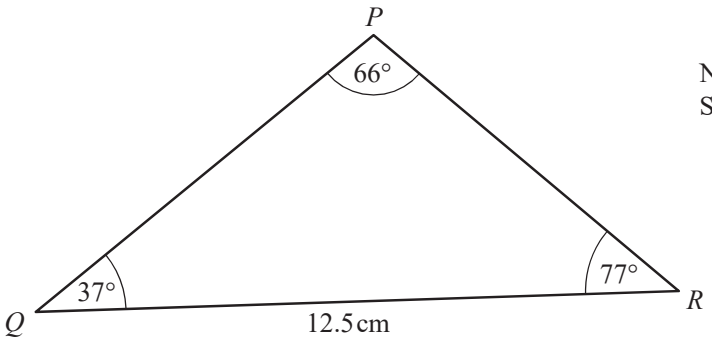
EXAM PAPERS PRACTICE

Sine & Cosine Rules

Model Answer

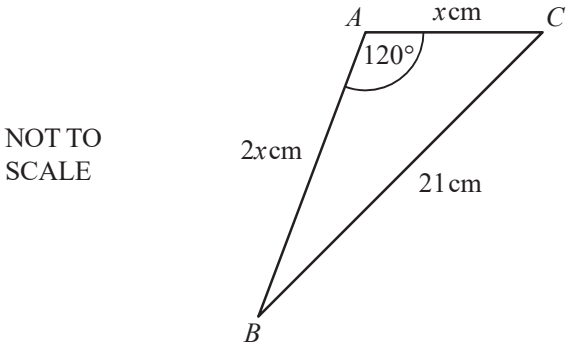


NOT TO SCALE

Calculate PR. [3]

$$\frac{PR}{\sin PQR} = \frac{QR}{\sin 2QPR}$$
$$\frac{PR}{\sin 37°} = \frac{12,5°}{\sin 66°}$$
$$PR = 8,2$$

Question 2



NOT TO SCALE

In triangle ABC, $AB = 2x$ cm, $AC = x$ cm, $BC = 21$ cm and angle $BAC = 120°$.
Calculate the value of x.

Since $\angle BAC = 120°$

As we can sec that -

$$\therefore \angle ABD =$$
$$\angle BDC = 90°$$
$$\angle BAD = 180° - \angle BAC$$
$$= 180° - 120°$$
$$= 60°$$

$$Co(\angle BAD) = \frac{AD}{AB}$$
$$\Rightarrow AC0° = \frac{AD}{AB}$$
$$\frac{1}{2} = \frac{AD}{2\times}$$
$$AD = \frac{2X}{2}$$
$$\Rightarrow \quad AD = \times Cm$$
$$\sin(\angle BAD) = \frac{BD}{AB}$$
$$Sin60° = \frac{BD}{2\times}$$
$$\Rightarrow \frac{\sqrt{3}}{2} = \frac{BD}{2\times}$$
$$BD = \frac{\sqrt{3}(2\times)}{2}$$
$$\Rightarrow \quad BD = \sqrt{3} \times \text{ cm}$$

now, in $\triangle BCD$

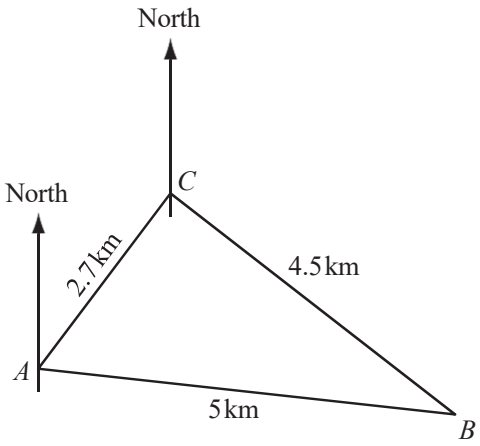
$$\text{Hypokmac} = BCD$$
$$\Rightarrow \quad BC^2 = BD^2 + CD^2$$
$$\Rightarrow \quad 21^2 = (\sqrt{3}x)^2 + (2x)^2$$
$$\Rightarrow \quad 441 = 3x^2 + 4x^2$$
$$\Rightarrow \quad 441 = 7x^2$$
$$\Rightarrow \quad 7x^2 = 441$$
$$\Rightarrow \quad x^2 = \frac{441}{7}$$
$$\Rightarrow \quad x^2 = 63$$
$$\Rightarrow \quad x = \pm\sqrt{63}$$
$$x = \pm 3\sqrt{7}$$

Since, length cannot be negetive

so, $x = 3\sqrt{7}$

Therefore x cm $= 3\sqrt{7}$ cm.

