2. We approximate the thickness of the atmosphere by using $P = P_0 + \rho g h$ with $P_0 = 0$ at the top of the atmosphere and $P = 1$ atm at sea level. This gives an approximation of

$$h = \frac{P - P_0}{\rho g} \sim \frac{10^5 \text{ Pa} - 0}{\left(1 \text{ kg/m}^3\right)\left(10^1 \text{ m/s}^2\right)} = 10^4 \text{ m} \qquad \text{or} \qquad h \sim 10 \text{ km}$$

Because both the density of the air, ρ, and the acceleration of gravity, g, decrease with altitude, the actual thickness of the atmosphere will be greater than our estimate.

4. Both must have the same strength. The force on the back of each dam is the average pressure of the water times the area of the dam. If both reservoirs are equally deep, the force is the same.

6. The external pressure exerted on the chest by the water makes it difficult to expand the chest cavity and take a breath while under water. Thus, a snorkel will not work in deep water.

8. A fan driven by the motor removes air and hence decreases the pressure inside the cleaner. The greater air pressure outside the cleaner pushes air in through the nozzle toward this region of lower pressure. This inward rush of air pushes or carries the dirt along with it.

10. The water level on the side of the glass stays the same. The floating ice cube displaces its own weight of liquid water, and so does the liquid water into which it melts.

12. The higher the density of a fluid, the higher an object will float in it. Thus, an object will float lower in low density alcohol.

14. A breeze from any direction speeds up to go over the mound, and the air pressure drops at this opening. Air then flows through the burrow from the lower to the upper entrance.