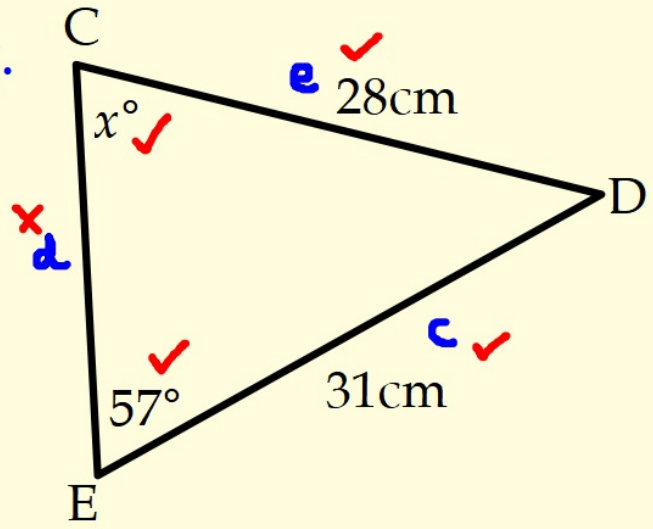
Further Trigonometry

LI: to be able to select the correct rule to solve a triangle

We will use the COSINE rule if all three sides are known by the end of our calculation. Otherwise, it will be the sine rule.

e.g.



- choose formula
- label triangle
- write formula
- subsitute
- rearrange/simplify
- solve

3 sides at end?

No → sine rule.

$$\frac{c}{\sin C} = \frac{d}{\sin D} = \frac{e}{\sin E}$$

$$\frac{\sin C}{c} = \frac{\sin E}{e}.$$

$$\frac{\sin x^\circ}{31} = \frac{\sin 57^\circ}{28}$$

$$\sin x^\circ = \frac{31 \sin 57^\circ}{28}$$

$$= 0.9285\ldots$$

$$x = \sin^{-1}(0.9285) = 68.2^\circ.$$

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Sine & Cosine Rules

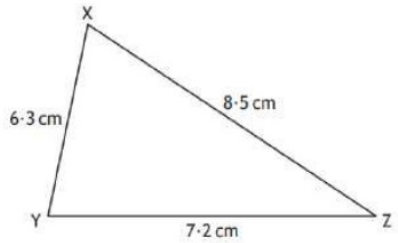
N5 Maths Exam Questions

Sine rule $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$

Cosine rule $a^2=b^2+c^2-2bc\cos A$ or $\cos A=\frac{b^2+c^2-a^2}{2bc}$

Source: 2019 P2 Q7 N5 Maths

(1) Triangle XYZ is shown below.



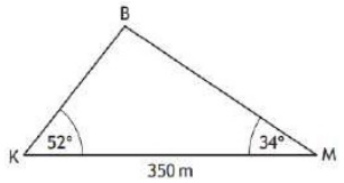
Calculate the size of the smallest angle in triangle XYZ.

Answer: $Angle = 46.406°$

Source: 2019 P2 Q19 N5 Maths

(2) Katy and Mona are looking up at a hot-air balloon.

In the diagram below, K, M and B represent the positions of Katy, Mona and the balloon respectively.



- The angle of elevation of the balloon from Katy is 52°
- The angle of elevation of the balloon from Mona is 34°
- Katy and Mona are 350 metres apart on level ground

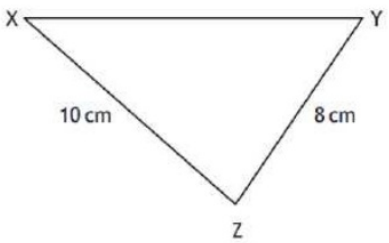
Calculate the height of the hot-air balloon above the ground.

Answer: $Height = 154.6\ m$

Source: 2018 P1 Q10 N5 Maths

(3) In triangle XYZ:

- XZ = 10 centimetres
- YZ = 8 centimetres
- $\cos Z = \frac{1}{8}$.



