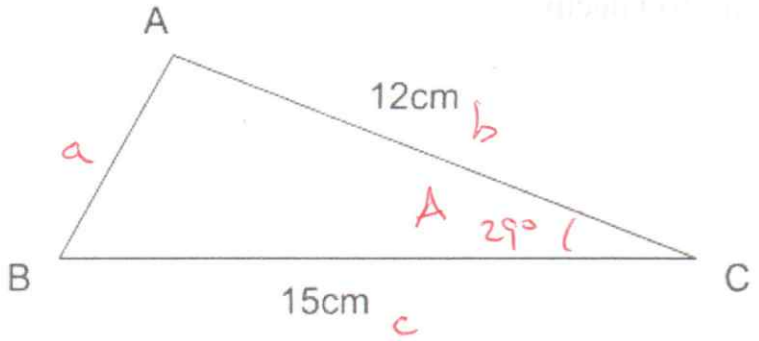
SeaHawk Tutors

Yr 11 Maths Sept Mock

1. In the triangle below, angle ACB is 29°. Find the length of AB. Give your answer to 3sf.



[3]

$a^2 = b^2 + c^2 - 2bc\cos A$

$= 12^2 + 15^2 - 2.12.15.\cos(29)$ (M1) for attempt at substitution in cosine rule

$= 54.14$

$a = \sqrt{54.14}$ (M1)

$= 7.358$

$= 7.36\text{ cm}$ (A1)

2. Line L has equation $3y - 2x = 13$. Line M has equation $y = 1.5x - 3$. Do lines L and M intersect? [2]

$L: 3y - 2x = 13 \Rightarrow 3y = 2x + 13$

$\Rightarrow y = \frac{2}{3}x + \frac{13}{3}$ $M_L = \frac{2}{3}$ (M1)

$M: y = 1.5x - 3$ $M_M = \frac{3}{2}$

$\therefore$ Not Parallel $\therefore$ THEY DO INTERSECT (A1)

3.

a. Factorise: $x^2 + 10x + 24$ [2]

$(x+4)(x+6)$ A1

24

1 24
2 12
3 8
4 6 M1

b. Solve, giving your answer to 1 decimal place:

$7x^2 - 8x - 13 = 0$ [3]

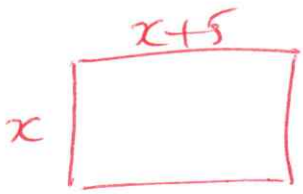
$a=7 \quad b=-8 \quad c=-13$

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ M1

$= \frac{8 \pm \sqrt{(-8)^2 - 4.(-13)(7)}}{2 \times 7}$ M1 for correct substitution

$= \frac{8 \pm \sqrt{428}}{14} = 2.0 \text{ or } -0.9$ A1 for both correct

c. A rectangle has sides x and $x+5$. The area of the rectangle is 36cm². By creating and solving a quadratic equation, find the value of x. You must show your working. [4]



