Solutions

Each answer shows the steps, then the **result**.

2.1

- $p = F/A$

$$p = \frac{200\text{ N}}{0.50\text{ m}^2} = \mathbf{400}\text{ Pa}$$

2.2

- its edge has a very small area, so the same force gives a very large pressure

2.3

- $p = F/A$

$$p = \frac{60\text{ N}}{0.25\text{ m}^2} = \mathbf{240}\text{ Pa}$$

2.4

$$A = \frac{20\text{ cm}^2}{10\,000} = \mathbf{0.0020}\text{ m}^{\mathbf{2}}$$

3.1 C

- liquid pressure increases with both depth and density

3.2

(a) $\Delta p = \rho g \Delta h$

$$\Delta p = (1030\text{ kg/m}^3)(10\text{ N/kg})(15\text{ m}) = \mathbf{154\,500}\text{ Pa}$$

(b) in all directions

3.3

- $p = F/A$

$$p = \frac{240\text{ N}}{0.30\text{ m}^2} = \mathbf{800}\text{ Pa}$$

3.4

(a) $\Delta p = \rho g \Delta h$

$$\Delta p = (1000\text{ kg/m}^3)(10\text{ N/kg})(1.5\text{ m}) = \mathbf{15\,000}\text{ Pa}$$

(b) $F = pA$

$$F = (15\,000\text{ Pa})(3.0\text{ m}^2) = \mathbf{45\,000}\text{ N}$$

(c) the pressure is the same

- because $\Delta p = \rho g \Delta h$ depends only on the depth and the density, not on the area or shape of the container

(d) area $= 50 \text{ cm} \times 30 \text{ cm} = 1500 \text{ cm}^2 = 0.15 \text{ m}^2$

- $p = F/A$

$$p = \frac{750 \text{ N}}{0.15 \text{ m}^2} = \mathbf{5000} \text{ Pa}$$

(e) the pressure in the water increases with depth

- so the wall must be thicker at the bottom to withstand the greater outward force there