

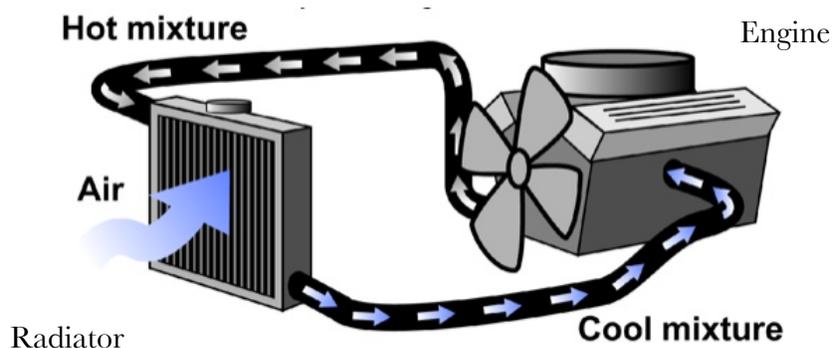
Heat and Temperature Unit Test

Multiple Choice (3 points each):

Total Questions: 25

On the Scantron sheet, bubble in the choice that best completes the statement or answers the question.

1. In which phase of matter do the molecules that make up the substance have the **least** motion?
 - A. Gas.
 - B. Liquid.
 - C. Plasma.
 - D. Solid.
2. Ten degree Celsius water is poured together with water at other temperatures to make water at a different temperature. Which other water temperature will give the **greatest** motion to the molecules after they are poured together?
 - A. 30 degree Celsius water
 - B. 50 degree Celsius water
 - C. 70 degree Celsius water
 - D. 90 degree Celsius water
3. Which is the correct equation that is used to change from Celsius units to Kelvin units?
 - A. Add 273
 - B. Subtract 273
 - C. Multiply by $\frac{9}{5}$ and add 32
 - D. Subtract 32 and multiply by $\frac{5}{9}$
4. Which phase change occurs at the *lowest* temperature?
 - A. Evaporation
 - B. Ionization
 - C. Melting
 - D. Vaporization
5. All of the following are good conductors **except** _____.
 - A. air
 - B. aluminum
 - C. copper
 - D. silver



6. The figure above show the movement of a liquid in a car from the engine through the radiator and back to the engine. The purpose of this is to _____.
- cool the engine down
 - heat the engine up
 - provide the engine with fuel
 - provide the engine with a spark
7. A 3 liter bottle of water is placed in refrigerator, and heat is removed from the water. The number of collisions that occur between the water molecules _____.
- decreases
 - disappears
 - increases
 - stays the same
8. What is the theoretical temperature when all motion stops?
- 273 Kelvins.
 - 0 degrees Celsius.
 - 0 degrees Fahrenheit.
 - 0 Kelvins.
9. The addition of heat causes particles to _____ their motion.
- counteract
 - decrease
 - increase
 - stay the same
10. Water at 450 Kelvins is a _____.
- Bose-Einstein condensate
 - liquid
 - gas
 - solid

