

## EOU Thermodynamics Quiz

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. When 1 grams of a substance loses 3 calories in cooling  $1^{\circ}\text{C}$ , its specific heat capacity using water as the unit of measure, is \_\_\_\_\_.
- 20
  - 10
  - 6
  - 3
  - none of the above
- \_\_\_\_\_ 2. As a system becomes more disordered, entropy
- increases.
  - remains the same.
  - decreases.
- \_\_\_\_\_ 3. Adiabatic processes occur in
- the atmosphere.
  - the oceans.
  - Earth's mantle.
  - all of the above.
  - none of the above
- \_\_\_\_\_ 4. 120 joules of heat is added to a system that performs 35 Joules of work. The internal energy change of the system is
- 85 J.
  - 155 J.
  - 35 J.
  - 0 J.
  - none of the above.
- \_\_\_\_\_ 5. To say that evaporation is a cooling process means that when evaporation occurs,
- the evaporating vapor cools.
  - the remaining liquid cools.
  - both A and B.
  - none of the above
- \_\_\_\_\_ 6. The ideal efficiency for a heat engine operating between temperatures of 2650 K and 377 K is
- 50%.
  - 25%.
  - 86%.
  - 14%.
  - none of the above.
- \_\_\_\_\_ 7. Eight hundred calories of heat are added to 200 grams of water when its temperature is  $42^{\circ}\text{C}$ . The resulting temperature of the water is
- $46^{\circ}\text{C}$
  - $32^{\circ}\text{C}$
  - $4^{\circ}\text{C}$
  - $80^{\circ}\text{C}$
  - $100^{\circ}\text{C}$

- \_\_\_\_\_ 8. Heat is the \_\_\_\_\_.
- total amount of energy contained in an object
  - average amount of energy per molecule contained in an object
  - amount of energy all the molecules have
  - energy transferred between objects because of a temperature difference
  - all of the above
- \_\_\_\_\_ 9. Heat travels from the sun to Earth by
- insulation.
  - conduction.
  - radiation.
  - vacuumization.
  - convection.
- \_\_\_\_\_ 10. Mix 2 liters of 10°C water with 3 liters of 30°C water and you'll have 5 liters of water at \_\_\_\_\_.
- 20°C
  - 24°C
  - 28°C
  - 22°C
- \_\_\_\_\_ 11. The number of calories released when 4 grams of 100°C steam cools to become 4 grams of 0° ice is
- 2480 calories.
  - 2880 calories.
  - none of the above
- \_\_\_\_\_ 12. Two pots are filled with boiling water. The pots are exactly the same size, but one pot is white and the other is black. Which pots cools faster?
- The black pot.
  - The white pot.
  - Neither—they both cool at the same rate.
- \_\_\_\_\_ 13. Heat transfer by convection occurs when
- electrons bump into other electrons.
  - large numbers of atoms move from place to place.
  - atoms give off heat in the form of electromagnetic waves.
  - electromagnetic waves travel from one place to another through a vacuum.
  - none of the above
- \_\_\_\_\_ 14. The cooling effect inside a refrigerator is produced by
- an electric motor that converts electrical energy into thermal energy.
  - vaporizing the refrigeration liquid.
  - compressing the refrigeration gas into a liquid.
  - proper insulation.
  - none of the above
- \_\_\_\_\_ 15. If you were caught in freezing weather with only a candle for heat, you would be warmest in
- a tent.
  - a wooden house.
  - a car.
  - an igloo.
- \_\_\_\_\_ 16. The lowest possible temperature in nature is
- 0 degrees C.
  - 273 degrees C.
  - 4 K.

- \_\_\_\_\_ 17. The energy needed to turn 48 grams of 100°C boiling water to 100°C steam is
- a. 540 calories.
  - b.  $48 \times 540$  calories.
  - c. neither of the above
- \_\_\_\_\_ 18. Newton's law of cooling says that the rate of cooling depends on
- a. the volume of an object.
  - b. the mass of an object.
  - c. the temperature difference between an object and its surroundings.
  - d. the specific heat capacity of an object.
  - e. all of the above
- \_\_\_\_\_ 19. Two identical blocks of iron, one at 10 degrees C and the other at 20 degrees C, are put in contact. Suppose the cooler block cools to 5 degrees C and the warmer block warms to 25 degrees C. This would violate the
- a. first law of thermodynamics.
  - b. second law of thermodynamics.
  - c. both of the above
  - d. none of the above
- \_\_\_\_\_ 20. Some molecules are able to absorb large amounts of energy in the form of internal vibrations and rotations. Materials composed of such molecules would have \_\_\_\_\_.
- a. low specific heat capacities
  - b. high specific heat capacities