetic waves.

17. Describe the range of frequencies and wavelengths of electromagnetic waves.

## 21.3 The Electromagnetic Spectrum

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which electromagnetic waves are used for cell phone signals?
  - X rays
  - microwaves
  - gamma rays
  - none of the above
- Which choice lists electromagnetic waves in the correct sequence from higher to lower frequencies?
  - microwaves, infrared light, visible light
  - ultraviolet light, X rays, gamma rays
  - X rays, ultraviolet light, visible light
  - radio waves, microwaves, infrared light
- Electromagnetic waves that have the least amount of energy are
  - radio waves.
  - infrared light.
  - visible light.
  - ultraviolet light.
- What color does the shortest wavelength of visible light appear to the human eye?
  - red
  - yellow
  - orange
  - violet
- X rays are used for
  - tracking storms.
  - killing bacteria.
  - screening luggage at airports.
  - two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Ultraviolet light has shorter wavelengths than visible light.
- \_\_\_\_\_ 7. Television broadcasts cannot pass through the ionosphere.
- \_\_\_\_\_ 8. Television broadcasts encode pictures with amplitude modulation.

\_\_\_\_\_ 9. Infrared light is used to sterilize surgical instruments.

\_\_\_\_\_ 10. X rays cannot pass through lead.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The most energetic of all electromagnetic waves are \_\_\_\_\_.

12. Electromagnetic waves with the longest wavelengths are \_\_\_\_\_.

13. Light with the shortest wavelengths is called \_\_\_\_\_.

14. Radar makes use of the radio waves called \_\_\_\_\_.

15. The skin makes vitamin D when it is exposed to \_\_\_\_\_ light.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how radar works to detect the speed of oncoming cars.

17. Compare and contrast the use of radio waves in AM and FM radio broadcasts. What are the pros and cons of each type of broadcast?

## 21.4 Electromagnetic Radiation

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. What do microwaves and waves in a rope have in common?
  - a. Both are mechanical waves.
  - b. Both are transverse waves.
  - c. Both travel only through matter.
  - d. two of the above
2. Albert Einstein's theory about the nature of electromagnetic radiation is the
  - a. wave-particle theory.
  - b. photon-particle theory.
  - c. wave-energy theory.
  - d. photon-energy theory.
3. Which of the following is not an example of electromagnetic radiation?
  - a. light
  - b. heat
  - c. X rays
  - d. radio waves
4. Which statement about the speed of electromagnetic waves is true?
  - a. They travel more quickly through a medium than across space.
  - b. They travel at the same speed through all media.
  - c. They always travel at the speed of light.
  - d. none of the above
5. Frequencies of electromagnetic waves range from
  - a. billions to trillions of hertz.
  - b. thousands to trillions of hertz.
  - c. hundreds to millions of hertz.
  - d. hundreds to thousands of hertz.
6. Which electromagnetic waves are used for television broadcasts?
  - a. radio waves
  - b. television waves
  - c. infrared waves
  - d. ultraviolet waves
7. Radar is used for
  - a. tracking storms.

- b. detecting air traffic.
- c. determining the speed of cars.
- d. all of the above

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. An electromagnetic wave begins when a charged particle vibrates.
- \_\_\_\_\_ 9. An electromagnetic wave consists of two vibrating electric fields.
- \_\_\_\_\_ 10. The most important source of electromagnetic radiation on Earth is the sun.
- \_\_\_\_\_ 11. The speed of an electromagnetic wave is a product of its wavelength and frequency.
- \_\_\_\_\_ 12. An electromagnetic wave with a higher frequency has a longer wavelength.
- \_\_\_\_\_ 13. The speed of light across space is  $3.0 \times 10^8$  meters per second.
- \_\_\_\_\_ 14. The higher the frequency of an electromagnetic wave, the more energy it has.
- \_\_\_\_\_ 15. Infrared light is used to kill bacteria.
- \_\_\_\_\_ 16. The color of visible light depends on its wavelength.
- \_\_\_\_\_ 17. Television broadcasts encode sounds with frequency modulation.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. When electromagnetic waves strike an obstacle, they may spread out around it, or \_\_\_\_\_.
- 19. A vibrating electric field creates a vibrating \_\_\_\_\_.
- 20. Electromagnetic radiation behaves as both a particle and as a(n) \_\_\_\_\_.
- 21. The wavelength of an electromagnetic wave equals its speed divided by its \_\_\_\_\_.
- 22. Electromagnetic waves with the shortest wavelengths are \_\_\_\_\_.
- 23. FM radio broadcasts encode sound by changing the \_\_\_\_\_ of radio waves.
- 24. Light with the longest wavelengths is classified as \_\_\_\_\_ light.
- 25. The full range of wavelengths of electromagnetic radiation is called the \_\_\_\_\_.

**Short Answer**

Answer the following questions in complete sentences.

- 26. What is sunlight? How does it travel from the sun to Earth, and how does it warm Earth's surface?

- 27. Explain how you can calculate the wavelength of an electromagnetic wave if you know only its frequency.

28. Describe the electromagnetic spectrum. How do electromagnetic waves vary from one end of the spectrum to the other?



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# CHAPTER **22** Visible Light Assessments

## Chapter Outline

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**22.1** THE LIGHT WE SEE

**22.2** OPTICS

**22.3** VISION

**22.4** VISIBLE LIGHT

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## 22.1 The Light We See

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Light bulbs that produce light by electroluminescence include
  - neon light bulbs.
  - vapor light bulbs.
  - LED light bulbs.
  - all of the above
- You can see clearly through an object that is transparent because all of the light that strikes the object is
  - transmitted.
  - reflected.
  - refracted.
  - absorbed.
- The shortest wavelength of visible light appears to the human eye as the color
  - red.
  - violet.
  - yellow.
  - magenta.
- Why does a blackboard appear black?
  - It reflects all wavelengths of visible light.
  - It absorbs all wavelengths of visible light.
  - It reflects only black wavelengths of visible light.
  - It absorbs only black wavelengths of visible light.
- Which of the following colors is a primary pigment color?
  - red
  - blue
  - cyan
  - green

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A luminous object is an object that appears to glow because it is reflecting light from another source.
- \_\_\_\_\_ 7. Some minerals produce visible light when they absorb ultraviolet light.
- \_\_\_\_\_ 8. A neon light produces violet or blue light.

- \_\_\_\_\_ 9. An object that reflects all the light that strikes it is opaque.
- \_\_\_\_\_ 10. Fireflies glow with visible light because of chemical reactions.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Rainbows form because of the \_\_\_\_\_ of visible light.
12. The sun produces visible light through the process of \_\_\_\_\_.
13. The pigment chlorophyll reflects only \_\_\_\_\_ light.
14. An object is \_\_\_\_\_ if it transmits but scatters visible light.
15. The colors cyan, magenta, and yellow are the \_\_\_\_\_ colors of light.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Incandescent light bulbs are being replaced by compact fluorescent light bulbs because fluorescent light bulbs are more energy efficient. Explain why.

