JP Maths Revision

Attempt the paper before watching the solutions!

https://www.youtube.com/@JPMathsRevision

Solutions

HIGHER

The Sine and Cosine Rule

SOLUTIONS GUIDE

- Compare your **method** as well as your final answer.
- Check where **marks** would be awarded.
- If you got stuck, **try the question again** before reading the full solution.
- **Alternative** correct methods may be shown.

MARKING INFORMATION

- **Method marks** may be awarded even if the final answer is incorrect.
- **Alternative valid methods** may exist.
- Answers are given to the **accuracy** stated in each question.

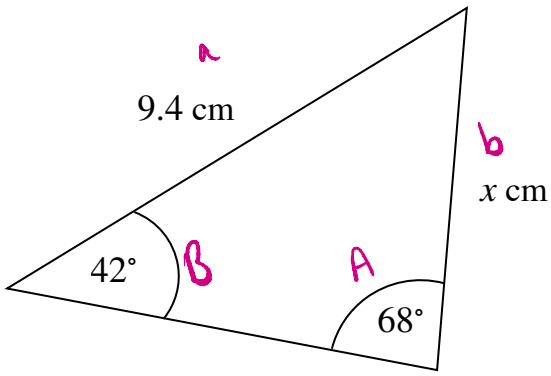
HELPFUL ADVICE

- **Review** any questions you found challenging.
- Make **notes** on any topics to revisit.
- **Practice** similar questions to build confidence.

Section 1: The Sine Rule

1. In the below triangle, work out the value of x.

Give your answer to 1 decimal place.



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{9.4}{\sin 68} = \frac{x}{\sin 42}$$

$$x = \frac{9.4}{\sin 68} \times \sin 42$$

$$= 6.78$$

6.8 cm

(Total for Question 1 is 3 marks)

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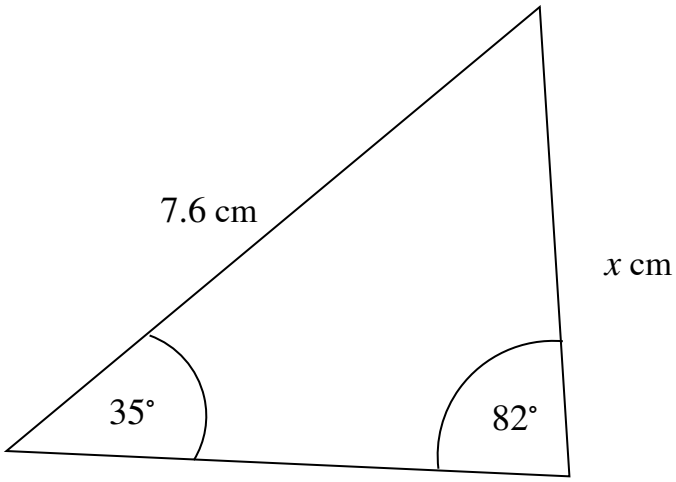
2. In the below triangle, work out the value of x.

Give your answer to 1 decimal place.



