

# Temperature and Heat

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## CHAPTER

## 1

# Temperature and Heat

## Lesson 18.1: True or False

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

Determine if the following statements are true or false.

- \_\_\_\_\_ 1. Only warm or hot objects have thermal energy.
- \_\_\_\_\_ 2. If particles of an object start to move more quickly, the object's temperature rises.
- \_\_\_\_\_ 3. Temperature is the same thing as thermal energy.
- \_\_\_\_\_ 4. An object with a higher temperature always has greater thermal energy than an object with a lower temperature.
- \_\_\_\_\_ 5. On the Celsius scale, the boiling point of water is 32 °C.
- \_\_\_\_\_ 6. Most types of matter expand to some degree when they get warmer.
- \_\_\_\_\_ 7. Temperature is a physical property of matter.
- \_\_\_\_\_ 8. Thermal energy always moves from an object with a higher temperature to an object with a lower temperature.
- \_\_\_\_\_ 9. Specific heat is a property that is specific to a given type of matter.
- \_\_\_\_\_ 10. Most metals have a very high specific heat.

## Lesson 18.1: Critical Reading

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

Read this passage from the text and answer the questions that follow.

### Heat

Heat is the transfer of thermal energy between objects that have different temperatures. Thermal energy always moves from an object with a higher temperature to an object with a lower temperature. When thermal energy is transferred in this way, the warm object becomes cooler and the cool object becomes warmer. Sooner or later, both objects will have the same temperature. Only then does the transfer of thermal energy end.

Assume that a cool spoon is placed in a cup of steaming hot coffee. Once in the coffee, the spoon quickly heats up. The fast-moving particles of the coffee transfer some of their energy to the slower-moving particles of the spoon. The spoon particles start moving faster and become warmer, causing the temperature of the spoon to rise. Because the coffee particles lose some of their kinetic energy to the spoon particles, the coffee particles start to move more slowly. This causes the temperature of the coffee to fall. Before long, the coffee and spoon have the same temperature.

### Questions

1. How is heat defined in physical science?
2. Describe how thermal energy is transferred.
3. When does the transfer of thermal energy end?

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## Lesson 18.1: Multiple Choice

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

*Circle the letter of the correct choice.*

- If two objects have the same mass, the object with the higher temperature always
  - has greater thermal energy.
  - has higher specific heat.
  - feels warmer.
  - two of the above
- Which of the following statements about temperature is true?
  - Temperature measures heat.
  - Temperature measures kinetic energy.
  - Temperature is the same thing as heat.
  - Temperature is the same thing as thermal energy.
- If a bucket full of water and a cup full of water have the same temperature, then the water in the
  - bucket and cup have the same thermal energy.
  - bucket has greater thermal energy.
  - cup has lower average kinetic energy.
  - cup has lower specific heat.
- The thermal energy of an object depends on its
  - mass.
  - temperature.
  - specific heat.
  - two of the above
- If you put a cool spoon into a cup of hot coffee, the temperature of the spoon rises because
  - thermal energy is transferred from the coffee to the spoon.
  - specific heat is transferred from the coffee to the spoon.
  - particles of the spoon gain kinetic energy.
  - two of the above
- Which of the following materials has the greatest specific heat?
  - iron
  - sand
  - wood
  - water
- A material with greater specific heat
  - warms up more quickly.
  - requires less energy to get hot.
  - always has a higher temperature.
  - none of the above

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## Lesson 18.1: Matching

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

Match each definition with the correct term.

### Definitions

- \_\_\_\_\_ 1. device for measuring temperature
- \_\_\_\_\_ 2. total kinetic energy of particles of matter
- \_\_\_\_\_ 3. amount of energy needed to raise the temperature of 1 gram of a substance by 1 °C
- \_\_\_\_\_ 4. average kinetic energy of particles of matter
- \_\_\_\_\_ 5. scale for measuring temperature
- \_\_\_\_\_ 6. transfer of thermal energy between objects with different temperatures
- \_\_\_\_\_ 7. measure that affects the thermal energy of matter but not its temperature

### Terms

- a. thermal energy
- b. heat
- c. temperature
- d. thermometer
- e. mass
- f. Celsius
- g. specific heat

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## Lesson 18.1: Fill in the Blank

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

Fill in the blank with the appropriate term.

1. The freezing point of water on the Celsius scale is \_\_\_\_\_.
2. All substances have thermal energy because their particles are always \_\_\_\_\_.
3. The specific heat of a substance is measured in the SI unit called the \_\_\_\_\_.
4. A(n) \_\_\_\_\_ shows how hot or cold something is relative to two reference temperatures.
5. Substances in the \_\_\_\_\_ state of matter usually expand the most when heated.
6. Water takes up \_\_\_\_\_ space as a liquid than it does as a solid.
7. Thermal energy is transferred between objects only when they have different \_\_\_\_\_.

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## Lesson 18.1: Critical Writing

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

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how kinetic energy, thermal energy, temperature, and heat are related.