17. Assume you are a painter and have paints only in the three primary pigment colors. What are the colors of your paints? Explain how you could use your paints to make paints of other colors.

## 22.2 Optics

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. A convex lens
  - a. is thicker at the edges than in the middle.
  - b. forms only real upside-down images.
  - c. may form enlarged or reduced images.
  - d. causes rays of light to diverge.
2. Concave mirrors are used
  - a. as side mirrors on cars.
  - b. behind car headlights.
  - c. in compound microscopes.
  - d. in cameras.
3. The optical instrument that produces a beam of very focused light is a
  - a. laser.
  - b. microscope.
  - c. telescope.
  - d. none of the above
4. Which surface is most likely to result in diffuse reflection?
  - a. completely still water in a puddle
  - b. choppy water in a lake
  - c. a plane glass mirror
  - d. a convex mirror
5. A compound microscope contains
  - a. convex lenses
  - b. plane mirror
  - c. convex mirror
  - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Moving the lens of a camera controls the amount of light that enters the camera.
- \_\_\_\_\_ 7. A laser beam consists of photons of light of a single wavelength.
- \_\_\_\_\_ 8. A reflecting telescope does not refract light.

\_\_\_\_\_ 9. Magnifications of all the lenses of a microscope are added to yield the overall magnification of the microscope.

\_\_\_\_\_ 10. Light refracts when it enters a new medium at an angle other than  $90^\circ$ .

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A lens that curves outward like the outside of a bowl is a(n) \_\_\_\_\_ lens.

12. A mirror with a flat surface is called a(n) \_\_\_\_\_ mirror.

13. A(n) \_\_\_\_\_ is a copy of an object formed by reflected or refracted light.

14. \_\_\_\_\_ is the study of visible light and ways we can use it.

15. A(n) \_\_\_\_\_ lens forms only upright virtual images.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain how a refracting telescope makes enlarged images of distant objects.

17. Explain how the focal point is related to the type of image formed by a concave mirror.

## 22.3 Vision

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which statement about the lens of the eye is true?
  - It is a concave lens.
  - Its shape is controlled by muscles.
  - It is the only structure in the eye to focus light.
  - all of the above
- Images from inside the eye on the
  - cornea.
  - iris.
  - pupil.
  - retina.
- The colored part of the eye is the
  - lens.
  - rod.
  - iris.
  - cone.
- The function of the structure in question 3 is to
  - change images to electrical signals.
  - fine-tune the focus of light.
  - control the size of the pupil.
  - adjust the position of the lens.
- Electrical signals from the retina reach the brain through the
  - visual nerve.
  - optic nerve.
  - optic rod.
  - electrical rod.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. One function of the cornea is to protect the eye.
- \_\_\_\_\_ 7. The role of the pupil is to help focus light.
- \_\_\_\_\_ 8. Images formed by the eye are upright and virtual.

\_\_\_\_\_ 9. We can see only if information from the eyes reaches the brain.

\_\_\_\_\_ 10. Rods can sense dim light but not colors of light.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The membrane lining the back of the eye is the \_\_\_\_\_.

12. The transparent outer covering of the eye is the \_\_\_\_\_.

13. The opening at the front of the eye that lets in light is the \_\_\_\_\_.

14. Laser surgery corrects vision problems by reshaping the \_\_\_\_\_.

15. Nerve cells in the retina that sense colors of light are called \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Identify four structures of the human eye and the role they play in vision.

17. Compare and contrast myopia and hyperopia, including how these two vision problems can be corrected.

## 22.4 Visible Light

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following objects is translucent?
  - clear window
  - frosted window
  - glass mirror
  - wooden door
- What causes the object in question one to be translucent?
  - It reflects light.
  - It refracts light.
  - It scatters light.
  - It absorbs light.
- Which of the following objects appears to glow because it is illuminated?
  - sun
  - firefly
  - light bulb
  - none of the above
- The image formed by a plane mirror is
  - upright.
  - virtual.
  - life-sized.
  - all of the above
- Which statement about a reflecting telescope is true?
  - It uses a convex mirror to collect and focus light.
  - It uses a plane mirror to reflect light into the eyepiece.
  - It uses a convex lens to collect light from distant objects.
  - It uses a concave lens in the eyepiece to enlarge the image.
- Structures of the human eye collect light and focus images on the
  - lens.
  - iris.
  - cornea.
  - retina.
- Which statement about hyperopia is true?
  - It is also called nearsightedness.



- b. It causes distant objects to appear blurry.
- c. It occurs because of the shape of the eye.
- d. It can be corrected with concave lenses.

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. A prism separates visible light into light of different wavelengths by diffraction.
- \_\_\_\_\_ 9. A banana appears to be yellow because it absorbs only yellow light.
- \_\_\_\_\_ 10. The color of a transparent object is determined by the color of light it transmits.
- \_\_\_\_\_ 11. Optics is the study of visible light and the ways it can be used.
- \_\_\_\_\_ 12. Convex mirrors can form both real and virtual images.
- \_\_\_\_\_ 13. You focus a microscope by moving the lenses up or down.
- \_\_\_\_\_ 14. Light enters a camera through an opening called the shutter.
- \_\_\_\_\_ 15. The images formed by the human eye are real, reduced, and upright.
- \_\_\_\_\_ 16. We could not see without the brain to interpret images formed by the eyes.
- \_\_\_\_\_ 17. Cells in the eye that are good at sensing dim light are called rods.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. An object is \_\_\_\_\_ if it absorbs or reflects all the light that strikes it.
- 19. A vapor light produces visible light by the process of \_\_\_\_\_.
- 20. The moon appears to glow because it \_\_\_\_\_ visible light.
- 21. A(n) \_\_\_\_\_ lens is thicker in the middle than it is at the edges.
- 22. \_\_\_\_\_ reflection occurs when a rough surface reflects light and makes a blurry image.
- 23. The type of lens that can form real images is a(n) \_\_\_\_\_ lens.
- 24. Both microscopes and telescopes use \_\_\_\_\_ lenses to make enlarged images.
- 25. Myopia occurs when the eyeball is \_\_\_\_\_ than normal.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Black is not a color of light, but some objects appear black. Explain why.

- 27. Compare and contrast concave and convex lenses.