$$\frac{x}{\sin 35} = \frac{7.6}{\sin 82}$$

$$x = \frac{7.6}{\sin 82} \times \sin 35$$

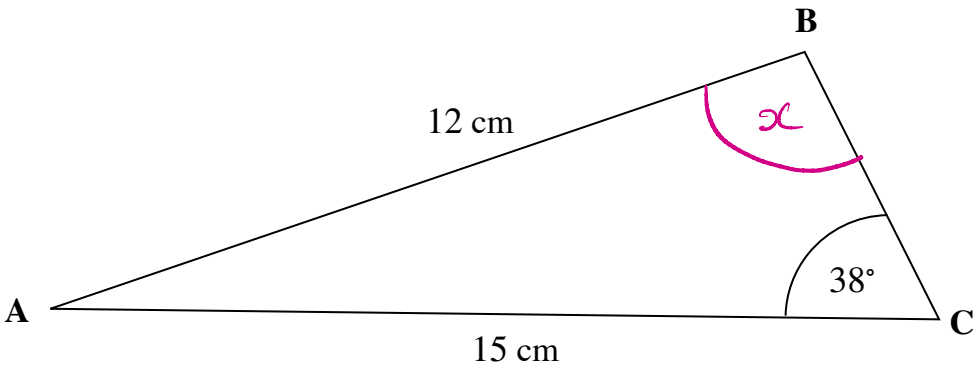
$$= 4.4$$

4.4 cm

(Total for Question 2 is 3 marks)

3. In the below triangle, work out the size of angle ABC

Give your answer to 1 decimal place.



$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin x}{15} = \frac{\sin 38}{12}$

$\sin x = \frac{15 \sin 38}{12}$

$x = \sin^{-1}(\text{ans})$

$= 50.3$

50.3 °

.....

(Total for Question 3 is 3 marks)

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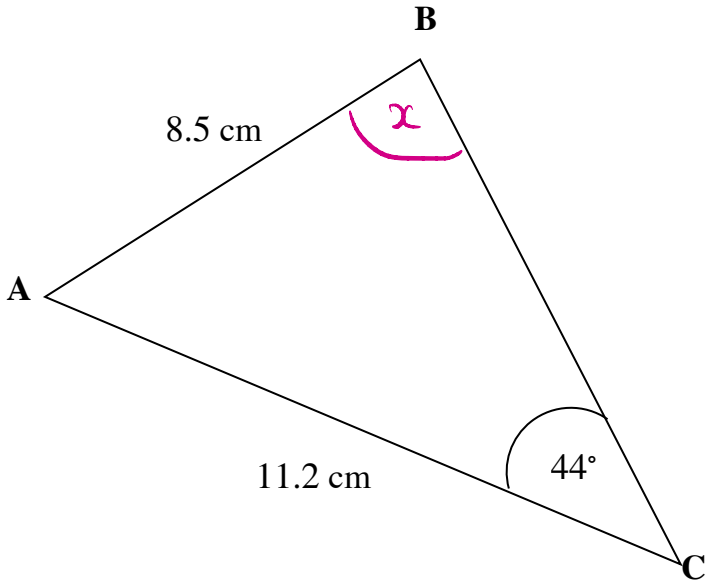
4. In the below triangle, work out the size of angle ABC

Give your answer to 1 decimal place.



$\frac{\sin x}{11.2} = \frac{\sin 44}{8.5}$

$\sin x = \frac{11.2 \sin 44}{8.5}$

$x = \sin^{-1}(\text{ans})$

$= 66.3$

66.3 °

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(Total for Question 4 is 3 marks)

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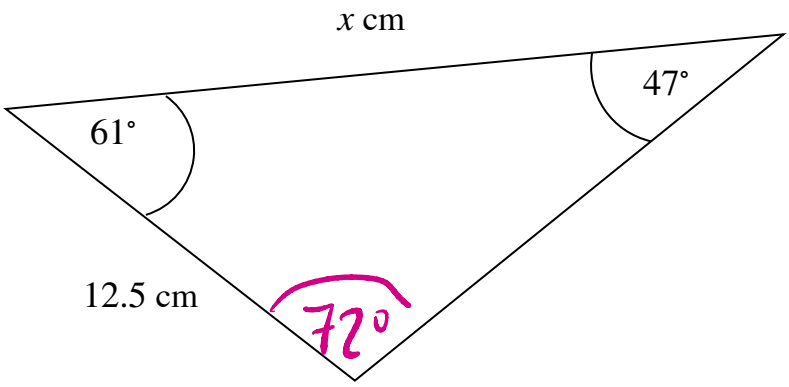
5. In the below triangle, work out the value of x.

Give your answer to 1 decimal place.