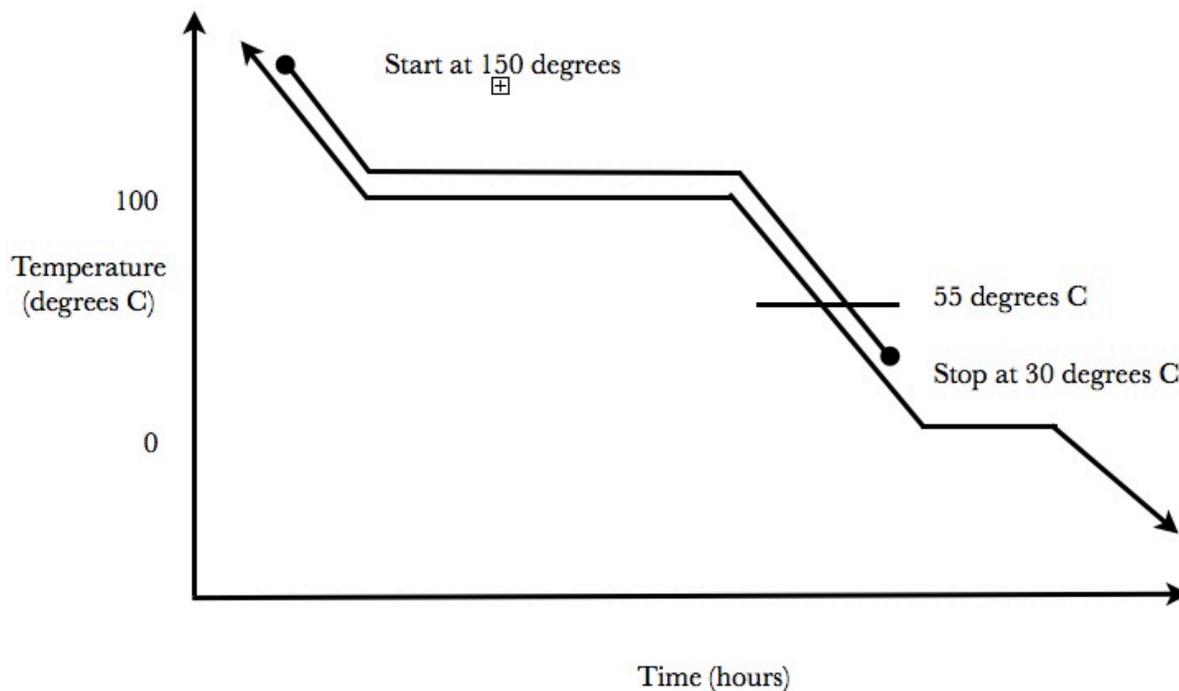
11. A device that removes heat from a small, enclosed area is a(n) _____.
- A. heat engine
 - B. heat pump
 - C. insulator
 - D. refrigerator
12. The freezing point of a substance is the same as its _____.
- A. boiling point
 - B. condensation point
 - C. evaporation point
 - D. melting point
13. What is the boiling point of water?
- A. 0 degrees Celsius.
 - B. 100 degrees Celsius.
 - C. 100 degrees Fahrenheit.
 - D. 100 Kelvins.
14. To change from a solid to a liquid at 1337 Kelvins, gold atoms are given an increase in heat. The motion of the gold atoms _____.
- A. decreases
 - B. disappears
 - C. increases
 - D. stays the same
15. Which of the following is **NOT** a way of transferring heat?
- A. Conduction
 - B. Convection
 - C. Insulation
 - D. Radiation
16. Dial thermostats have bimetallic strips in them to regulate the temperature. Bimetallic strips are made of two pieces of metal that have _____ of expansion.
- A. different rates
 - B. high rates
 - C. rigid rates
 - D. the same rates
17. One gram of _____ has the most energy.
- A. ice
 - B. ice water
 - C. steam
 - D. tap water

18. "It was so cold yesterday that the temperature only reached 275!" Which temperature scale is being used?
- A. Celsius.
 - B. Centigrade.
 - C. Fahrenheit.
 - D. Kelvin.
19. Water at 60 degrees Celsius is a _____.
- A. gas
 - B. liquid
 - C. plasma
 - D. solid
20. When a weather forecaster in Williamsburg predicts that the high for today will be 76 degrees, which temperature scale is she using?
- A. Celsius.
 - B. Centigrade.
 - C. Fahrenheit.
 - D. Kelvin.
21. Through which of the following will convection most likely occur?
- A. Liquids and gases.
 - B. Liquids and solids.
 - C. Solids and gases.
 - D. Solids and plasmas.
22. Which of the following temperatures are **NOT** possible?
- A. -274 degrees Fahrenheit.
 - B. -5 Kelvins.
 - C. 2 degrees Celsius
 - D. 45 degrees Celsius
23. A material that easily transfers the flow of heat is a(n) _____.
- A. collector
 - B. condenser
 - C. conductor
 - D. insulator
24. A temperature of 30 degrees Celsius is equal to _____ Kelvins.
- A. -303
 - B. -243
 - C. 243
 - D. 303

25. Transfer of energy that does **NOT** require matter is _____.
- A. conduction
 - B. convection
 - C. insulation
 - D. radiation

Short Answer:

Write your response to each question clearly so that you will receive full credit for your answer. Show all work including the initial equation for any calculation.



