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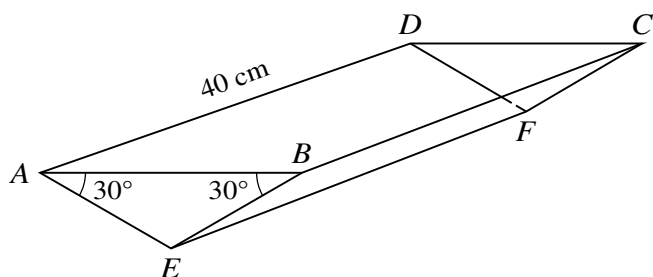


Fig. 1

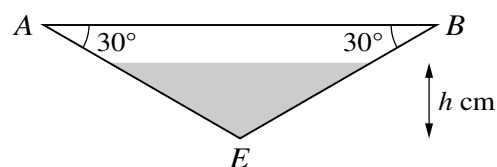


Fig. 2

Fig. 1 shows an open tank in the shape of a triangular prism. The vertical ends ABE and DCF are identical isosceles triangles. Angle $ABE = \text{angle } BAE = 30^\circ$. The length of AD is 40 cm. The tank is fixed in position with the open top $ABCD$ horizontal. Water is poured into the tank at a constant rate of $200 \text{ cm}^3 \text{ s}^{-1}$. The depth of water, t seconds after filling starts, is h cm (see Fig. 2).

- (i) Show that, when the depth of water in the tank is h cm, the volume, $V \text{ cm}^3$, of water in the tank is given by $V = (40\sqrt{3})h^2$. [3]
- (ii) Find the rate at which h is increasing when $h = 5$. [3]