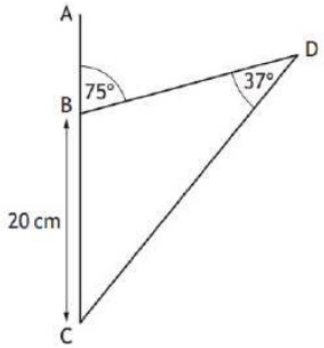
Calculate the length of XY.

Answer: $Length\,XY = 12\,cm$

Source: 2018 P2 Q9 N5 Maths

(4) In this diagram:

- angle ABD = 75°
- angle BDC = 37°
- BC = 20 centimetres.

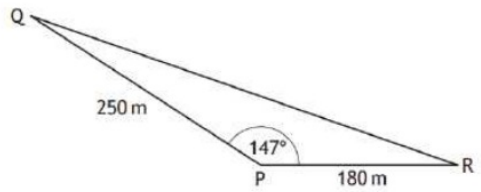


Calculate the length of DC.

Answer: $DC = 32.1\,cm$

Source: 2017 P2 Q3 N5 Maths

(5) A piece of land is in the shape of a triangle as shown.



- PQ = 250 metres
- PR = 180 metres
- angle QPR = 147°

The owner wishes to build a fence along the side QR.

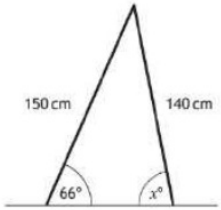
Calculate the length of the fence.

Answer: $Length\ of\ fence = 413\ metres$

Source: 2016 P2 Q8 N5 Maths

(6) A set of stepladders has legs 150 centimetres and 140 centimetres long.

When the stepladder is fully open, the angle between the longer leg and the ground is 66°.



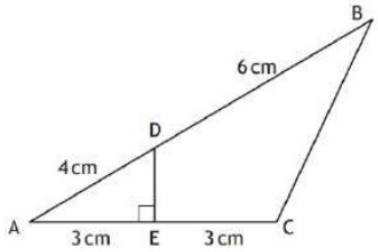
Calculate $x°$, the size of the angle between the shorter leg and the ground.

Answer: $x = 7.8°$

Source: 2016 P2 Q16 N5 Maths

(7) In the diagram below:

- DE is perpendicular to AC.
- AD = 4 centimetres.
- DB = 6 centimetres.
- AE = EC = 3 centimetres.



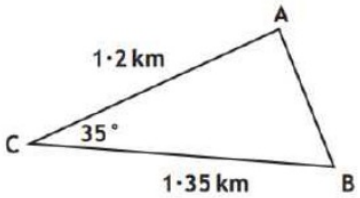
Calculate the length of BC.

Give your answer correct to one decimal place.

Answer: $BC = 6.8\ cm$

Source: 2015 P2 Q3 N5 Maths

(8) Triangle ABC is shown below.

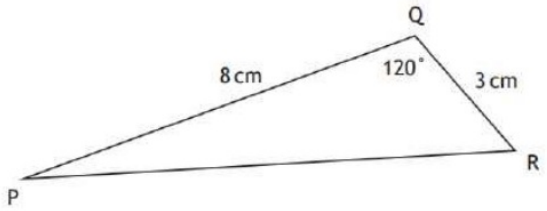


Calculate the length of AB.

Answer: $AB = 0.78\ km$

Source: Specimen P2 Q5 N5 Maths

(9) In triangle PQR, PQ = 8 centimetres, QR = 3 centimetres and angle PQR = 120°.



Calculate the length of PR.

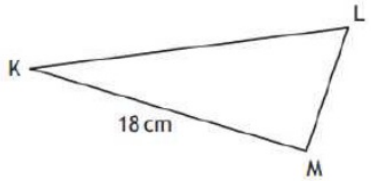
Answer: $PR = 9.8\ cm$

Source: 2014 P1 Q5 N5 Maths

(10) In triangle KLM

- KM = 18 centimetres
- sin K = 0·4
- sin L = 0·9

Calculate the length of LM.



Answer: $LM = 8\ cm$