$180 - 61 - 47$

$= 72°$

$$\frac{x}{\sin 72} = \frac{12.5}{\sin 47}$$

$$x = \frac{12.5}{\sin 47} \times \sin 72$$

$= 16.3$

16.3 cm

(Total for Question 5 is 4 marks)

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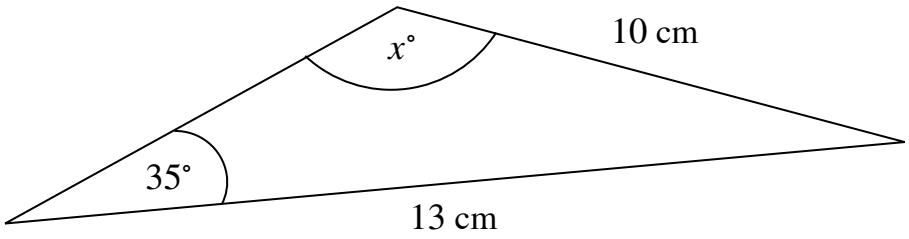
6. In the below triangle, angle $x°$ is obtuse.

work out the size of the angle marked $x°$.

Give your answer to 1 decimal place.



$$\frac{\sin x}{13} = \frac{\sin 35}{10}$$

$$\sin x = \frac{13 \sin 35}{10}$$

$x = \sin^{-1}(\text{ans})$

$= 48.2$

$180 - 48.2 = 131.8$

131.8 °

(Total for Question 6 is 4 marks)

Section 2: The Cosine Rule

7. In the below triangle, work out the value of x.

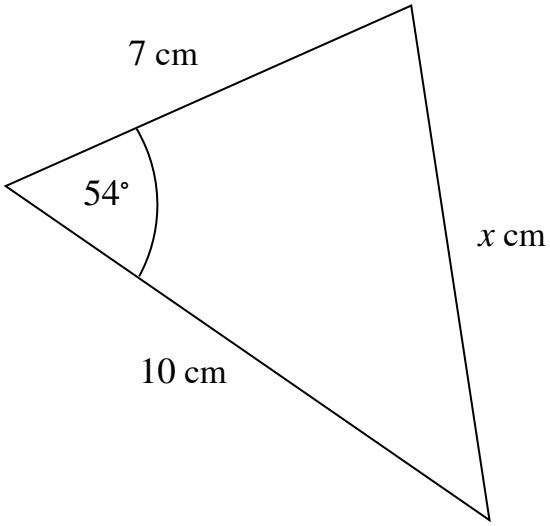
Give your answer to 1 decimal place.

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

$x^2 = 7^2 + 10^2 - 2(7)(10)\cos 54$

$x = \sqrt{ans}$

$= 8.2$



8.2 cm

.....

(Total for Question 7 is 3 marks)

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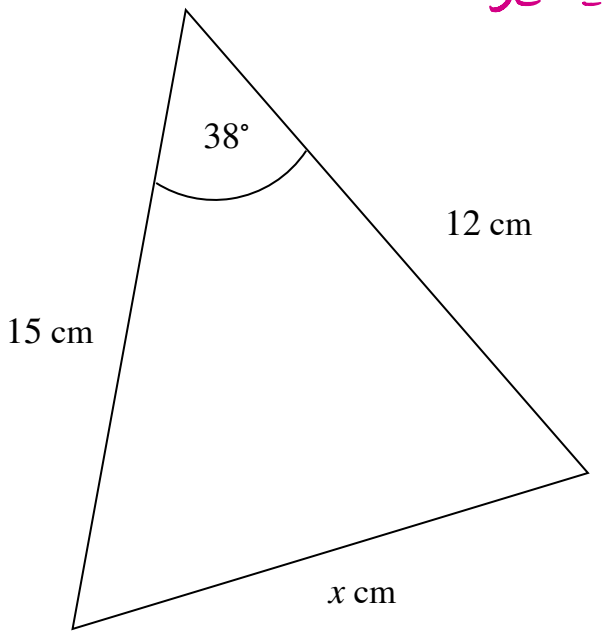
8. In the below triangle, work out the value of x.