The above time versus temperature graph represents 20 grams of water cooling from 150 degrees Celsius to 30 degrees Celsius. Answer the following questions, with the specific heat of water given by

$$c = 1.00 \frac{\text{calorie}}{(\text{gram})(\text{degrees Celsius})}$$

and the equation as

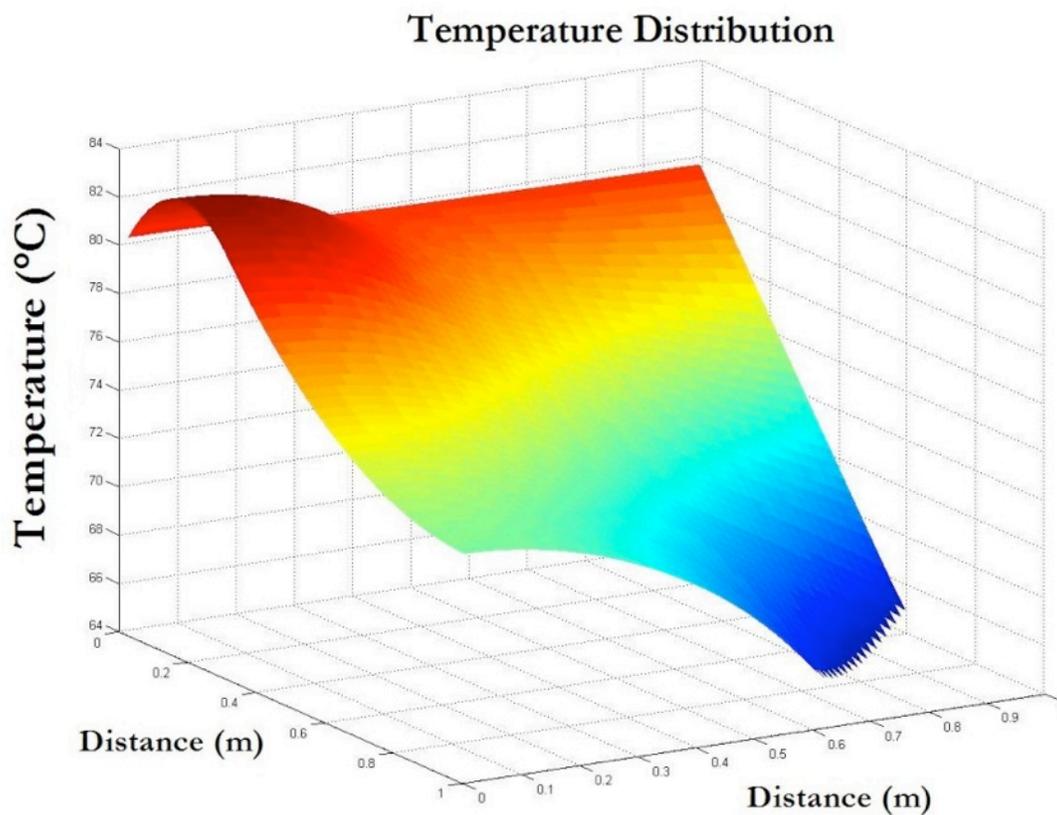
$$Q = mc\Delta T$$

26. List the phases of matter that the water passed through as it cooled from 150 degrees Celsius to 30 degrees Celsius. (Worth 3 points.)

27. Calculate the heat gained or lost as the water cools from 55 degrees Celsius to 30 degrees Celsius. Use the equation below as your starting point, and show all work including units (meaning, show me where you plugged in the values for each variable). (Worth 2 points.)

$$Q = mc\Delta T$$

28. There are three ways in which heat is transferred between substances.
- List each way and provide an example of heat is transferred. (Worth 6 points.)
 - How are all three ways of heat transfer alike? (Worth 2 points.)
 - How are all three ways of heat transfer different? (Worth 2 points.)



29. The figure above is a 3-dimensional heat versus distance graph. From this graph, draw circles (about the size of quarters) around the part(s) have the highest temperature and which part(s) have the lowest temperature. Label one circle highest temperature and the other lowest temperature. In addition, draw an arrow showing the direction of the heat flow on the graph. (Worth 5 points.)
30. Imagine that the above figure was the heat signature as 50 kg of water was warmed from 66 degrees Celsius to 84 degrees Celsius. Use the equation below as your starting point, and show all work including units (meaning, show me where you plugged in the values for each variable) (Worth 2 points.)

$$c = 1.00 \frac{\text{calorie}}{(\text{gram}) (\text{degrees Celsius})}$$

$$Q = mc\Delta T$$

31. There are three temperature scales that are used by scientists to measure temperature. How are they different from each other? (Worth 3 points.)