PRACTICE EXAM. PART 4

1- If two objects are in thermal equilibrium with each other

a) they cannot be moving
b) they cannot be undergoing an elastic collision
c) they cannot have different pressures
d) they cannot be at different temperatures
e) they cannot be falling in the Earth's gravitational field

2- The heat capacity of an object is:

a) the amount of heat energy to raise its temperature by 1°C
b) the amount of heat energy per kilogram to raise its temperature by 1°C
c) the ratio of its specific heat to that of water
d) the amount of heat energy to change its state without changing its temperature
e) the change in its temperature caused by adding 1 J of heat

3- Two different samples have the same mass and temperature. Equal quantities of heat are absorbed as heat by each. Their final temperatures may be different because the samples have different:

a) coefficients of expansion
b) thermal conductivities
c) heat capacities
d) densities
e) volumes

4- During the time that latent heat is involved in a change of state:

a) the substance always expands
b) a chemical reaction takes place
c) kinetic energy changes into potential energy
d) molecular activity remains constant
e) the temperature does not change

5- When the temperature of a copper penny is increased by 100 C°, its diameter increases by 0.17%. How much does the area of one of its faces increase?

6- The coefficient of linear expansion of steel is 11×10^{-6} per C°. A steel ball has a volume of exactly 100 cm^3 at 0°C. What is the volume when heated to 100°C?

7- A cube of aluminum is 20 cm on edge. Aluminum has a density 2.7 times that of water (1 g/cm^3) and a specific heat 0.217 times that of water (1 cal/g·C). Find the heat in calories needed to raise the temperature of the cube from 20°C to 30°C.

8- The energy given off by 300 grams of an alloy as it cools through 50°C raises the temperature of 300 grams of water from 30°C to 40°C. Find the specific heat of the alloy.

9- Ten grams of ice at -20°C is to be changed to steam at 130°C. The specific heat of both ice and steam is 0.5 cal/g • °C. The heat of fusion is 80 cal/g and the heat of vaporization is 540 cal/g. How much heat is required for the entire process?

10- Fifty grams of ice at 0°C is placed in a thermos bottle containing one hundred grams of water at 6°C. How many grams of ice will melt? The heat of fusion of water is 333 kJ/kg and the specific heat is 4190 J/kg • K.

11- A system undergoes an adiabatic process in which its internal energy increases by 20 J.
a) What is the work done by the system?
b) What is the heat absorbed by the system?

12- 273 cm^3 of an ideal gas is at 0°C. It is heated at constant pressure to 10°C. What volume will it now occupy?

13- An air bubble doubles in volume as it rises from the bottom of a lake (1000 kg/m^3). Ignoring any temperature changes, find the depth of the lake.

14- One mol of an ideal gas expands from 2.0 m^3 to 8.0 m^3 while its pressure decreases from 8.0 Pa to 2.0 Pa.
a) How much work is done by the gas if its pressure changes with volume via each of the three paths shown in the figure?
b) What are the initial and final temperatures?
c) What is the change in energy?
d) How much heat is absorbed?

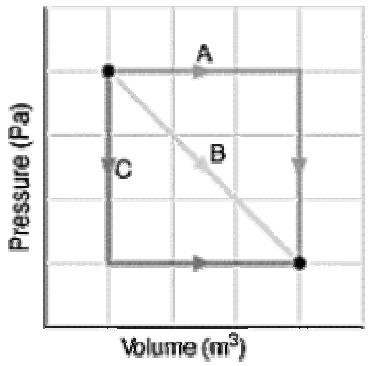

Fig. 18-36

KEY

1. d
2. a
3. c
4. e
5. 0.34%
6. 100.33 cm^3
7. 47000 cal
8. 0.2 cal/g•°C
9. 7450 cal
10. 7.5 g
11. Heat: none, Work: 20 J on system
12. 283 cm^3
13. 10 m
14. 48 J, 30 J, 12 J, 1.9 K, 1.9K, 0J, -48J, -30J, -12J