Give your answer to 1 decimal place.

$x^2 = 15^2 + 12^2 - 2(15)(12)\cos(38)$

$x = \sqrt{ans}$

$= 9.2$



9.2 cm

.....

(Total for Question 8 is 3 marks)

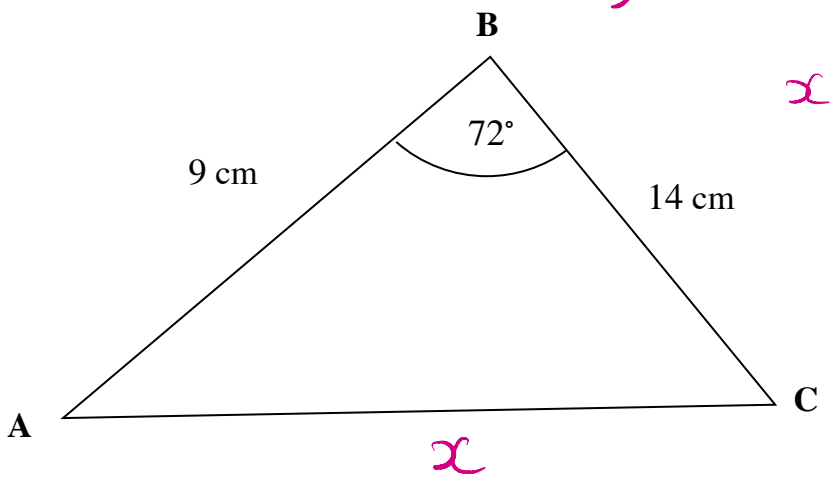
9. In the below triangle, work out the length of AC.

Give your answer to 1 decimal place.

$x^2 = 9^2 + 14^2 - 2(9)(14)\cos(72)$

$x = \sqrt{ans}$

$= 14.1$



14.1 cm

(Total for Question 9 is 3 marks)

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10. In the below triangle, work out the angle of ABC.

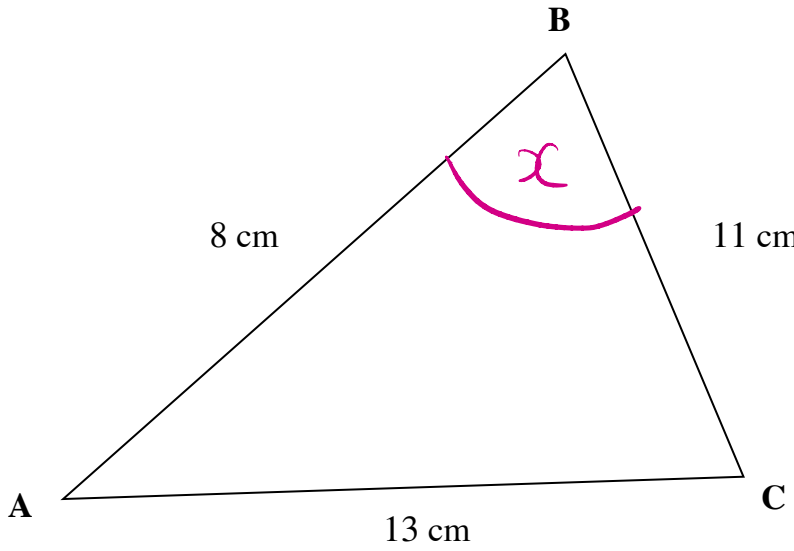
Give your answer to 1 decimal place.