28. Explain how the eyes and brain work together to enable vision.

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# CHAPTER **23** Electricity Assessments

## Chapter Outline

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- 23.1** ELECTRIC CHARGE
  - 23.2** ELECTRIC CURRENT
  - 23.3** ELECTRIC CIRCUITS
  - 23.4** ELECTRONICS
  - 23.5** ELECTRICITY
- 



## 23.1 Electric Charge

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Static electricity occurs whenever
  - electric fields interact.
  - particles exert electric force.
  - charges build up on an object.
  - electrons flow away from an object.
- Both lightning bolts and electric current occur because of
  - polarization.
  - static discharge.
  - static electricity.
  - moving electric charges.
- Electric field lines around a positively charged particle
  - repel the particle.
  - attract the particle.
  - point toward the particle.
  - point away from the particle.
- If you rub a piece of wool cloth on a balloon, friction causes the
  - wool to transfer electrons to the balloon.
  - balloon to become negatively charged.
  - balloon to attract the wool.
  - all of the above
- The movement of air molecules, water droplets, and ice particles inside a cloud causes the
  - transfer of electric charges within the cloud.
  - top of the cloud to become negatively charged.
  - bottom of the cloud to become positively charged.
  - all of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A charged particle exerts force over a distance because the particle has an electric field.
- \_\_\_\_\_ 7. The law of conservation of charge states that charges cannot move without being destroyed.
- \_\_\_\_\_ 8. When you touch a van de Graaff generator, electrons flow to you from the device.

\_\_\_\_\_ 9. Polarization is the transfer of electrons between oppositely charged objects.

\_\_\_\_\_ 10. The ground beneath a storm cloud becomes positively charged by conduction.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The transfer of electrons that occurs when one object rubs on another is called \_\_\_\_\_.

12. \_\_\_\_\_ is the sudden flow of electrons from an object that has a buildup of charges.

13. The force of attraction or repulsion between charged particles is known as \_\_\_\_\_.

14. Two negatively charged particles always \_\_\_\_\_ each other.

15. Cations form when atoms \_\_\_\_\_ electrons.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe three ways that charges can be transferred, and give an example of each.

17. Assume that you walk across a wool carpet in rubber-soled shoes. Then you reach out to touch a metal doorknob and get a shock. Explain why.

## 23.2 Electric Current

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The SI unit for electric current is the
  - ampere.
  - volt.
  - ohm.
  - watt.
- What does voltage mean?
  - electrical resistance
  - potential difference
  - flow of electric charges
  - none of the above
- Which statement about the electrodes in a battery is false?
  - Electrodes react chemically with the electrolyte.
  - Electrodes either give up or accept electrons.
  - Electrodes are either positive or negative.
  - Electrodes are either a paste or a liquid.
- Copper electrical wires have a plastic coating because
  - plastic is a very good electric insulator.
  - plastic offers a lot of resistance to electric current.
  - current flows through the material with the least resistance.
  - all of the above
- Assume that a wire has 1.5 ohms of resistance. If the wire is connected to two 1.5-volt batteries, how much current will flow through the wire?
  - 3.0 amps
  - 2.3 amps
  - 2.0 amps
  - 1.0 amps

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Electric current is a continuous flow of electric charges.
- \_\_\_\_\_ 7. Greater resistance always results in more current.
- \_\_\_\_\_ 8. An electric generator changes kinetic energy to electrical energy.

- \_\_\_\_\_ 9. A battery with six electrodes contains six chemical cells.
- \_\_\_\_\_ 10. Electric current can travel through matter or across space.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Opposition to the flow of electric current is known as \_\_\_\_\_.
12. Electric current flows through a wire only if there is a difference in electric \_\_\_\_\_.
13. A material that has high resistance to the flow of electric current is called an electric \_\_\_\_\_.
14. Electric current that keeps reversing direction is called \_\_\_\_\_.
15. A battery that contains a liquid electrolyte is referred to as a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Explain why cooling a wire lowers its resistance to electric current.

17. How is electric current related to voltage?

## 23.3 Electric Circuits

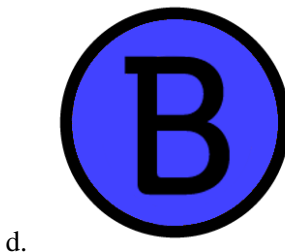
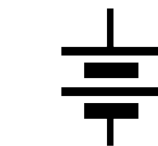
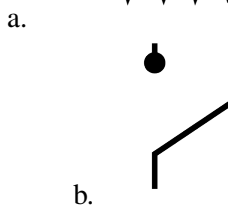
### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

Circle the letter of the correct choice.

- Most home circuits can carry a maximum current of about
  - 240 amps.
  - 120 amps.
  - 60 amps.
  - 30 amps.
- The source of voltage in home electric circuits is a(n)
  - electric outlet.
  - large battery.
  - power plant.
  - breaker box.
- Which of the following symbols represents a battery in a circuit diagram?



- Which units are used to measure electrical energy use?
  - amps
  - ohms



- c. watts
  - d. kilowatt-hours
5. What is the power of a device that uses 10 amps of current in a 120-volt circuit?
- a. 12 kilowatts
  - b. 1.2 kilowatts
  - c. 0.2 kilowatts
  - d. 0.1 kilowatts

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 6. All electric circuits must include a voltage source and a switch.
- \_\_\_\_\_ 7. Electrical energy use is a product of current and time.
- \_\_\_\_\_ 8. GFCI outlets are used in kitchens and bathrooms.
- \_\_\_\_\_ 9. Water is a very good electrical conductor.
- \_\_\_\_\_ 10. A damaged electric cord can cause an electric short.

**Fill in the Blank**

Fill in the blank with the appropriate term.

11. Any closed loop through which a current can flow is a(n) \_\_\_\_\_.
12. A(n) \_\_\_\_\_ is any device that converts electric current to another form of energy.
13. \_\_\_\_\_ is the rate at which a device changes electric current to another form of energy.
14. A circuit that consists of a single loop is called a(n) \_\_\_\_\_ circuit.
15. A circuit that consists of two loops is called a(n) \_\_\_\_\_ circuit.

**Short Answer**

Answer the following questions in complete sentences.

16. In the past, string lights were manufactured in series circuits. What would happen if one of the light bulbs in a 100-light series string were to burn out? How would you know which bulb it was?

17. Identify two rules for using electricity safely, and explain the science behind each rule.



## 23.4 Electronics

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following electric devices uses electric current to encode information?
  - lamp
  - toaster
  - steam iron
  - microphone
- Which of the following statements about n-type semiconductors is true?
  - They consist of silicon and boron.
  - They contain holes where electrons are missing.
  - They are like the negative terminal of a chemical cell.
  - all of the above
- Which type of electronic component contains semiconductors?
  - diodes.
  - transistors.
  - integrated circuits.
  - all of the above
- Integrated circuits are commonly known as
  - motherboards.
  - microchips.
  - hard drives.
  - CPUs.
- Which statement applies to a binary code?
  - It uses continuous changes in voltage.
  - It is used for analog signals.
  - It is based on 0's and 1's.
  - It is an eight-digit code.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A transistor can be used to increase the amount of current in a circuit.
- \_\_\_\_\_ 7. A diode can be used as a switch in an electric circuit.
- \_\_\_\_\_ 8. The role of the ROM microchip in a computer is to provide temporary storage.

