Homework 7

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Chapter 12:

30) v = pi \* 52 \* 10 = 785.398 cm3

d = m / v = 10000 / 785.398 = 12.732 g/cm3

31) m = d \* v = 400 \* 1 = 400 kg (No I can’t lift 400 kg).

44) As air in a rubber balloon is heated, its density decreases since its volume increases while its mass remains the same.

45) The density of the two objects will be the same as long as they are made of the same substance.

46) A liter of ice weighs less than a liter of water because as water is cooled and frozen, its volume increases. Therefore, if a liter of water is frozen, the resulting block of ice will be larger than one liter and some must be shaved off to decrease its size, decreasing the overall mass of the block of ice as well.

Chapter 13:

5) The pressure will be the same, as pressure is dependent upon depth rather than total volume of a liquid.

7) It is easier to lift an object under water because the water exerts a force on that object opposite to the force of gravity.

9) The volume of a completely submerged object is equal to the volume of water displaced.

14) The buoyant force on a submerged object is equal to the weight of the fluid displaced by the object.

16) The buoyant force on a submerged object depends on the volume of the object, not its weight, since the amount of fluid displaced by a submerged object depends on the volume of the object.

32) P = force/area = 2/50 = 1/25 N/cm2

34) P = weight density \* depth = 10000 \* 50 = 500,000 N/m2

38) P = f / a = 50 / 1 = 50 N/cm2 = 500 kPa

39) d = m / v = 12 / .002 = 6000 kg/m3. This is denser than water, since water has a density of 998 kg/m3.

42) (a) The buoyant force on the rock is 2 N.

(b) When the rock is suspended beneath the surface of the water, the scale will read 10 N.

(c) When the rock is resting on the bottom of the container, the scale will read 20 N.

44) Since the smaller piston has a surface area of about 3.14 cm2 and the larger piston has a surface area of about 28.27 cm2, the larger piston can exert about 28.27/3.14 times more force, or about 9 times more.