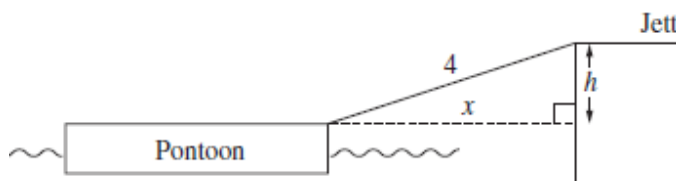




- TG 1** A ferry wharf consists of a floating pontoon linked to a jetty by a 4 metre long walkway. Let h metres be the difference in height between the top of the pontoon and the top of the jetty and let x metres be the horizontal distance between the pontoon and the jetty.



- (i) Find an expression for x in terms of h . **1**
- (ii) When the top of the pontoon is 1 metre lower than the top of the jetty, the tide is rising at a rate of 0.3 metres per hour. **3**
At what rate is the pontoon moving away from the jetty?

$$(i) \quad x^2 = 16 - h^2$$

$$x = \sqrt{16 - h^2}$$

$$\frac{dx}{dh}(1) = \frac{-1}{\sqrt{16 - 1^2}}$$

$$= \frac{-1}{\sqrt{15}}$$

$$(ii) \quad h = 1, \quad \frac{dh}{dt} = -0.3$$

$$x = (16 - h^2)^{\frac{1}{2}}$$

$$\frac{dx}{dh} = \frac{1}{2}(16 - h^2)^{-\frac{1}{2}} \cdot -2h$$

$$= \frac{-h}{\sqrt{16 - h^2}}$$

$$\frac{dx}{dt} = \frac{dx}{dh} \times \frac{dh}{dt}$$

$$= \frac{-1}{\sqrt{15}} \times -0.3$$

$$= 0.077 \text{ (3 dec pl)}$$

\therefore pontoon moving away at 0.077 m/h

* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

Want **Mathematics Extension 1** Topic Revision?

Go to our [MathsFit](#) page for downloads @ \$2.95 each