Part 1. *(1.0 point each)*

Please circle ◯ the correct answer, to the nearest number for quantitative questions, for each of the following questions:

1. An airplane flies at constant velocity of **40 m/s** at an altitude of **50 m**. The pilot drops a heavy package, which falls and strikes the ground. Where, approximately, does the package land?

A) Beneath the plane. B) 400 m behind the plane.
C) 500 m behind the plane. D) More than 500 m behind the plane.
E) not enough information given.

2. A ball is thrown horizontally from the top of a tall cliff. Four seconds later, the ball has fallen a vertical distance of

A) 100 m. B) 30 m. C) 40 m. D) 45 m. E) 80.

3. When gas in a container is squeezed to half its volume and the temperature remains the same, the gas pressure

A) halves. B) doubles. C) quadruples. D) remains the same.
E) none of the above.

4. In a vacuum, an object has no

A) buoyant force. B) mass. C) weight. D) temperature.
E) all of the above.

5. An umbrella tends to move upwards on a windy day principally because

A) air gets trapped under the umbrella, warms, and rises.
B) buoyancy increases with increasing wind speed.
C) air pressure is reduced over the curved top surface.
D) all of the above. E) not enough information.

6. A substance registers a temperature change from **20°C** to **40°C**. To what incremental temperature change does this correspond?

A) 20°F. B) 36°F. C) 40°F. D) 313°F.
E) none of the above.

7. Place a **1.0 kg** block of iron at **40°C** into a **kilogram** of water at **20°C** and the final temperature of the two becomes

A) 25^0C. B) 22^0C. C) 39^0C. D) 30^0C. E) none of the above.

8. A good absorber of radiation is a

A) good emitter of radiation. B) poor emitter of radiation.
C) good reflector. D) all of the above.
E) none of these.

9. To melt **50 g** of **0°C** ice requires

A) 25 calories. B) 50 calories. C) 80 calories.
D) 100 calories. E) 4000 calories.

10. A cube of wood with a density of **0.780 g/cm^3** is **10.0 cm** on each side. When the cube is placed in water, what buoyant force acts on the wood?

A) 7.65×10^3 N B) 6.40 N C) 7.65 N D) 5.00 N
E) none of the above.

11. When **100 J** of heat is added to a system that performs **60 J** of work, the thermal energy change of the system is

A) 0 J B) 40 J C) 60 J D) 100 J E) none of the above.

Part 2:

Please read each of the following questions carefully and show your work in the space provided. Include the appropriate units in your answer.

P1. Water flows at a speed of **15 m/s** through a pipe that has a radius of **0.40 m**. The water then flows through a smaller pipe at a speed of **45 m/s**. What is the radius of the smaller pipe?

(1 point)

***Answer*_____**

P2. A raft with a length of **3.0 m**, a width of **1.5 m**, a thickness of **0.12 m**, and a density of **750.0 kg/m^3** is placed in a river. How far below the water's surface does the bottom of the raft sink? ***(2 points)***

***Answer*_____**

P3. A heat transfer of **9.5 x 10^5 J** is required to convert a block of ice at **-15 ^{0}C** to water at **15 ^{0}C**. What was the mass of the block of ice? ***(2 points)***

***Answer*_____**

Good Luck

Some Useful Constants:

g=10 m/s^2 ρ_{water} **= 1 gm/cm^3** α_{steel} **= 1.2 x 10^{-5} / K**

c_{water} = 4190 J/ kg. K = 1.0 cal/g.^{0}C = 4.186 J/g.^{0}C.

c_{iron} = 448 J/kg. K =0.11 cal/g.^{0}C = 0.448 J/g.^{0}C.

c_{ice} = 2095 J/ kg. K = 0.5 cal/g.^{0}C = 2.093 J/g.^{0}C.

$L_{fusion\ for\ water}$ = 80 cal/g = 33.5 x 10^4 J/kg

$L_{vaporization\ for\ water}$ = 540 cal/g = 22.6 x 10^5 J/kg.