\_\_\_\_\_ 9. DVDs use digital signals to encode sounds and pictures.

\_\_\_\_\_ 10. Any device that uses electric current is an electronic device.

### Fill in the Blank

*Fill in the blank with the appropriate term.*

11. The use of electric current to encode information is called \_\_\_\_\_.

12. An electronic signal created by a continuous change in voltage is a(n) \_\_\_\_\_ signal.

13. An electronic signal created by pulses of voltage is a(n) \_\_\_\_\_ signal.

14. A(n) \_\_\_\_\_ is a crystal that conducts current better than an insulator but not as well as a conductor.

15. An electronic component consisting of just two semiconductors is a(n) \_\_\_\_\_.

### Short Answer

*Answer the following questions in complete sentences.*

16. Explain why a crystal of pure silicon cannot conduct electric current but a silicon crystal with a tiny amount of added phosphorus can.

17. Identify an electronic device that you commonly use. How does the device use electric current?

## 23.5 Electricity

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Polarization is the transfer of electric charges
  - from one object to another.
  - between two charged particles.
  - by static discharge.
  - within an object.
- Which statement about electric charge is false?
  - Electric charge is a chemical property of particles or objects.
  - Particles with the same electric charge repel each other.
  - Electric charge results from the transfer of electrons.
  - Electric charge may be positive or negative.
- The SI unit called the ohm measures electric
  - power.
  - current.
  - voltage.
  - resistance.
- Which energy transformation occurs in a solar cell?
  - electrical energy → chemical energy
  - chemical energy → thermal energy
  - thermal energy → light energy
  - light energy → electrical energy
- A switch allows current to flow through a circuit by
  - closing the circuit.
  - turning off the resistor.
  - turning on the power.
  - turning on the voltage source.
- Which statement about parallel circuits is true?
  - They have a single loop.
  - They are used in flashlights.
  - They are used in houses.
  - two of the above
- Which statement about semiconductors is false?
  - They consist mainly of silicon.

- b. They contain either boron or phosphorus.
- c. They are the basis of all electronic components.
- d. They are better electric conductors than any other material.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. Lightning is an example of static discharge.
- \_\_\_\_\_ 9. The strength of electric force depends only on the distance between charged particles.
- \_\_\_\_\_ 10. Plastic attracts electrons more strongly than hair does.
- \_\_\_\_\_ 11. Aluminum is a material with high resistance to electric current.
- \_\_\_\_\_ 12. Adding more wire to a circuit reduces resistance.
- \_\_\_\_\_ 13. Electric current is inversely related to voltage.
- \_\_\_\_\_ 14. GFCI outlets are installed in rooms where water is used.
- \_\_\_\_\_ 15. The amount of electrical energy used by a device depends on its power and how long it is used.
- \_\_\_\_\_ 16. A diode can be used to change alternating current to direct current.
- \_\_\_\_\_ 17. A computer's CPU carries out program instructions.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. The buildup of electric charges on an object is called \_\_\_\_\_.
- 19. The space around a charged particle where it exerts electric force is its \_\_\_\_\_.
- 20. A continuous flow of electric charges is a(n) \_\_\_\_\_.
- 21. \_\_\_\_\_ is a difference in electric potential energy between two positions.
- 22. All electric circuits must have a conductor and a source of \_\_\_\_\_.
- 23. Electrical power is measured in the SI unit called the \_\_\_\_\_.
- 24. Electronic devices encode information by changing the \_\_\_\_\_ of electric current.
- 25. The type of electronic component that consists of three semiconductors is a(n) \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Explain why charged particles do not have to be touching in order to exert force over each other.

- 27. Explain how wet and dry cells create voltage.

28. Compare and contrast diodes and transistors.

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# CHAPTER **24** Magnetism Assessments

## Chapter Outline

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**24.1**    **MAGNETS AND MAGNETISM**

**24.2**    **EARTH AS A MAGNET**

**24.3**    **MAGNETISM**

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## 24.1 Magnets and Magnetism

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. A maglev train can hover above the track without touching it because of
  - a. friction.
  - b. magnetic force.
  - c. static electricity.
  - d. none of the above
2. Ferromagnetic materials include
  - a. iron.
  - b. nickel.
  - c. cobalt.
  - d. all of the above
3. If a magnet is allowed to move freely, its north and south poles will always
  - a. line up with Earth's north-south axis.
  - b. keep changing places.
  - c. point east and west.
  - d. repel each other.
4. How is magnetic force like electric force?
  - a. It is caused by moving electrons.
  - b. It generates a force field.
  - c. It acts over a distance.
  - d. all of the above
5. Magnetic domains in a ferromagnetic material are most likely to align in the same direction when the material is
  - a. heated to a high temperature.
  - b. placed near a magnet.
  - c. dropped on a hard surface.
  - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. An atom is a tiny magnet because its electrons spin around its nucleus.
- \_\_\_\_\_ 7. Copper and aluminum are attracted by magnets.
- \_\_\_\_\_ 8. Only temporary magnets can be demagnetized.

\_\_\_\_\_ 9. The most magnetic material in nature is magnetite.

\_\_\_\_\_ 10. An iron nail can be turned into a permanent magnet.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. An object that attracts ferromagnetic materials is a(n) \_\_\_\_\_.

12. The north or south end of a magnet is known as a magnetic \_\_\_\_\_.

13. \_\_\_\_\_ is the ability of a material to respond to and exert magnetic force.

14. An area of a ferromagnetic material where the poles of all the atoms are aligned is a(n) \_\_\_\_\_.

15. The area around a magnet where it exerts magnetic force is its \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe how magnetic fields interact.

17. Explain how a ferromagnetic material becomes a magnet.

## 24.2 Earth as a Magnet

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

1. The idea that Earth is a magnet was first proposed in
  - a. 1600.
  - b. 1700.
  - c. 1800.
  - d. 1900.
2. The magnetosphere is
  - a. a huge region.
  - b. strongest at the poles.
  - c. the region where Earth exerts magnetic force.
  - d. all of the above
3. What causes Earth's magnetism?
  - a. The movement of charged particles in Earth's outer core.
  - b. The revolution of Earth around the sun.
  - c. The magnetism of the sun.
  - d. none of the above
4. Evidence for magnetic field reversals comes from
  - a. rocks on the ocean floor.
  - b. metals in Earth's liquid core.
  - c. measurements of Earth's magnetosphere.
  - d. seismograph readings from inside Earth.
5. Earth's magnetic field is beneficial to living things because it
  - a. protects them from harmful particles.
  - b. can be used for navigation.
  - c. never changes.
  - d. two of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Earth has north and south magnetic poles like a bar magnet.
- \_\_\_\_\_ 7. Earth's magnetic and geographic poles are located in the same places.
- \_\_\_\_\_ 8. Scientists no longer accept the idea of magnetic reversals.



