**IB Physics**

**FA 10.1 - Fluid Statics**

Name

Show your work, round to the correct significant figures, circle your answers, and label them with units.

(1 atm = 1.013x105 Pa = 101.3 kPa = 14.7 psi = 760 Torr; 1 m3 = 1000 liters; pabsolute = pgauge + 1 atm; )

1. A circular porthole in an airplane has a diameter of 37.0 cm. If there is a pressure difference of 31,510 Pa from one side of the window to the other, what is the net force pushing out on the porthole? (3390 N)

2. A cannon ball has a density of 7820 kgm-3 and a mass of 23.2 kg. What is its radius if it is perfectly spherical?

(8.91 cm)

3. A hydraulic jack has an input piston diameter of 0.850 cm, and an output piston diameter of 4.50 cm. What force must you exert on the input piston to lift a 1210 kg car? (424 N )

4a. An empty beaker 8.20 cm in diameter is pushed 10.3 cm into mercury (ρ = 13.6x103 kg m-3). What is the net upward force on the bottom of the beaker? (Assume the pressure above the mercury is 1 atm) (72.6 N)

4b. What is the gauge pressure in PSI at a depth of 8.50 m in fresh water? (ρ = 1000. kg m-3) (12.1 PSI)

4c. At what depth in ocean water (ρ = 1025 kgm-3) is the absolute pressure 8320 Torr? (100. m)

5a. A cylinder has a radius of 0.920 cm and is 25.0 cm long. How far will it sink into a mixture with a density of 865 kg m-3 if it has a mass of 37.5 grams assuming it is weighted so it floats vertically? (16.3 cm )

5b. What upward force would you need to exert on a 11.5 kg piece of Murralite (ρ = 1666 kgm-3) submerged in the dead sea where the water has a density of 1240 kgm-3 to keep it from sinking? (28.8 N)

5c. A hot air balloon is 9.00 m in radius (assume it is spherical) and contains hot air with a mean density of 0.950 kgm-3. Calculate the lifting capacity (in N) of the hot air if it is surrounded by air with a density of 1.31 kgm-3 (10,784 N)