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

$= \dfrac{8^2 + 11^2 - 13^2}{2(8)(11)}$

$A = \cos^{-1}(ans)$

$= 84.8$

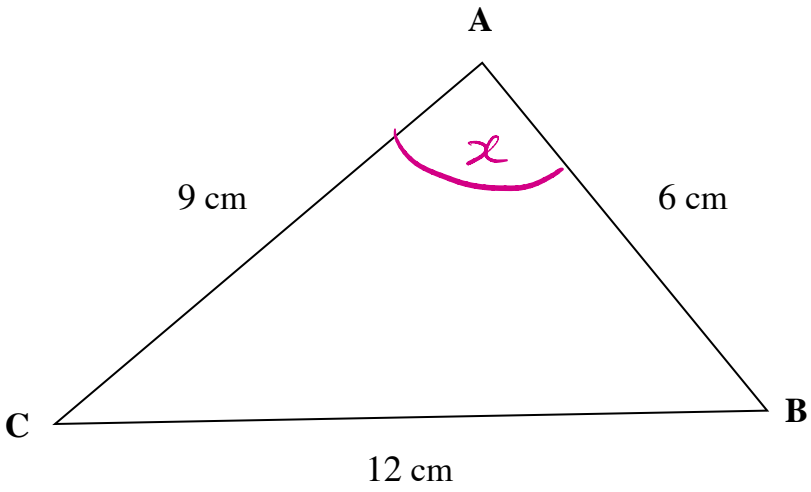


84.8 °

(Total for Question 10 is 3 marks)

11. In the below triangle, work out the size of angle BAC.

Give your answer to 1 decimal place.



$\cos(x) = \frac{9^2 + 6^2 - 12^2}{2(9)(6)}$

$x = \cos^{-1}(\text{ans})$

$= 104.5$

104.5 °

(Total for Question 11 is 3 marks)

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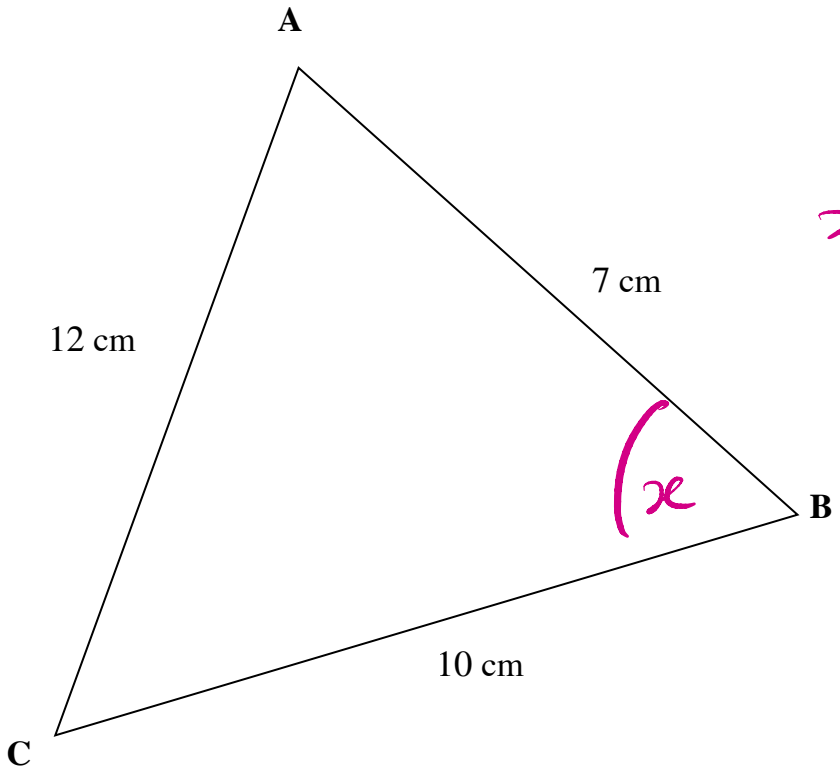
12. In the below triangle, work out the size of angle ABC.

Give your answer to 1 decimal place.