## 24.3 Magnetism

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Electrons spinning around the nucleus of an atom cause the atom to
  - be a tiny magnet.
  - have north and south poles.
  - have a magnetic field.
  - all of the above
- Which statement about magnetic force is false?
  - It can be exerted over a distance.
  - It is weakest near the poles of a magnet.
  - It includes both attraction and repulsion.
  - It occurs as lines of force in a force field.
- An iron nail becomes a permanent magnet if it is
  - surrounded by a magnetic field.
  - placed in a magnetic domain.
  - attracted by another magnet.
  - stroked with a bar magnet.
- When it comes to magnetism, Earth is most like a(n)
  - iron nail.
  - paper clip.
  - bar magnet.
  - horseshoe magnet.
- A compass needle aligns itself with Earth's
  - axis.
  - equator.
  - lines of latitude.
  - none of the above
- Which statement about the magnetosphere is false?
  - It is the name of Earth's magnetic field.
  - It is found only over Earth's magnetic poles.
  - It extends outward from Earth in all directions.
  - It protects Earth from harmful particles from the sun.
- Scientists know Earth's magnetic poles have switched places in the past because
  - magnetic domains in rocks are aligned in opposite directions.

- b. Earth keeps changing the direction of its rotation.
- c. Earth's outer core consists of liquid metals.
- d. Earth spins on its north-south axis.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. All magnets have north and south magnetic poles.
- \_\_\_\_\_ 9. Only bar magnets have a magnetic field.
- \_\_\_\_\_ 10. Refrigerator magnets will stick to any metal surface.
- \_\_\_\_\_ 11. The north poles of atoms are aligned in the same direction in a magnetic domain.
- \_\_\_\_\_ 12. The magnetic domains of iron naturally align with Earth's axis.
- \_\_\_\_\_ 13. Earth is surrounded by lines of magnetic force.
- \_\_\_\_\_ 14. Reversals of Earth's magnetic field have occurred only a few times in the past.
- \_\_\_\_\_ 15. The magnetic domains in solid rock can keep changing direction.
- \_\_\_\_\_ 16. Some birds may be able to see Earth's magnetic field as a visual pattern.
- \_\_\_\_\_ 17. The idea that Earth is a magnet was first proposed by William Gilbert.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. A magnet is an object that attracts \_\_\_\_\_ materials.
- 19. The north poles of two magnets \_\_\_\_\_ each other.
- 20. Magnetism is due to the movement of \_\_\_\_\_ within atoms.
- 21. A paper clip clinging to a bar magnet is a(n) \_\_\_\_\_ magnet.
- 22. Ferromagnetic materials include iron, cobalt, and \_\_\_\_\_.
- 23. Earth's magnetic field is generated by the movement of \_\_\_\_\_ in its outer core.
- 24. Living things use Earth's magnetic field for \_\_\_\_\_.
- 25. Earth's north magnetic pole is located at about \_\_\_\_\_ north latitude.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Compare and contrast nonmagnetic and ferromagnetic materials.

- 27. Describe the magnetic field of a bar magnet.

28. If opposite magnetic poles attract each other, why does the north end of a compass needle point north instead of south?

# CHAPTER 25

# Electromagnetism Assessments

## Chapter Outline

- 25.1 ELECTRICITY AND MAGNETISM
- 25.2 USING ELECTROMAGNETISM
- 25.3 GENERATING AND USING ELECTRICITY
- 25.4 ELECTROMAGNETISM





## 25.1 Electricity and Magnetism

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Oersted was the scientist who discovered how
  - a magnetic compass works.
  - magnetism causes an electric current.
  - electricity and magnetism are related.
  - electric charges flow through a wire.
- To use the right hand rule, you should point your thumb in the same direction as the
  - voltage source.
  - magnetic field.
  - electric current.
  - none of the above
- Assume that a wire is connected to a battery so current is flowing through the wire. If you place a compass near the wire, the needle of the compass will point toward
  - the wire.
  - the battery.
  - your thumb.
  - none of the above
- If you disconnect one end of the wire in question 3 from the battery, the compass needle will point toward
  - the loose end of the wire.
  - Earth's north magnetic pole.
  - the fingers of your right hand.
  - the end of the wire still attached to the battery.
- If you increase the amount of current flowing through a wire, the magnetic field around the wire will
  - remain the same.
  - change direction.
  - increase in strength.
  - decrease in strength.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Moving electric charges generate a magnetic field.
- \_\_\_\_\_ 7. When you apply the right hand rule, your thumb points in the direction of the magnetic field.
- \_\_\_\_\_ 8. The direction of the magnetic field around a wire carrying current is the same as the direction of the current.

\_\_\_\_\_ 9. A compass can be used to find the direction of a magnetic field around a current-carrying wire.

\_\_\_\_\_ 10. The magnetic field created by current flowing through a wire surrounds the wire in concentric circles.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. Magnetism produced by an electric current is called \_\_\_\_\_.

12. A(n) \_\_\_\_\_ is a continuous flow of electric charges.

13. A(n) \_\_\_\_\_ is a material through which electric current can flow.

14. A device that points toward a north magnetic pole is called a(n) \_\_\_\_\_.

15. The right hand rule is used to find the \_\_\_\_\_ of the magnetic field around a wire that is carrying current.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Outline how Oersted accidentally discovered that an electric current creates a magnetic field.

17. Identify two factors that affect the magnetic field surrounding a wire that is carrying electric current.

## 25.2 Using Electromagnetism

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Factors that affect the strength of a solenoid's magnetic field include the
  - amount of current flowing through the wire.
  - direction in which the current flows.
  - number of turns in the wire.
  - two of the above
- In an electromagnet, the solenoid magnetizes the iron bar by
  - reversing the direction of the current.
  - repeatedly turning the current on and off.
  - aligning the magnetic domains of the iron.
  - causing electric current to flow through the bar.
- What happens when the clapper of an electric doorbell moves to strike the bell?
  - The electromagnet turns on.
  - The doorbell's circuit is broken.
  - The voltage source causes current to flow.
  - two of the above
- When current flows through an electric motor, its electromagnet
  - repels the shaft.
  - rotates continuously.
  - controls the commutator.
  - attracts the permanent magnets.
- Why do the poles of the electromagnet in an electric motor keep reversing?
  - The shaft keeps rotating.
  - The permanent magnets keep moving.
  - The current keeps changing direction.
  - The voltage source keeps turning off and on.

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. A coiled wire has a weaker magnetic field than a straight wire.
- \_\_\_\_\_ 7. An electromagnet is stronger if more current flows through it.
- \_\_\_\_\_ 8. Electromagnets are not as strong as naturally occurring magnets.

\_\_\_\_\_ 9. Electric devices that contain electromagnets include hair dryers.

\_\_\_\_\_ 10. Most electric devices with moving parts contain electric motors.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. A(n) \_\_\_\_\_ is a coil of wire with electric current flowing through it, giving it a magnetic field.