[3]



NOT TO SCALE

The diagram shows 3 ships A, B and C at sea.

$AB = 5$ km, $BC = 4.5$ km and $AC = 2.7$ km.

(a) Calculate angle ACB.

Show all your working. [4]

$$c^2 = a^2 + b^2 - 2ab\cos c$$

$$\cos c = \frac{a^2+b^2-c^2}{2ab}$$

$$\cos c = \frac{(4.5)^2+(2.7)^2-(5)^2}{2\times4.5\times2.7}$$

$$\cos c = \frac{20.25+7.29-25}{24.3} = \frac{2.54}{24.3}$$

$$\cos c = 0.10453$$

$$c = \cos^{-1}(0.10453) = 84°$$

Hence $\angle ACB = 84°$

(b) The bearing of A from C is 220°.

Calculate the bearing of B from C. [1]

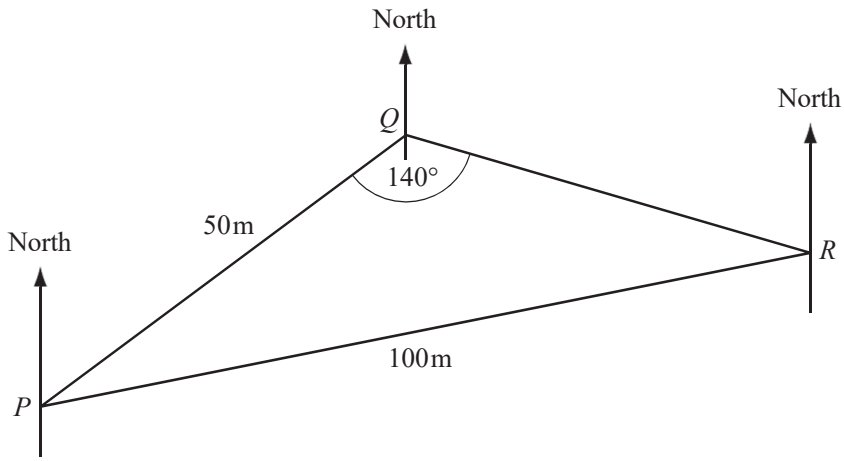
$\therefore \angle ACD = 220° - 180° = 40°$

$\because \angle ACB = 84°$

$\therefore \angle DCB = 84° - 40° = 44°$

$\therefore 180° - 44° = 136°$

$\therefore B$ from C is 136°



NOT TO SCALE

The diagram shows three points P, Q and R on horizontal ground.

PQ = 50 m, PR = 100 m and angle PQR = 140°.

(a) Calculate angle PRQ. [3]

In triangle PQR.

$\frac{PQ}{\sin PRQ} = \frac{PR}{\sin PQR}$

{Sine law }

$$\frac{50}{\sin PRQ} = \frac{100}{\sin 140^\circ}$$

$$\frac{1}{\sin PRQ} = \frac{2}{\sin 140^\circ}$$

$$\sin PRQ = \frac{\sin 140^\circ}{2}$$

$$\approx \frac{0.980}{2}$$

$$= 0.49$$

so $PRQ \approx 29.34^\circ$

(b) The bearing of R from Q is 100°.

Find the bearing of P from R. [2]

A triangle has sides of length 2 cm, 8 cm and 9 cm.

