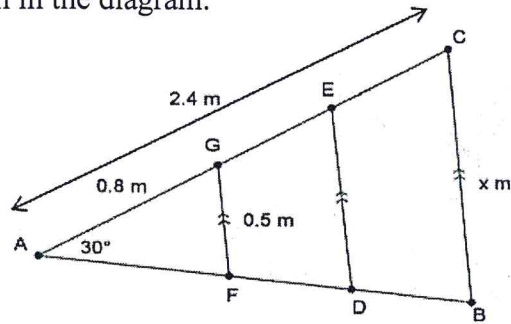


## 2D Summative/ Exam Review

1. Roof trusses are being constructed as shown in the diagram.  
Determine the value of  $x$ .

$\angle CAB = \angle GAF$  same angle  
 $\angle ABC = \angle AFG$  PLT  
 $\therefore \triangle ABC \sim \triangle AFG$  AA~  
 then  $\frac{x}{0.5} = \frac{2.4}{0.8}$   
 $x = 1.5$



2. Define and sketch an example of:  
a) angle of elevation

Compared to the horizontal how far you look up



- b) angle of depression

Compared to the horizontal how far you look down



3. A ladder must reach 6 metres up a wall and pass over a fence. The fence is 1.5 metres in height and 3 metres from the wall. Determine the length of the ladder.

Could use similar triangles or trig...

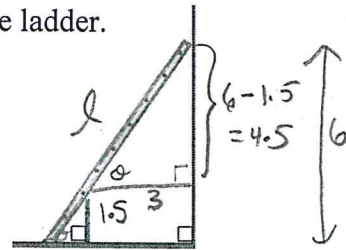
$$\tan \theta = \frac{4.5}{3}$$

$$\theta = 56^\circ$$

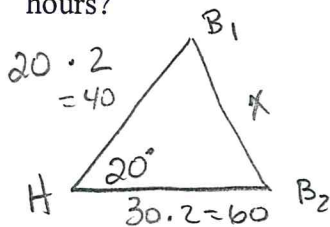
$$\sin 56^\circ = \frac{6}{l}$$

$$l = \frac{6}{\sin 56^\circ}$$

$l = 7.2$   
 $\therefore$  the ladder is approx 7.2 m



4. Two boats leave a harbour at the same time in directions that are  $20^\circ$  apart. If one is travelling at 20 km/h and the other at 30 km/h, how far apart are they after two hours?



$$x^2 = 40^2 + 60^2 - 2(40)(60)\cos 20^\circ$$

$$= 689.48$$

$$x = 26.3$$

$\therefore$  the boats are approx 26.3 km apart.

5. Ahmed, Bonnie and Clyde are located at  $A(0, 4)$ ,  $B(3, 5)$  and  $C(7, -1)$  respectively. They agree to meet at their truck located halfway between Bonnie and Clyde. Determine the distance Ahmed must travel to reach the truck. Note: each unit on the grid represents 1 km.

$$M_{BC} = \left( \frac{3+7}{2}, \frac{5+(-1)}{2} \right)$$

$$= (5, 2)$$

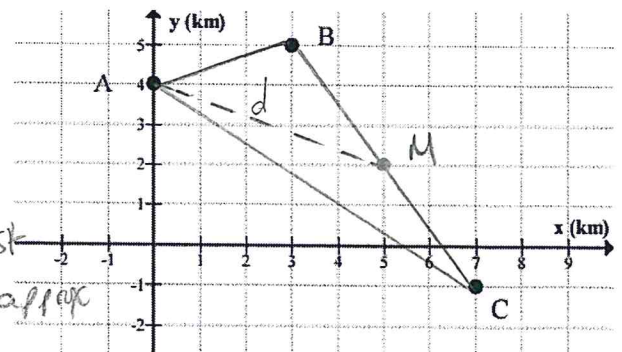
$$d = \sqrt{(0-5)^2 + (4-2)^2}$$

$$= \sqrt{25+4}$$

$$= \sqrt{29}$$

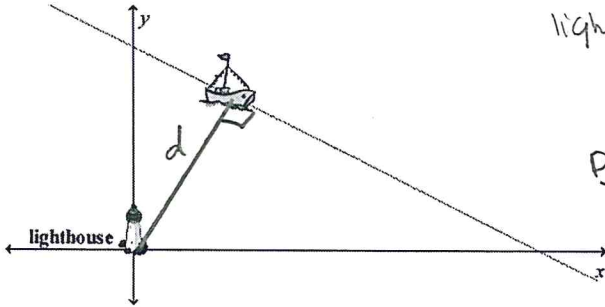
$$\approx 5.4$$

$\therefore$  he must travel approx 5.4 km



$$m = -\frac{1}{2}$$

6. A boat is travelling on a path defined by  $y = -\frac{1}{2}x + \frac{17}{2}$  where x and y are measured in kilometres. A lighthouse, located at the origin, can detect boats up to 8 km away. Determine if the boat gets close enough to the lighthouse to be detected.



Shortest distance  $\perp$   $\therefore m_{\perp} = 2$   
 light house @ (0,0)  $b = 0$   
 eqn  $y = 2x$

POI  $2x = -\frac{1}{2}x + \frac{17}{2}$       DISTANCE FROM (0,0) TO P.O.I  
 $\frac{5}{2}x = \frac{17}{2}$   
 $x = \frac{34}{10}$   
 $= 3.4$   $\therefore$  P.O.I

$d = \sqrt{3.4^2 + 6.8^2}$   
 $= \sqrt{57.8}$   
 $\approx 7.6$   
 since  $7.6 < 8$   
 yes the boat will be detected

7. Determine the key features of the parabola with equation  $y = x^2 + 2x - 8$

Factor  
 $y = (x-2)(x+4)$   
 $\therefore$  zeroes are 2 and -4

or change to vertex form + isolate

Vertex  
 $y = (x+1)^2 - 9$  Complete sq.  
 vertex (-1, -9)

or look halfway between zeros

Y int  
 (0, -8)  
 $\hookrightarrow$  Sympt: (-2, -8)

8. a) A stream of water flowing out of a hose can be modelled by the equation  $y = -\frac{1}{6}(x+1)(x-11)$ , where y is the height of the water, in metres above the ground, and x is the horizontal distance from the hose, in metres. The fireman climbs up the inclined ladder so that the peak of the stream is now 4 metres further horizontally and 2 metres higher. How far can the water stream now reach?

① vertex from graph (5, 6)

Vertex form  $y = -\frac{1}{6}(x-5)^2 + 6$

(\*Same "a")

② Transform  $y = -\frac{1}{6}(x-9)^2 + 8$

no.

④  $\therefore$  the water will reach 15.93m

b) What other question(s) could be asked given this scenario?

- State the equation of the ladder after it was raised.
- What is the new angle of elevation of the ladder?

③ New zeros  $-\frac{1}{6}(x-9)^2 + 8 = 0$

$(x-9)^2 = 48$   
 $x = 9 \pm \sqrt{48}$

then  $x = 2.07$  OR  $15.93$   
 inadmiss (close)