15. A small wooden boat floats in a swimming pool, and the level of the water at the edge of the pool is marked. Consider the following situations and explain whether the level of the water will rise, fall, or stay the same. (*a*) The boat is removed from the water. (*b*) The boat in the water holds an iron anchor which is removed from the boat and placed on the shore. (*c*) The iron anchor is removed from the boat and dropped in the pool.
16. Why do you float higher in salt water than in fresh?
17. If you dangle two pieces of paper vertically, a few inches apart (Fig. 10–46), and blow between them, how do you think the papers will move? Try it and see. Explain.

FIGURE 10–46
Question 17.

18. Why does the canvas top of a convertible bulge out when the car is traveling at high speed? [*Hint*: the windshield deflects air upward, pushing streamlines closer together.]
19. Roofs of houses are sometimes "blown" off (or are they pushed off?) during a tornado or hurricane. Explain, using Bernoulli's principle.
20. Children are told to avoid standing too close to a rapidly moving train because they might get sucked under it. Is this possible? Explain.
21. A tall Styrofoam cup is filled with water. Two holes are punched in the cup near the bottom, and water begins rushing out. If the cup is dropped so it falls freely, will the water continue to flow from the holes? Explain.
22. Why do airplanes normally take off into the wind?
23. Why does the stream of water from a faucet become narrower as it falls (Fig. 10–47)?

FIGURE 10–47
Question 23 and Problem 82.
Water coming from a faucet.

24. Two ships moving in parallel paths close to one another risk colliding. Why?

Problems

10–2 Density and Specific Gravity

1. (I) The approximate volume of the granite monolith known as El Capitan in Yosemite National Park (Fig. 10–48) is about $10^8\,m^3$. What is its approximate mass?

FIGURE 10–48 Problem 1.

2. (I) What is the approximate mass of air in a living room $4.8\,m \times 3.8\,m \times 2.8\,m$?
3. (I) If you tried to smuggle gold bricks by filling your backpack, whose dimensions are $60\,cm \times 28\,cm \times 18\,cm$, what would its mass be?
4. (I) State your mass and then estimate your volume. [*Hint*: Because you can swim on or just under the surface of the water in a swimming pool, you have a pretty good idea of your density.]
5. (II) A bottle has a mass of 35.00 g when empty and 98.44 g when filled with water. When filled with another fluid, the mass is 88.78 g. What is the specific gravity of this other fluid?
6. (II) If 5.0 L of antifreeze solution (specific gravity = 0.80) is added to 4.0 L of water to make a 9.0-L mixture, what is the specific gravity of the mixture?

10–3 to 10–6 Pressure; Pascal's Principle

7. (I) Estimate the pressure exerted on a floor by (*a*) one pointed chair leg (60 kg on all four legs) of area = $0.020\,cm^2$, and (*b*) a 1500-kg elephant standing on one foot (area = $800\,cm^2$).
8. (I) What is the difference in blood pressure (mm-Hg) between the top of the head and bottom of the feet of a 1.60-m-tall person standing vertically?
9. (I) (*a*) Calculate the total force of the atmosphere acting on the top of a table that measures $1.6\,m \times 2.9\,m$. (*b*) What is the total force acting upward on the underside of the table?
10. (II) In a movie, Tarzan evades his captors by hiding underwater for many minutes while breathing through a long, thin reed. Assuming the maximum pressure difference his lungs can manage and still breathe is −85 mm-Hg, calculate the deepest he could have been.
11. (II) The gauge pressure in each of the four tires of an automobile is 240 kPa. If each tire has a "footprint" of $220\,cm^2$, estimate the mass of the car.
12. (II) The maximum gauge pressure in a hydraulic lift is 17.0 atm. What is the largest size vehicle (kg) it can lift if the diameter of the output line is 28.0 cm?
13. (II) How high would the level be in an alcohol barometer at normal atmospheric pressure?
14. (II) (*a*) What are the total force and the absolute pressure on the bottom of a swimming pool 22.0 m by 8.5 m whose uniform depth is 2.0 m? (*b*) What will be the pressure against the *side* of the pool near the bottom?