

Total time: 1 hr Total Points: 10 pt**Student Name:**

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.

$$g = 9.8 \text{ m/s}^2 \quad F = ma \quad F_g = mg \quad F_{fr} = \mu F_N$$

$$\text{density} = \frac{\text{mass}}{\text{volume}} \quad \text{specific gravity} = \frac{\text{density}}{\text{water density}}$$

$$\text{stress} = \frac{F}{A} \quad \text{strain (relative stretch)} = \frac{\text{stretch}}{\text{length}}$$

$$\text{Hooke's Law for Elastic Springs} \quad F = (\text{stiffness}) \times (\text{stretch})$$

$$\text{Pressure} \quad P = \frac{F}{A}$$

1. A packing crate 2.50 m by 0.80 m by 0.45 m weighs 1.41×10^5 N. Find the stress (in kPa) exerted by the crate on the floor in each of its three possible positions.
2. A spring is stretched 12.0 in by a force of 30.0 lb. How far will it stretch if a force of 90.0 lb is applied?
3. A spring is stretched 24.0 in by a force of 54.0 lb. How far will it stretch if a force of 104 lb is applied?
4. A spring is stretched 24.0 in by a force of 48.0 lb. What force will stretch the spring 9.00 in?
5. An object has a specific gravity of 0.78. If you place it in water will it sink or float?
6. You apply a 50-lb force over 3.0 square inch area. What is the pressure in psi?
7. What force will create a 1000-Pa pressure over area of 2.0 m^2 ?

$$d = \frac{m}{V} \quad \text{buoyancy force} = \text{difference in weight measured in air and water (just as in lab)}$$

$$\text{hydrostatic pressure} = d_{\text{water}}(g)V_{\text{object}}$$

8. Find the density of a metal rectangular block with mass 380.0 g and dimensions 1.25 cm by 7.8 cm by 3.4 cm.
9. A rock of mass 10.8 kg displaces 3200 cm^3 of water when submerged. What is its density?
10. How much will be the absolute pressure at 10 m below the water surface?
11. You measure the mass of a rectangular block to be 200 g in air. You place it in water, and its mass appears to be only 85 g. How much is the buoyancy force of the water on the block?