PS Physics **CHAPTER 6 REVIEW** Test Date _____

- ✓ 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. False Temperature is the same thing as heat. Is not
2. True The average kinetic energy of molecules in a substance is related to temperature.
3. False A temperature scale that has 100 degrees between the boiling point and the freezing point of water is the Fahrenheit scale. Celsius
4. True Materials that are poor heat conductors are insulators.
5. False Winds and weather patterns are good examples of radiation currents. convection
6. True Heat that is transferred to us from the sun is transferred by radiation.
7. True 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. True The SI unit of heat is the joule.
9. False A warm fluid is more dense than a cool fluid. Less dense
10. False If you wanted to measure the transfer of heat, you would use a thermometer. Kinetic energy

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. Both work
    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 J/g°C, goes from 25.0 °C to 35.0 °C?
Q= (500 g)(10°C)(4.184)
Q= 20920 J

22. How much heat is absorbed when 500 g of copper, C= 0.385 J/g°C , goes from 25.0 °C to 35.0 °C?
Q= (500 g)(10°C)(0.385)
Q= 1925 J

23. How much heat is released when 150 g of iron cools from 525°C to 100°C? (Cp = 0.44 J/g°C) the temperature of the glass rise?
Q= (150 g)(-425°C)(0.44)
Q= -388025 J

25. A 50.0 g block of glass (C= 0.50 J/g°C) absorbs 333 joules of heat energy. How much does the temperature of the glass rise?
333 J= (50 g)(ΔT)(0.50)
333= (25)(ΔT)
13.32°C = ΔT

26. The temperature of a silvers coin (C= 0.24 J/g°C) falls by 353 °C as it releases 5,550 Joules of heat. What is the mass of the coin?
5550 J= (m)(-353°C)(0.24)
5550 = (m)(84.72)
m = 65.51 grams

27. An aluminum can with a mass of 12.5 grams (C= .90 J/g°C) absorbs 245 Joules of heat. How much does the temperature rise?
245 J= (12.5 g)(ΔT)(0.90)
245= (11.25)(ΔT)
21.78°C = ΔT

28. Is mercury (C= 0.14 J/g°C) or silver (C= 0.24 J/g°C) a better conductor of heat? Explain.
Mercury would be the better conductor than silver. Mercury has a lower specific heat, therefore I would heat up faster than silver.

29. If a substance freezes at -100°C, what is its freezing poin t on the Kelvin scale? On the Fahrenheit scale? K= -100°C +273 -100°C = (°F – 32)/1.8
=173 Kelvin = -148 °F

30. The weatherman this morning said the expected high today is 10°F. What is the corresponding temperature on the other two scales? °C = (10 – 32)/1.8 K= -12.22 +273
= -12.22°C = 260.78 Kelvin

Short Answer Essay

31. Distinguish among thermal energy, temperature, and heat.
temperature is the measurement of average kinetic energy (how fast the particles are moving), temperature is measured with a thermometer; thermal energy is the sum of all energy of the particles in the object (increasing temp will increase thermal energy); heat is energy that flows from one object to another (heat is measured in joules)

32. What is absolute zero? What is the corresponding value of absolute zero on the Celsius scale? On the Fahrenheit scale? Absolute zero is zero on the Kelvin scale. It is theoretically the lowest temperature and at this temperature particles no longer move.

33. What is thermal equilibrium? Provide an example.
Thermal equilibrium is reached when the temperature of the material is the same throughout. For example, cold milk is added to hot chocolate, when the heat from the hot chocolate transfers to the cold milk, the temp of the milk will increase. Heat will continue to transfer from hot to cold until all of it is the same temperature.

34. Is outer space a good conductor or a good insulator for thermal energy? Explain
Outer space is a good insulator because it is made up of gas. Particles in gases are much more spread out making the transfer of heat more difficult.

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
The sheet of aluminum would stay cool longer because it has a higher specific heat. Having a higher specific heat means it needs more energy to raise the temperature of the material (therefore it takes longer to heat up).