12. A solenoid wrapped around a bar of ferromagnetic material is a(n) \_\_\_\_\_.

13. A device that uses an electromagnet to change electrical energy to kinetic energy is a(n) \_\_\_\_\_.

14. The part of an electric motor that is turned by the rotating electromagnet is the \_\_\_\_\_.

15. The part of an electric motor that changes the direction of the current is the \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Compare and contrast a solenoid and a bar magnet.

17. Explain how an electric doorbell works.

## 25.3 Generating and Using Electricity

### Lesson Quiz

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- Which of the following sentences correctly states Faraday's law?
  - The flow of electric current creates a changing magnetic field.
  - Only an alternating current can produce a magnetic field.
  - A rotating electromagnet has a changing magnetic field.
  - A changing magnetic field produces an electric current.
- Moving a magnet back and forth inside a coil of wire produces a(n)
  - electromagnet.
  - alternating current.
  - increase in voltage.
  - decrease in voltage.
- Uses of electromagnetic induction include
  - generating electricity.
  - changing the voltage of current.
  - changing electrical energy to kinetic energy.
  - two of the above
- An electric generator is the reverse of an
  - electric transformer.
  - electric motor.
  - electromagnet.
  - none of the above
- An electric transformer with more turns of wire in coil S
  - decreases the voltage of current.
  - increases the amount of current.
  - is a step-down transformer.
  - none of the above

#### True or False

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 6. Faraday's discovery is the reverse of Oersted's discovery about electric currents and magnetic fields.
- \_\_\_\_\_ 7. Electromagnetic induction always requires movement of a magnet.
- \_\_\_\_\_ 8. The current produced by a magnetic field is always alternating current.

\_\_\_\_\_ 9. The two coils of a transformer are connected to different electric circuits.

\_\_\_\_\_ 10. Power plant generators produce low-voltage electric current.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

11. The process of generating electric current with a changing magnetic field is called \_\_\_\_\_.

12. A device that uses electromagnetic induction to change kinetic energy to electrical energy is a(n) \_\_\_\_\_.

13. A device that uses electromagnetic induction to increase the voltage of electric current is a(n) \_\_\_\_\_.

14. A(n) \_\_\_\_\_ decreases the voltage of electric current with the use of electromagnetic induction.

15. Kinetic energy in a power plant is supplied by a(n) turning \_\_\_\_\_.

**Short Answer**

*Answer the following questions in complete sentences.*

16. Describe the process of electromagnetic induction.

17. Explain how an electric generator works.

## 25.4 Electromagnetism

### Chapter Test

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

#### Multiple Choice

*Circle the letter of the correct choice.*

- The right hand rule is used to find the
  - positive terminal of a chemical cell.
  - amount of electric current flowing through a wire.
  - strength of the magnetic field around a coil of wire.
  - direction of the magnetic field around a current-carrying wire.
- The magnetic field around a straight wire that is carrying current is stronger when
  - the direction of the current keeps changing.
  - the amount of current is decreased.
  - a compass is placed near the wire.
  - none of the above
- What would happen if the commutator were removed from an electric motor?
  - The electromagnet would not turn.
  - The permanent magnets would repel the shaft.
  - The direction of the current would not change.
  - two of the above
- The shaft of an electric motor is turned directly by the
  - commutator.
  - electromagnet.
  - electric current.
  - permanent magnets.
- All of the following devices contain electromagnets except
  - electric motors.
  - electric fans.
  - telephones.
  - solenoids.
- A changing magnetic field can produce a(n)
  - battery.
  - solenoid.
  - electromagnet.
  - electric current.
- The transformer outside of a house has the job of
  - reducing the amount of current entering the house.

- b. decreasing the voltage of current entering the house.
- c. measuring the amount of current entering the house.
- d. changing the direction of current entering the house.

**True or False**

*Write true if the statement is true or false if the statement is false.*

- \_\_\_\_\_ 8. Faraday discovered that an electric current generates a magnetic field.
- \_\_\_\_\_ 9. If current is allowed to flow through a wire, the wire becomes a permanent magnet.
- \_\_\_\_\_ 10. Adding more turns of wire to a solenoid increases the amount of current that flows through it.
- \_\_\_\_\_ 11. Placing a bar of iron inside the coils of a solenoid creates an electromagnet.
- \_\_\_\_\_ 12. A maglev train levitates above the track because of magnetic repulsion.
- \_\_\_\_\_ 13. The electromagnet inside a doorbell strikes the bell when the button is pushed.
- \_\_\_\_\_ 14. Oersted discovered electromagnetic induction.
- \_\_\_\_\_ 15. Electric generators may be set up to produce either direct or alternating current.
- \_\_\_\_\_ 16. A step-up transformer has more turns of wire in coil P than coil S.
- \_\_\_\_\_ 17. Both electric generators and electric transformers are needed to safely provide electricity to homes.

**Fill in the Blank**

*Fill in the blank with the appropriate term.*

- 18. Electromagnetism refers to magnetism generated by a(n) \_\_\_\_\_.
- 19. Each turn of wire in a solenoid has its own \_\_\_\_\_.
- 20. When more current flows through a solenoid, its magnetic field is \_\_\_\_\_.
- 21. The electromagnet inside an electric doorbell attracts the \_\_\_\_\_.
- 22. An electric motor changes electrical energy to \_\_\_\_\_ energy.
- 23. The outcome of electromagnetic induction is a(n) \_\_\_\_\_.
- 24. Electromagnetic induction can be used to change the \_\_\_\_\_ of electric current.
- 25. A(n) \_\_\_\_\_ is a device that changes kinetic energy to electrical energy through electromagnetic induction.

**Short Answer**

*Answer the following questions in complete sentences.*

- 26. Describe how to determine the direction of a magnetic field around a wire when the direction of current flowing through the wire is known.

- 27. Explain the function of the electromagnet in an electric motor.



28. Explain why an electric generator is an electric motor in reverse.

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# CHAPTER **26** Physical Science Unit Tests

## Chapter Outline

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**26.1 UNIT 1: SCIENCE AND TECHNOLOGY TEST**

**26.2 UNIT 2: MATTER TEST**

**26.3 UNIT 3: CHEMICAL INTERACTIONS TEST**

**26.4 UNIT 4: MOTION AND FORCES TEST**

**26.5 UNIT 5: ENERGY TEST**

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## 26.1 Unit 1: Science and Technology Test

Unit 1 chapters: *The World of Science* and *Scientific Research and Technology*

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

1. The person who first proposed that natural events have natural causes was
  - a. Aristotle.
  - b. Einstein.
  - c. Copernicus.
  - d. Thales.
2. Isaac Newton was the scientist who discovered that
  - a. Earth revolves around the sun.
  - b. some elements are radioactive.
  - c. objects with greater mass have a greater force of attraction.
  - d. particles of matter are in constant motion.
3. Careers in physical science include
  - a. pharmacist.
  - b. engineer.
  - c. surveyor.
  - d. all of the above
4. A student did an experiment to test the hypothesis that more sugar dissolves in hot water than cold water. What is the dependent variable in the experiment?
  - a. amount of water
  - b. temperature of water
  - c. amount of dissolved sugar
  - d. amount of stirring
5. What does the following lab safety symbol represent?