Calculate the value of the largest angle in this triangle. [4]

$\{$ Cosine theorem $\}$

$AB^2 = AC^2 + BC^2 - 2AC \cdot BC \cdot \cos C$

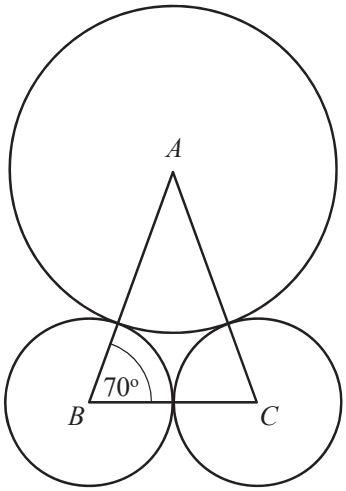
$81 = 64 + 4 - 2 \cdot 8 \cdot 2 \cdot \cos C$

$81 = 68 - 32 \cos C$

$32 \cos C = -13$

$\cos C = \frac{-13}{32}$

$C = \arccos\left(\frac{-13}{32}\right) = 113.97°$



NOT TO SCALE

The diagram shows three touching circles.
A is the centre of a circle of radius x centimetres.
B and C are the centres of circles of radius 3.8 centimetres. Angle $ABC = 70°$.
Find the value of x. [3]

$AB = AC.$

$\angle BAC = 40°$

$\cos 40° = \frac{AB^2+AC^2-BC^2}{2AB \cdot AC}$

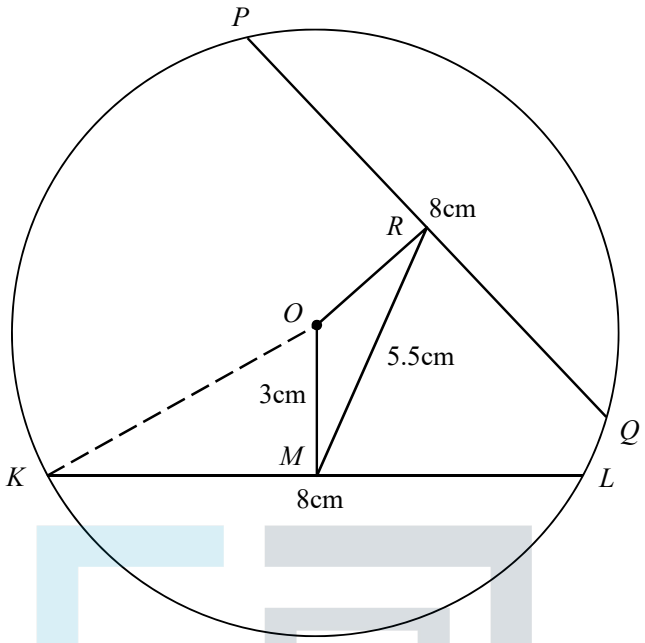
$\therefore BC = 2 \times 3.8 = 7.6.$

$AB = AC = x + 3.8.$

$\therefore \cos 40° = \frac{(x+3.8)^2 \cdot 2 - 7.6^2}{2(x+3.8)^2},$

$x \approx 7.31$

NOT TO SCALE



In the circle, centre O, the chords KL and PQ are each of length 8 cm.
M is the mid-point of KL and R is the mid-point of PQ. $OM = 3$ cm.

(a) Calculate the length of OK.

The length of OK is 5 cm.

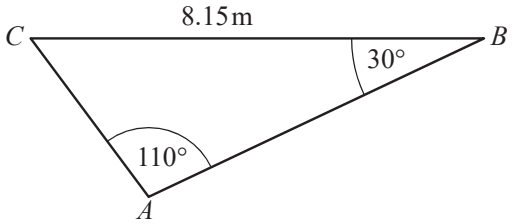
[2]

(b) RM has a length of 5.5 cm. Calculate angle ROM.

Answer: 132.9 degrees

[3]

Question 8



NOT TO SCALE

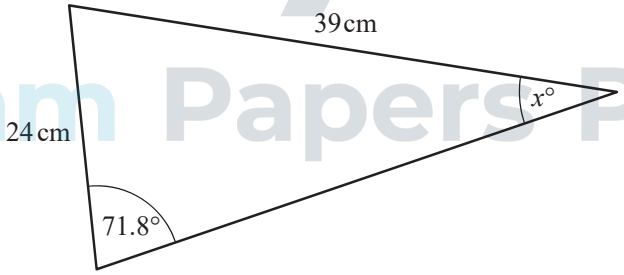
Calculate AC. [3]

$$\frac{\overline{BC}}{\sin(\angle BAC)} = \frac{\overline{AC}}{\sin(\angle ABC)}$$

