

AP Physics Fall 2013
Test 12

Name: _____

Short Answer	_____	30 pts
Problem 10	_____	13 pts
Problem 11	_____	7 pts
Problem 12	_____	14pts
Problem 13	_____	8pts
Problem 14	_____	28pts
Bonus	_____	18 pts
Total	_____	

Name: _____

6 pts **1.** State the two conditions (either in words or equations) that must be met for a rigid body to be in equilibrium

3 pts **2** State the definition of pressure (either in words or equation)

3 pts **3.** State the definition of density (either in words or equation)

3 pts **4.** State Pascal's Principle in words.

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3 pts **5.** State Archimedes' Principle in words.

3 pts **6.** State Pascal's Law (either in words or equation)

3pts **7.** Explain why a person can lie on a bed made up of hundreds of sharp nails and be unharmed, but the same person will have their foot puncture if they step on a single sharp nail.

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3 pts **8.** A small amount of water is boiled in a 1-gallon metal can. The can is removed from heat and the lid put on. Shortly thereafter the can collapses. Explain how this occurs?

3 pts **9.** Give an example (be specific including drawing a picture if necessary) where an object is not in equilibrium even though the net force upon the object is zero.

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13 pts **10.** A swimming pool is 10.0 m long and 4.0 m wide. The swimming pool is filled to a depth of 2.0 m.

4 pts **A.** What is the mass of the water?

5 pts **B.** What is the absolute pressure at the bottom of the pool?

4 pts **C.** What is the force on the bottom of the pool?

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7 pts

- 11.** The maximum gauge pressure in a hydraulic lift is 17.0 atm. What is the largest vehicle by mass that it can lift if the diameter of the output line is 28.0 cm?

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14 pts **12.** A cube with sides of 15 cm in length and a density of 0.65 g/cm^3 is floating in a fluid of density 0.85 g/cm^3 .

6 pts **A.** What is the buoyant force upon the object?

4 pts **B.** What percent of the object's volume was submerged?

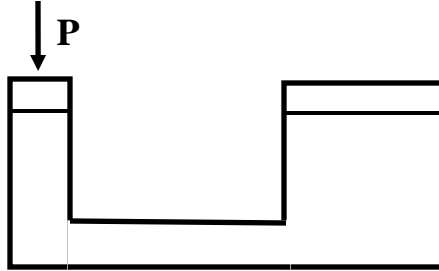
Name: _____

4 pts

C. What volume of fluid was displaced by the object?

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- 8 pts **13.** A hydraulic jack is shown below. The large piston's cross sectional area is 200 cm^2 and the small piston's cross sectional area is 5 cm^2 .



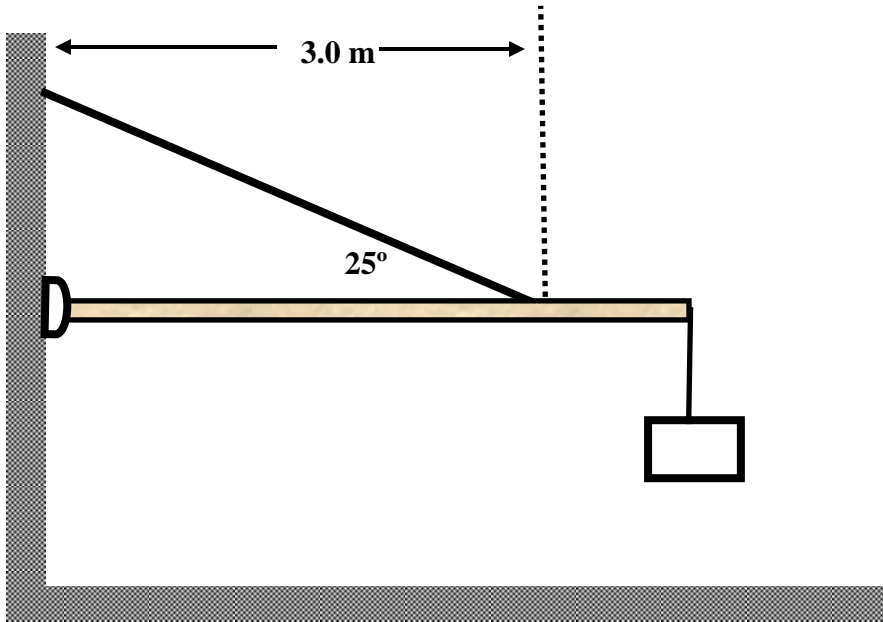
If a pressure of $45,000 \text{ Pa}$ is applied to the small piston,

- 3 pts **A.** what is the pressure at the large piston?

- 5 pts **B.** what is the force on the large piston?

Name: _____

- 28 pts 14. A uniform 1600 N beam of length 4.0 m is hinged at one end to the wall and held on the other end by a rope attached to the wall as shown below. A 700 N block is attached to the end of the beam by a second rope.



- 8 pts A. Draw proper Free Body Diagrams for the beam and the block.

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3 pts **B.** Find the tension in the rope holding the block.

6 pts **C.** Find the tension in the rope attached to the wall.

Name: _____

- 11 pts **D.** Find the magnitude and direction of the force applied by the hinge upon the beam?

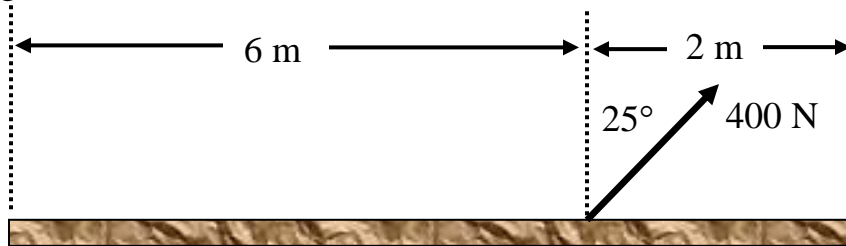
Name: _____

BONUS PROBLEMS

4 pts

1. What is the condition necessary for an object to float in a fluid?

2. Calculate the magnitude of the torque produced by the 400 N force applied to the bar as shown below for an axis perpendicular to the page at:



4 pts

- A. the left end of the bar

4 pts

- B. the right end of the bar

Name: _____

4 pts **3.** Give the value of 1.0 atmospheres in the following units:

A. bars

B. torr

2 pts **4.** An object has a density of 1250 kg/m^3 . What is its specific density?