- a. radioactive hazard
- b. biohazard
- c. toxic chemical hazard

- d. open flame hazard
6. What is a graduated cylinder used to measure?
- mass
  - width
  - volume
  - circumference
7. Which of the following is not a step in the technological design process?
- develop a hypothesis
  - identify a problem
  - create a model
  - select the best solution

### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Copernicus proposed that Earth is at the center of the solar system.
- \_\_\_\_\_ 9. Matter refers to all the “stuff” that exists in the universe.
- \_\_\_\_\_ 10. An example of a chemical change is water boiling.
- \_\_\_\_\_ 11. Advances in physical science are responsible for the invention of motor vehicles.
- \_\_\_\_\_ 12. The first step of a scientific investigation is gathering data.
- \_\_\_\_\_ 13. Volume is an example of a derived quantity.
- \_\_\_\_\_ 14. The freezing point of water on the Celsius scale is 32 degrees.
- \_\_\_\_\_ 15. The evolution of modern computers began in the 1990s.
- \_\_\_\_\_ 16. All technological designs have constraints.
- \_\_\_\_\_ 17. Ethics is important in science but not in technology.

### Fill in the Blank

Fill in the blank with the appropriate term.

18. A scientific \_\_\_\_\_ is a broad explanation that is supported by a great deal of evidence.
19. \_\_\_\_\_ means drawing general conclusions from many observations.
20. A scientific hypothesis is a potential answer to a question that must be \_\_\_\_\_.
21. \_\_\_\_\_ gives matter the ability to move and change.
22. The physical science that focuses on matter is \_\_\_\_\_.
23. The manipulated variable in an experiment is also called the \_\_\_\_\_ variable.
24. The total spread of values in a set of measurements is the \_\_\_\_\_.
25. A device that records ground movements caused by earthquakes is a(n) \_\_\_\_\_.

### Short Answer

Answer the following questions in complete sentences.

26. Compare and contrast scientific theories and scientific laws, and give an example of each.

27. Which two concepts are the focus of physical science? What are some specific questions relating to these two concepts that physical science might be able to answer?

28. What are similarities and differences between the technological design process and scientific investigation?

## 26.2 Unit 2: Matter Test

Unit 2 chapters: *Introduction to Matter, States of Matter, Atoms and Periodic Table*

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

- Which of the following is a physical property of matter?
  - state of matter
  - ability to burn
  - ability to react chemically
  - ability to dissolve in other substances
- Which element is the most common element in living things?
  - hydrogen
  - oxygen
  - carbon
  - iron
- The state of matter in which matter has a fixed volume and shape is
  - gas.
  - solid.
  - plasma.
  - liquid.
- The nucleus of an atom contains
  - protons.
  - neutrons.
  - electrons.
  - two of the above
- The first known person to introduce the idea of atoms as the smallest particles of matter was
  - Dalton.
  - Democritus.
  - Thomson.
  - Rutherford.
- Bohr introduced the idea that electrons orbit the nucleus only at fixed distances called
  - energy levels.
  - electron clouds.
  - orbitals.
  - quarks.
- From left to right across most periods of the periodic table, elements change from
  - nonmetals to metals to metalloids.
  - metals to nonmetals to metalloids.
  - metalloids to metals to nonmetals.
  - metals to metalloids to nonmetals.

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. Weight is a measure of the force of gravity pulling on an object.
- \_\_\_\_\_ 9. Glass breaking is an example of a chemical change in matter.
- \_\_\_\_\_ 10. Viscosity is a force that pulls particles at the exposed surface of a liquid toward other liquid particles.
- \_\_\_\_\_ 11. As the temperature of a gas increases, its volume also increases.
- \_\_\_\_\_ 12. Matter loses energy when it changes from a liquid to a gas.
- \_\_\_\_\_ 13. The process in which a solid changes to a gas is called melting.
- \_\_\_\_\_ 14. Different isotopes of the same element have the same atomic number.
- \_\_\_\_\_ 15. Elements that are good conductors of electricity are classified as metals.
- \_\_\_\_\_ 16. Boron and silicon are examples of elements that are classified as nonmetals.
- \_\_\_\_\_ 17. Alkali metals are the most reactive of all metals.

**Fill in the Blank**

Fill in the blank with the appropriate term.

18. A homogeneous mixture with particles large enough to reflect light is a(n) \_\_\_\_\_.
19. The ability of matter to burn is a property called \_\_\_\_\_.
20. \_\_\_\_\_ law states the relationship between temperature and volume of a gas.
21. A liquid changes to a solid in the process of \_\_\_\_\_.
22. An atom that gains or loses electrons becomes a charged particle called a(n) \_\_\_\_\_.
23. Denser regions in an electron cloud where electrons are most likely to be are called \_\_\_\_\_.
24. Electrons in the outer energy level of an atom are called \_\_\_\_\_ electrons.
25. Highly reactive elements with seven valence electrons are called \_\_\_\_\_.

**Short Answer**

Answer the following questions in complete sentences.

26. A large candle has burned and all that seems to remain is a small puddle of wax. Explain how the law of conservation of mass applies to the candle.

27. Explain the relationship between the kinetic energy of particles and the state of matter.

28. Describe Dalton's atomic theory. Which parts of the theory are still accepted today? Which parts are no longer accepted? Why?



## 26.3 Unit 3: Chemical Interactions Test

Unit 3 chapters: *Chemical Bonding, Chemical Reactions, Chemistry of Carbon, Chemistry of Solutions and Nuclear Chemistry*

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

- How many valence electrons does each hydrogen atom have?
  - 1
  - 2
  - 3
  - 4
- The chemical formula CH<sub>4</sub> represents the compound named
  - carbon hydroxide.
  - hydrogen chloride.
  - hydrogen carbide.
  - methane.
- Which coefficient is missing from the following chemical equation?  $2\text{H}_2\text{O} \rightarrow \text{H}_2 + \text{O}_2$ 
  - 1
  - 2
  - 3
  - 4
- The form of carbon in which carbon atoms are arranged in layers is
  - coal.
  - graphite.
  - diamond.
  - fullerene.
- Which of the following hydrocarbons is saturated?
  - ethane
  - benzene
  - ethylene
  - methyne
- Which gas is considered the solvent in Earth's atmosphere?
  - oxygen
  - nitrogen
  - water vapor
  - carbon dioxide
- The scientist who won Nobel prizes for discovering the radioactive elements polonium and radium was
  - Einstein.
  - Geiger.
  - Curie.

d. Mendeleev.