Area $= x(x+5) = 36$ M1

$x^2 + 5x = 36$

$x^2 + 5x - 36 = 0$ M1

$(x+9)(x-4) = 0$ M1

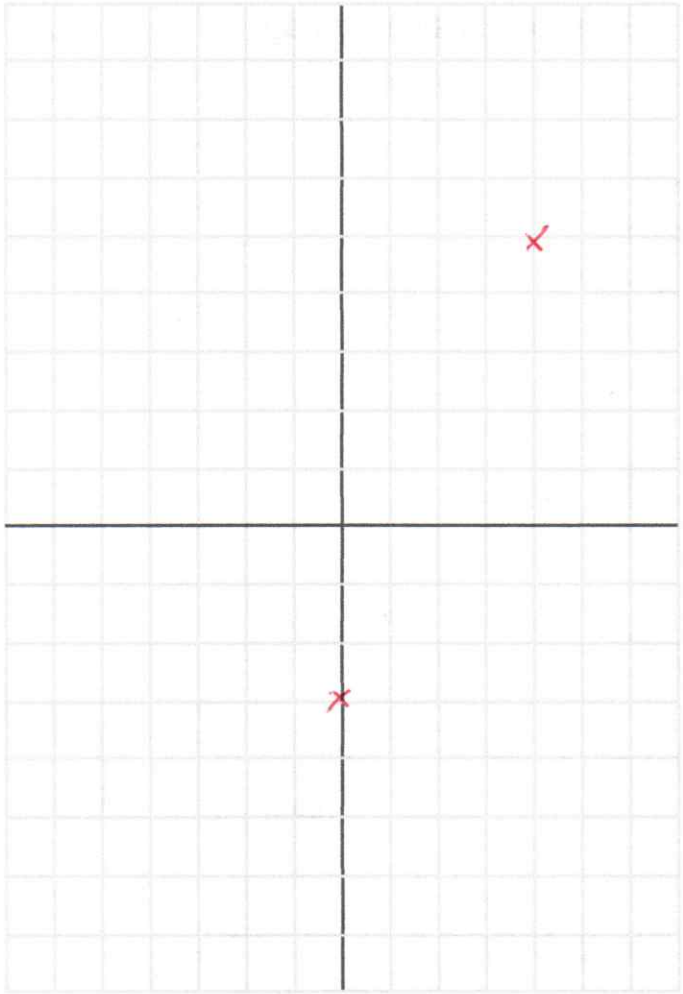
$x = 4 \text{ or } -9$

$x = 4\text{cm}$ A1

36

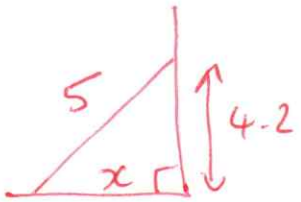
1 36
2 18
3 12
4 9
6 6

4. Plot a graph of the equation $y = 2x - 3$ for the range of x from -3 to 4. [3]



x	-3	0	4
y	-9	-3	5

5. A 5m long ladder is placed up against a vertical wall. The top of the ladder reaches a point 4.2m up the wall. The ground is flat and at right angles to the wall.
   a. To the nearest 0.1m, how far is the bottom of the ladder from the base of the wall? [2]

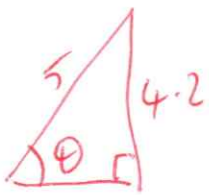


$x^2 = 5^2 - 4.2^2$ (M1)

$x = \sqrt{7.36}$

$= 2.7\text{m}$ (A1)

   b. The ladder is considered safe if the angle it makes with the ground is no more than 60°. Is the ladder safe as set up? You must show your working. [3]

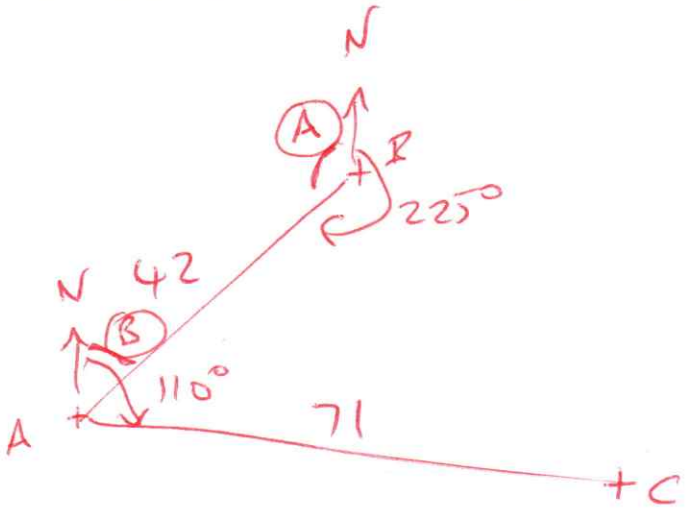


$\sin\theta = \frac{4.2}{5}$ (M1)

$\theta = \sin^{-1}\left(\frac{4.2}{5}\right)$

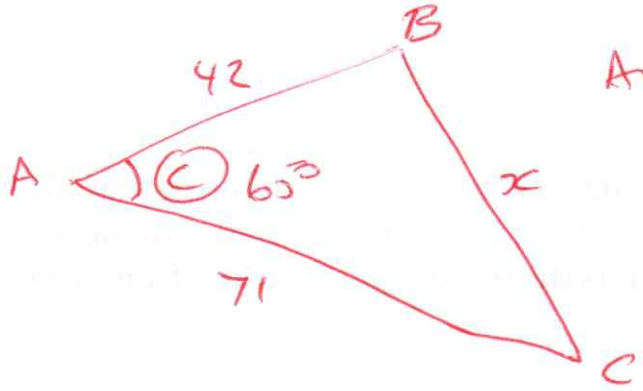
$= 57.10°$ (M1) $< 60°$ ∴ YES SAFE (A1)

6. Ashford is on a bearing of 225° from Bristholm. The distance between them is 42km. Cliftonhead is 71km away from Ashford on a bearing of 110°. Find the distance from Bristholm to Cliftonhead. Give your answer to 1 dp. [4]



Angle (A) $360 - 225 = 135°$

Angle (B) $180 - (A) = 180 - 135 = 45°$ (M1) for angle at bearing A from B



Angle (C) $= 110 - (B)$
$= 110 - 45$
$= 65°$ (M1) for correct △

Use cosine rule:

$x^2 = 42^2 + 71^2 - 2 \times 42 \times 71 \times \cos 65$ (M1)

$= 4285$

$x = \sqrt{4285} = 65.5\text{ km}$ (A1)

7. Line L has equation $3y - 2x = 13$. Line M is perpendicular to L and passes through the point (1, 10). Find the equation of M. [4]

L: $3y - 2x = 13 \Rightarrow 3y = 2x + 13$

$\Rightarrow y = \frac{2}{3}x + \frac{13}{3}$

Gradient of L $= \frac{2}{3}$ (M1)

$\Rightarrow$ Gradient of M $= \frac{-1}{2/3} = \frac{-3}{2}$ (M1)

M: $y = \frac{-3}{2}x + c$ (1, 10)

$\Rightarrow 10 = \frac{-3}{2}(1) + c$

$\Rightarrow 10 = \frac{-3}{2} + c$

$\Rightarrow c = 11.5$

(M1) for attempt to find c, using their gradient

$y = \frac{-3}{2}x + 11\frac{1}{2}$ oe (A1)