$\cos x = \frac{7^2 + 10^2 - 12^2}{2(7)(10)}$

$x = \cos^{-1}(\text{ans})$

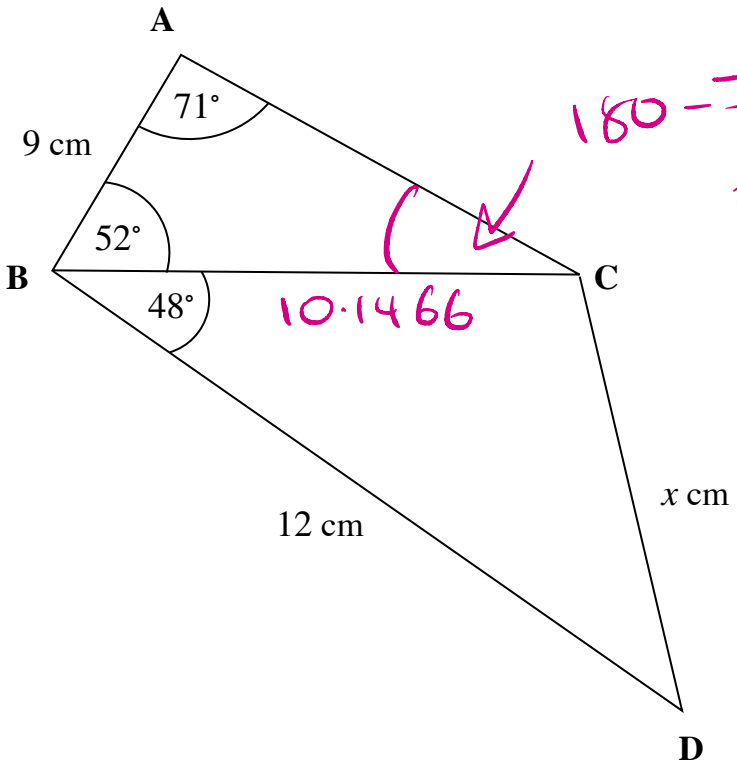
$= 88.0$

88.0°

(Total for Question 10 is 3 marks)

13. In the below triangle, work out the size of CD.

Give your answer to 3 significant figures.



180 − 71 − 52 = 57

$\frac{BC}{\sin 71} = \frac{9}{\sin 57} \Rightarrow BC = \frac{9}{\sin 57} \times \sin 71$

$= 10.1466$

10.1466

$x^2 = (10.1466)^2 + 12^2 - 2(10.1466)(12)\cos(48)$

$x = \sqrt{\text{ans}}$

$= 9.2$

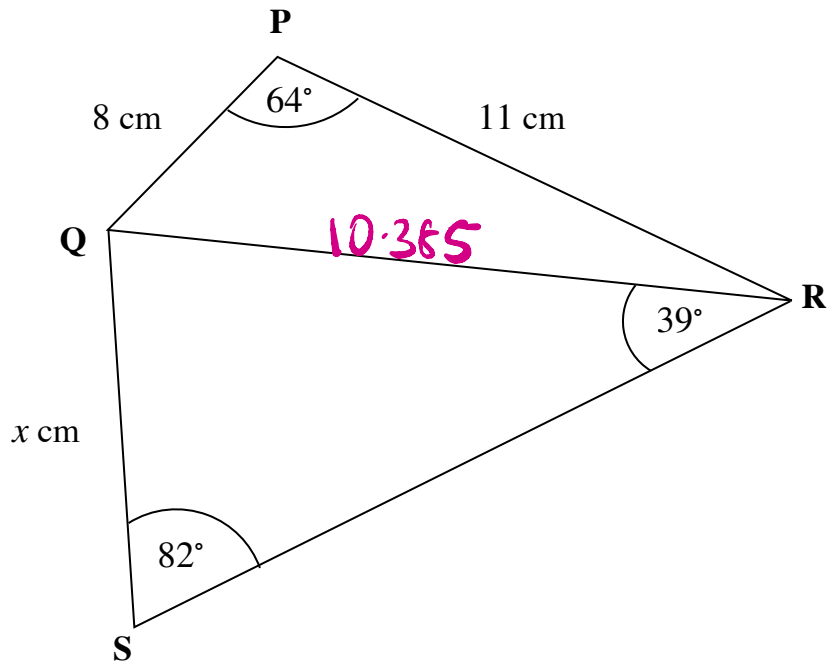
9.2 cm

.....

