

- ✓ Know the difference between heat and temperature.
- ✓ Know how to calculate change in thermal energy (how much heat is absorbed or lost).
- ✓ Know the difference between conduction, convection, and radiation. Be able to provide an example of each.
- ✓ Know the difference between a conductor and an insulator. Be able to provide examples.
- ✓ Be able to briefly describe the heat movers and heat engines.
- ✓ Recognize the differences between the temperature scales (Fahrenheit, Celsius, Kelvin).

SAMPLE QUESTIONS

True/False: Correct the false statements by changing the wording.

1. Temperature is the same thing as heat.
2. The average kinetic energy of molecules in a substance is related to temperature.
3. A temperature scale that has 100 degrees between the boiling point and the freezing point of water is the Fahrenheit scale.
4. Materials that are poor heat conductors are insulators.
5. Winds and weather patterns are good examples of radiation currents.
6. Heat that is transferred to us from the sun is transferred by radiation.
7. If 25 grams of hot water are added to 35 grams of cold water, the heat lost by the hot water is equal to the heat gained by the cold water.
8. The SI unit of heat is the joule.
9. A warm fluid is more dense than a cool fluid.
10. If you wanted to measure the transfer of heat, you would use a thermometer.

Multiple Choice:

11. When Jenny stepped from the grass onto the black asphalt she noticed that there was a distinct difference in temperature between the two, even though they had spent the same amount of time in the sunlight. The asphalt was warmer than the grass because it probably has:
 - a higher specific heat capacity and so it heats up quickly
 - a lower specific heat capacity and so it heats up quickly
 - a higher specific heat capacity and so it heats up slowly
 - a lower specific heat capacity and so it heats up slowly

12. Jenny found that the bricks felt warmer than the grass, even though they had spent the same amount of time in the sun. This probably means that the bricks will cool down:

- more slowly than the grass because the bricks have a higher specific heat capacity
- more quickly than the grass because the bricks have a higher specific heat capacity
- more quickly than the grass because the bricks have a lower specific heat capacity

13. Which of the following statements correctly summarizes the relationship between the change in temperature of a substance and its specific heat capacity, assuming a constant energy change?

- The higher the specific heat capacity the slower the change in temperature.
- The lower the specific heat capacity the faster the change in temperature.
- The lower the specific heat capacity the slower the change in temperature.
- The higher the specific heat capacity the faster the change in temperature.

14. What temperature is the boiling point of water on the Celsius scale.

- 212°C
- 0°C
- 32°C
- 100°C

15. What is heat?

- a measure of how much thermal energy is in an object
- the energy transferred from something of higher temperature to lower temperature
- the amount of energy required to change the physical state of a material
- All of the above

16. When a solid is heated, its

- Volume increases.
- Melting point increases
- Volume decreases
- Melting point decreases

17. A refrigerator works most like

- A heat working when the temperature outside is warm.
- A heat pump working when the temperature outside is cold.
- Active solar heating
- Passive solar heating

18. At absolute zero, the molecules of a substance

- Stop moving
- Break down into individual atoms
- Condense
- Boil

19. An example of heat transfer by radiation is

- An oven door that feels hot to the touch
- Hot air coming out of a hair dryer
- The heat from a sun lamp
- Boiling water on a glass stove.

20. Forced-air heating systems heat a room by
Convection
conduction
radiation
solar heating

Practice Problems

21. How much heat is absorbed when 500 g of water, $C = 4.184 \text{ J/g}^\circ\text{C}$, goes from 25.0°C to 35.0°C ?
22. How much heat is absorbed when 500 g of copper, $C = 0.385 \text{ J/g}^\circ\text{C}$, goes from 25.0°C to 35.0°C ?
23. How much heat is released when 150. g of iron cools from 525°C to 100°C ? ($C_p = 0.44 \text{ J/g}^\circ\text{C}$)
the temperature of the glass rise?
25. A 50.0 g block of glass ($C = 0.50 \text{ J/g}^\circ\text{C}$) absorbs 333 joules of heat energy. How much does the temperature of the glass rise?
26. The temperature of a silver coin ($C = 0.24 \text{ J/g}^\circ\text{C}$) falls by 353°C as it releases 5,550 Joules of heat. What is the mass of the coin?
27. An aluminum can with a mass of 12.5 grams ($C = .90 \text{ J/g}^\circ\text{C}$) absorbs 245 Joules of heat. How much does the temperature rise?
28. Is mercury ($C = 0.14 \text{ J/g}^\circ\text{C}$) or silver ($C = 0.24 \text{ J/g}^\circ\text{C}$) a better conductor of heat? Explain.
29. If a substance freezes at -100°C , what is its freezing point on the Kelvin scale? On the Fahrenheit scale?

30. The weatherman this morning said the expected high today is 10°F . What is the corresponding temperature on the other two scales?

Short Answer Essay

31. Distinguish among thermal energy, temperature, and heat.

32. What is absolute zero? What is the corresponding value of absolute zero on the Celsius scale? On the Fahrenheit scale?

33. What is thermal equilibrium? Provide an example.

34. Is outer space a good conductor or a good insulator for thermal energy? Explain

35. On a hot day, which would stay cool longer, a sheet of aluminum (specific heat 920 J/kg K) or copper (specific heat 380 J/kg K)? Why? CHANGE MATERIAL

STUDY! STUDY! STUDY!