$$\frac{8.15}{\sin(110°)} = \frac{\overline{AC}}{\sin(30°)}$$

$$\overline{AC} = 4.337 \text{ m}$$

Question 9

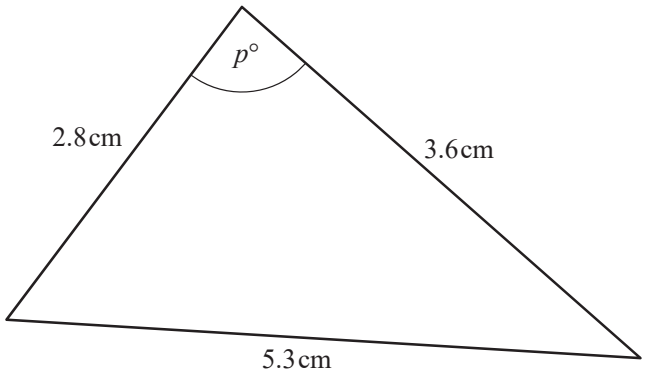


NOT TO SCALE

Find the value of x. [3]

$$\frac{24}{\sin x°} = \frac{39}{\sin 71.8°}$$

$$x = 35.46°$$



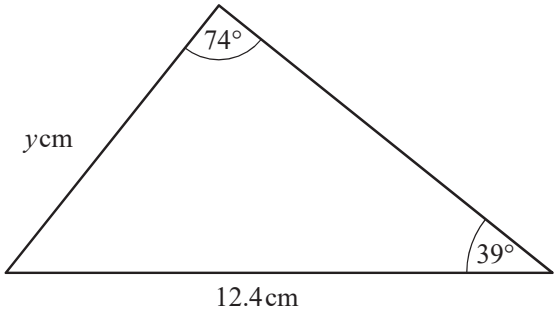
NOT TO SCALE

Find the value of p. [4]

$$\cos p^\circ = \frac{2.8^2 + 3.6^2 - 5.3^2}{2(2.8) - (3.6)} = -0.405 \Rightarrow p^\circ = 113.89^\circ$$

$$p = 113.89$$

Question 11



NOT TO SCALE

Calculate the value of y. [3]

since $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin c} = R$

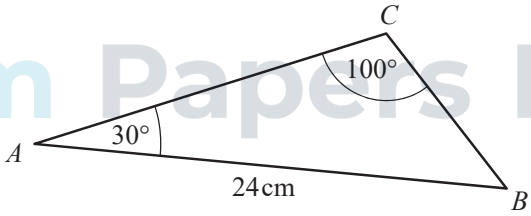
The angles are $74°, 39°$.

The side is y cm and 12.4 cm

So. $\frac{12.4}{\sin 74°} = \frac{y}{\sin 39°}$

so $y = 8.125\ cm$

Question 12



NOT TO SCALE

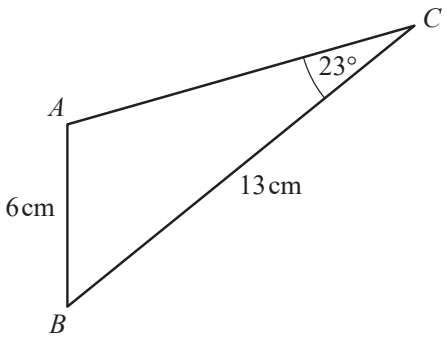
Use the sine rule to calculate BC. [3]

$| \overline{BC} = 12.185$ cm

$\frac{\overline{AB}}{\sin(\angle ACB)} = \frac{\overline{BC}}{\sin(\angle BAC)}$

$\frac{24}{\sin(100°)} = \frac{\overline{BC}}{\sin(30°)}$

$\overline{BC} = 12.185$ cm



NOT TO SCALE

In triangle ABC, $AB = 6$ cm, $BC = 13$ cm and angle $ACB = 23°$.
Calculate angle BAC, which is obtuse. [4]

$$\frac{\overline{BC}}{\sin(\angle BAC)} = \frac{\overline{AB}}{\sin(\angle ACB)}$$

$$\frac{13}{\sin(\angle BAC)} = \frac{6}{\sin(23°)}$$

$$\angle BAC = 57.842°$$