

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

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

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

- $p = F/A$

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

- (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