✤ 1. The atmospheric pressure at sea level is about 1.0 x10^5 Pa. What is the force at sea level that air exerts on the top of a desk that is 152 cm long and 76 cm wide?

✤ 2. A car tire makes contact with the ground on a rectangular area of 12 cm by 18 cm. If the car's mass is 925 kg, what pressure does the car exert on the ground as it rests on all four tires?

✤ 3. A lead brick, 5.0 cm x10.0 cm x 20.0 cm, rests on the ground on its smallest face. Lead has a density of 11.8 g/cm^3. What pressure does the brick exert on the ground?

✤ 4. In a tornado, the pressure can be 15 percent below normal atmospheric pressure. Suppose that a tornado occurred outside a door that is 195 cm high and 91 cm wide.

- What net force would be exerted on the door by a sudden 15 percent drop in normal atmospheric pressure?
- In what direction would the force be exerted?

✤ 23. Dentists' chairs are examples of hydraulic-lift systems. If a chair weighs 1600 N and rests on a piston with a cross-sectional area of 1440 cm^2, what force must be applied to the smaller piston, with a cross-sectional area of 72 cm^2, to lift the chair?

✤ 24. A mechanic exerts a force of 55 N on a 0.015 m^2 hydraulic piston to lift a small automobile. The piston that the automobile sits on has an area of 2.4 m^2. What is the weight of the automobile?

✤ 25. By multiplying a force, a hydraulic system serves the same purpose as a lever or seesaw. If a 400-N child standing on one piston is balanced by a 1100-N adult standing on another piston, what is the ratio of the areas of their pistons?

✤ 26. In a machine shop, a hydraulic lift is used to raise heavy equipment for repairs. The system has a small piston with a cross-sectional area of 0.07 m^2 and a large piston with a cross-sectional area of 0.2 m^2. An engine weighing 2700 N rests on the large piston.

- a.What force must be applied to the small piston to lift the engine?
- b.If the engine rises 0.20 m, how far does the smaller piston move?

✤ 27. Common brick is about 1.8 times denser than water. What is the apparent weight of a 0.20 m^3 block of bricks under water?

✤ 28. A girl is floating in a freshwater lake with her head just above the water. If she weighs 610 N, what is the volume of the submerged part of her body?

✤ 29. What is the tension in a wire supporting a 1250-N camera submerged in water? The volume of the camera is 16.5 $x10^{-3}$ m^3.

✤ 31. Canoes often have plastic foam blocks mounted under the seats for flotation in case the canoe fills with water. What is the approximate minimum volume of foam needed for flotation for a 480 N canoe?

✤ 75. A 0.85-kg physics book with dimensions of 24.0 cm x 20.0 cm is at rest on a table.

- a.What force does the book apply to the table?
- b.What pressure does the book apply?

✤ 76. A 75-kg solid cylinder that is 2.5 m long and has an end radius of 7.0 cm stands on one end. How much pressure does it exert?

✤ 82. A reservoir behind a dam is 17-m deep. What is the pressure of the water at the following locations?

- a. the base of the dam
- b. 4.0 m from the top of the dam

✤ 83. A test tube standing vertically in a test-tube rack contains 2.5 cm of oil (ρ = 0.81 g/cm^3) and 6.5 cm of water. What is the pressure exerted by the two liquids on the bottom of the test tube?

✤ 86.What is the size of the buoyant force on a 26.0 N ball that is floating in fresh water?

✤ 87. What is the apparent weight of a rock submerged in water if the rock weighs 45 N in air and has a volume of 2.1 x 10^{-3} m^3?

✤ 88. What is the maximum weight that a balloon filled with 1.00 m^3 of helium can lift in air? Assume that the density of air is 1.20 kg/m^3 and that of helium is 0.177 kg/m^3. Neglect the mass of the balloon.