### True or False

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. When an ionic bond forms, atoms of a metal gain one or more electrons.
- \_\_\_\_\_ 9. Hydrogen chloride is an example of an ionic compound.
- \_\_\_\_\_ 10. A cake baking is an example of a change that involves chemical reactions.
- \_\_\_\_\_ 11. A chemical equation is a symbolic representation of a chemical compound.
- \_\_\_\_\_ 12. Biochemical compounds that contain nitrogen include nucleic acids and lipids.
- \_\_\_\_\_ 13. All human enzymes help the body digest food by speeding up biochemical reactions.
- \_\_\_\_\_ 14. A solution is any mixture of two or more substances.
- \_\_\_\_\_ 15. Increasing the pressure on a gas increases its solubility.
- \_\_\_\_\_ 16. A beta particle consists of two protons and two neutrons.
- \_\_\_\_\_ 17. Nuclear fission begins when a nucleus captures a neutron.

### Fill in the Blank

Fill in the blank with the appropriate term.

18. A covalent bond between two atoms of the same element is called a(n) \_\_\_\_\_ bond.
19. The general equation of a(n) \_\_\_\_\_ reaction is  $A + B \rightarrow C$ .
20. A chemical reaction that releases energy is known as a(n) \_\_\_\_\_ reaction.
21. A(n) \_\_\_\_\_ is a large molecule that consists of many smaller molecules joined together by covalent bonds.
22. The amount of solute in a given amount of solution is the \_\_\_\_\_ of the solution.
23. Litmus changes from red to blue in the presence of a(n) \_\_\_\_\_.
24. The scientist who discovered radioactivity was \_\_\_\_\_.
25. The type of radioactive decay that emits only energy and no particles is called \_\_\_\_\_ decay.

### Short Answer

Answer the following questions in complete sentences.

26. Compare and contrast ionic, covalent, and metallic bonds.

27. Explain how photosynthesis and cellular respiration are related.

28. Make arguments for and against using nuclear fission for energy.

## 26.4 Unit 4: Motion and Forces Test

Unit 4 chapters: *Motion, Forces, Newton's Law of Motion, Fluid Forces and Work and Machines*

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

Circle the letter of the correct choice.

- Motion is a vector if it includes both distance and
  - speed.
  - length.
  - position.
  - direction.
- A bicyclist traveling on a straight road went from 0 m/s to 2m/s in 2 seconds. What was the bicyclist's acceleration?
  - 1 m/s<sup>2</sup>
  - 2 m/s<sup>2</sup>
  - 4 m/s<sup>2</sup>
  - none of the above

- In the sketch below, what is the net force acting on the block?



- 0 N to the right
  - 3 N to the right
  - 6 N to the right
  - 9 N to the right
- What determines the inertia of any object?
    - its mass
    - its volume
    - friction acting on it
    - two of the above
  - An object's velocity will change only if it is acted on by a(n)
    - net force.
    - strong force.
    - moving force.
    - unbalanced force.
  - The pressure exerted by a fluid depends on its
    - mass.
    - depth.
    - density.
    - two of the above
  - How much work does Tran do if he lifts a 100-N box to a height of 2 m above the ground?

- a. 50 N/m
- b. 102 N • m
- c. 200 N • m
- d. none of the above

**True or False**

Write true if the statement is true or false if the statement is false.

- \_\_\_\_\_ 8. The slope of a distance-time graph represents speed.
- \_\_\_\_\_ 9. Speed is a vector unless it is equal to zero.
- \_\_\_\_\_ 10. You can stand on a sidewalk without slipping because of static friction.
- \_\_\_\_\_ 11. Rolling friction is stronger than sliding friction.
- \_\_\_\_\_ 12. Newton's second law of motion is also called the law of inertia.
- \_\_\_\_\_ 13. The acceleration of an object equals the net force acting on the object times the object's mass.
- \_\_\_\_\_ 14. When the same amount of force is exerted over a greater area, it produces greater pressure.
- \_\_\_\_\_ 15. Archimedes' law states that the buoyant force acting on an object in a fluid equals the weight of the water displaced by the object.
- \_\_\_\_\_ 16. A machine cannot increase the amount of work that is done.
- \_\_\_\_\_ 17. When the threads of a screw are farther apart, the screw has a greater mechanical advantage.

**Fill in the Blank**

Fill in the blank with the appropriate term.

- 18. Acceleration is a change in speed or \_\_\_\_\_.
- 19. \_\_\_\_\_ was the first person to suggest that gravity affects all objects in the universe.
- 20. A stretched rubber band returns to its original shape when released because it has the property of \_\_\_\_\_.
- 21. According to Newton's \_\_\_\_\_ law of motion, forces always act in pairs.
- 22. An object's mass multiplied by its velocity equals its \_\_\_\_\_.
- 23. The upward force exerted by a fluid is known as \_\_\_\_\_ force.
- 24. In a(n) \_\_\_\_\_ class lever, the input and output forces are on opposite sides of the fulcrum
- 25. Any machine that consists of two or more simple machines is called a(n) \_\_\_\_\_ machine.

**Short Answer**

Answer the following questions in complete sentences.

- 26. Relate the concepts of force, weight, and mass.

27. Compare and contrast Newton's three laws of motion.

28. What is the efficiency of a machine, and how is it calculated? Why is the efficiency of a machine always less than 100 percent?

## 26.5 Unit 5: Energy Test

Unit 5 chapters: *Introduction to Energy, Thermal Energy, Waves, Sound, Radiation, Visible Light, Electricity, Magnetism and Electromagnetism*

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

### Multiple Choice

*Circle the letter of the correct choice.*

1. Tory throws a 0.5-kilogram rock through the air. If the rock is moving at a velocity of 2 m/s, what is its kinetic energy?
  - a. 1 J
  - b. 2 J
  - c. 3 J
  - d. 4 J
2. The thermal energy of a substance depends on the average kinetic energy of its particles and its
  - a. temperature.
  - b. specific heat.
  - c. volume.
  - d. mass.
3. Any wave that transfers energy through matter is called a
  - a. surface wave.
  - b. mechanical wave.
  - c. transverse wave.
  - d. longitudinal wave.
4. Decibels are units that measure the
  - a. speed of sound.
  - b. pitch of sound.
  - c. intensity of sound.
  - d. amplitude of sound.
5. Electromagnetic waves include all of the following except
  - a. ultraviolet light.
  - b. microwaves.
  - c. radio waves.
  - d. ocean waves.
6. Ways of producing light without heat include
  - a. fluorescence.
  - b. bioluminescence.
  - c. electroluminescence.
  - d. all of the above
7. If you scuff rubber-soled shoes across a wool rug
  - a. the rubber soles transfer electrons to the rug.
  - b. the rubber soles become positively charged.





28. Explain how electric transformers function and why they are used.