(Total for Question 13 is 4 marks)

14. In the below triangle, work out the size of QS.

Give your answer to 3 significant figures.



$QR^2 = 8^2 + 11^2 - 2(8)(11)\cos(64)$

$QR = \sqrt{\text{ans}} = 10.385$

$$\frac{x}{\sin(39)} = \frac{10.385}{\sin(82)}$$

$$x = \frac{10.385}{\sin 82} \times \sin 39 = 6.6$$

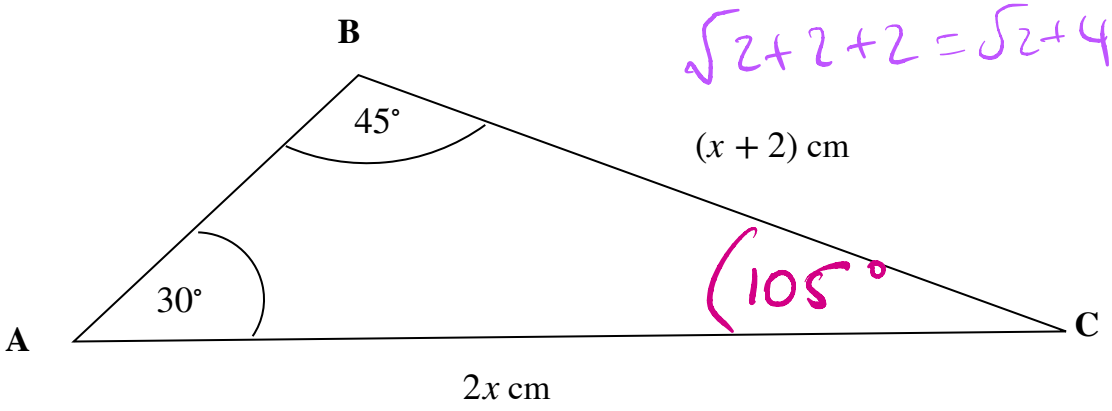
6.6 cm

.....

(Total for Question 14 is 4 marks)

15. In the below triangle, work out the size of AB.

Give your answer to 3 significant figures.



$\sqrt{2}+2+2=\sqrt{2}+4$

$\frac{x+2}{\sin 30} = \frac{2x}{\sin 45}$

$\frac{x+2}{\frac{1}{2}} = \frac{2x}{\frac{\sqrt{2}}{2}}$

$\frac{\sqrt{2}}{2}(x+2) = \frac{1}{2}(2x)$

$\frac{\sqrt{2}}{2}x + \sqrt{2} = x$

$\frac{\sqrt{2}}{2}x - x = -\sqrt{2}$

$x\left(\frac{\sqrt{2}}{2}-1\right) = -\sqrt{2}$

$x = \frac{-\sqrt{2}}{\frac{\sqrt{2}}{2}-1} = 2+\sqrt{2}$

$\frac{AB}{\sin 105} = \frac{\sqrt{2}+4}{\sin 30}$

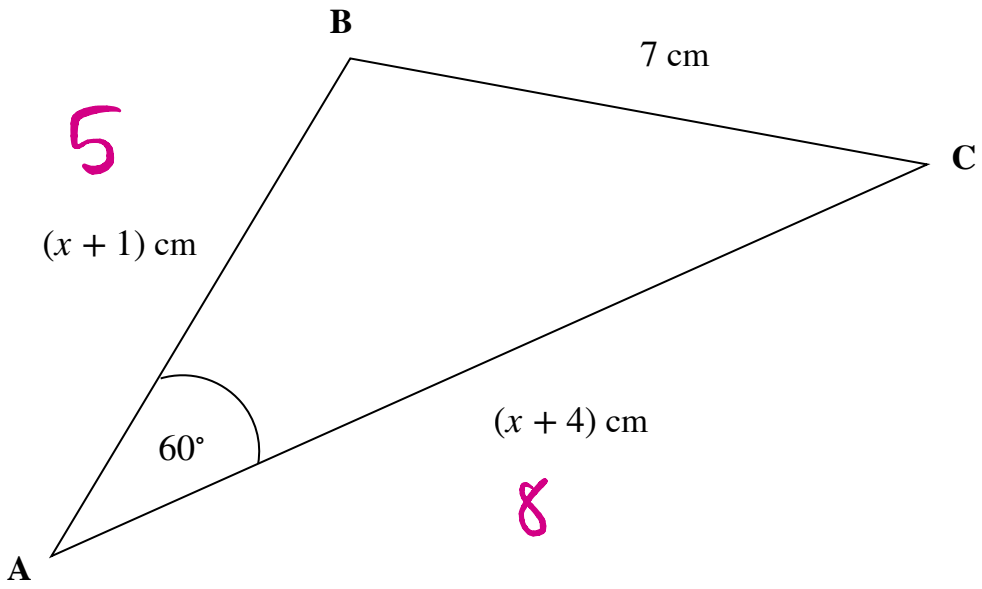
$AB = \frac{\sqrt{2}+4}{\sin 30} \times \sin 105$

$= 13.2$

13.2 cm

(Total for Question 15 is 5 marks)

16. Work out the perimeter of the triangle ABC.



$7^2 = (x+1)^2 + (x+4)^2 - 2(x+1)(x+4)\cos(60)$

$49 = x^2 + 2x + 1 + x^2 + 8x + 16 - (x^2 + 5x + 4)$

$49 = x^2 + 5x + 13$

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

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

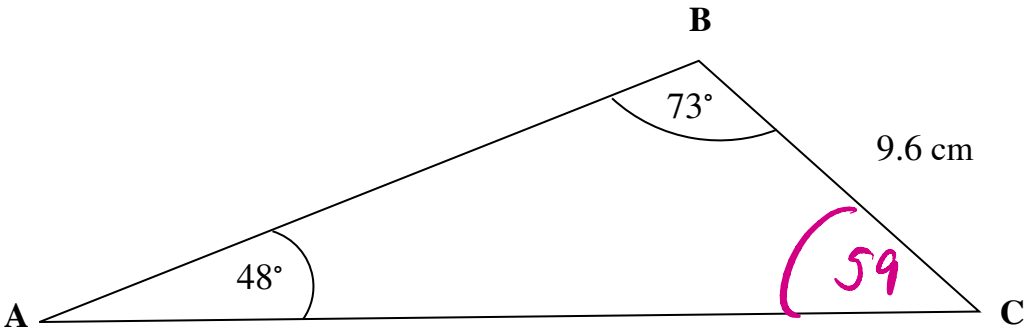
$x = -9, 4 \Rightarrow \boxed{x = 4}$

$P = 7 + 5 + 8 = 20$

20 cm

(Total for Question 16 is 5 marks)

17. Work out the perimeter of the triangle ABC.



$$\frac{AC}{\sin 73} = \frac{9.6}{\sin 48} \Rightarrow AC = \frac{9.6}{\sin 48} \times \sin 73$$

$$= 12.35$$

$$\frac{AB}{\sin 59} = \frac{9.6}{\sin 48} \Rightarrow AB = \frac{9.6}{\sin 48} \times \sin 59$$

$$= 11.07$$

$$P = 12.35 + 9.6 + 11.07$$

$$= 33.02$$

33 cm

.....

(Total for Question 17 is 5 marks)