Sine and Cosine Rules questions and answers

11 questions · Extended · calculator · worked answers

Name _____ Date _____ Score _____

- Original questions in the style of the Cambridge 0580 papers, each labelled Core or Extended and calculator or non-calculator. Try every question before you look at the answers.
- Worked answers start after the questions. Questions with marks come from our 0580 practice bank (M method, A accuracy, B independent marks).
- Online, with more practice: igcsemathrevision.com/igcse-frontend/0580/sine-and-cosine-rules-questions

Extended: for Papers 2 and 4

1. **Extended · calculator · easy**

In triangle ABC, $a = 7$ cm, $b = 9$ cm and angle $C = 40^\circ$.
Work out the area of the triangle, correct to 3 significant figures.

2. **Extended · calculator · easy · 2 marks**

In triangle ABC, angle $A = 48°$, angle $B = 67°$ and $BC = 9$ cm.

Work out the length of AC.

3. **Extended · calculator · medium**

In triangle ABC, angle $A = 42^\circ$, angle $B = 71^\circ$ and $a = 8$ cm.
Find b, correct to 3 significant figures.

4. **Extended · calculator · medium**

In triangle ABC, angle $A = 50^\circ$, angle $B = 60^\circ$ and $c = 10$ cm.
Find a, correct to 3 significant figures.

5. **Extended · calculator · medium**

In triangle ABC, $b = 6$ cm, $c = 9$ cm and angle $A = 52^\circ$.
Find a, correct to 3 significant figures.

6. **Extended · calculator · medium**

A triangle has sides 5 cm, 7 cm and 9 cm.
Find its largest angle, correct to 1 decimal place.

7. **Extended · calculator · medium · 3 marks**

In triangle ABC, $AB = 10$ cm, $AC = 7$ cm and angle $BAC = 115°$.

Work out the length of BC.

8. **Extended · calculator · hard**

In triangle ABC, $a = 10$ cm, $b = 14$ cm and angle $A = 35^\circ$.
Find the two possible values of angle B, correct to 1 decimal place.

9. **Extended · calculator · hard**

A triangle has sides of 8 cm and 10 cm, and an area of 30 cm². The angle between these sides is acute.
Find this angle, correct to 1 decimal place.

10. **Extended · calculator · hard**

A boat sails 12 km on a bearing of 050°, then 9 km on a bearing of 170°.
How far is it from its starting point? Give your answer correct to 3 significant figures.

11. **Extended · calculator · hard · 4 marks**

In triangle ABC, $AB = 10$ cm, $BC = 7$ cm and angle $BAC = 35°$.

Find the two possible sizes of angle ACB, correct to 1 decimal place.

Answers and worked solutions

Question 1

Answer: $20.2\ \text{cm}^2$

1. Area $= \frac{1}{2}ab\sin C = \frac{1}{2} \times 7 \times 9 \times \sin 40^\circ = 20.24\ldots\ \text{cm}^2$

Question 2

2 marks

Answer: 11.1 cm

M1 AC/$\sin 67^\circ = \frac{9}{\sin 48}^\circ$

A1 11.1 cm

Question 3

Answer: 11.3 cm

1. Sine rule: $\frac{b}{\sin 71^\circ} = \frac{8}{\sin 42^\circ}$
2. $b = \frac{8\sin 71^\circ}{\sin 42^\circ} = 11.30\ldots$ cm

Question 4

Answer: 8.15 cm

1. Angle $C = 180^\circ - 50^\circ - 60^\circ = 70^\circ$.
2. $a = \frac{10\sin 50^\circ}{\sin 70^\circ} = 8.152\ldots$ cm

Question 5

Answer: 7.11 cm

1. Cosine rule:
   $a^2 = 6^2 + 9^2 - 2 \times 6 \times 9\cos 52^\circ = 117 - 66.49\ldots = 50.50\ldots$
2. $a = 7.106\ldots$ cm

Question 6

Answer: 95.7°

1. The largest angle is opposite the 9 cm side.
2. $\cos\theta = \frac{5^2+7^2-9^2}{2\times5\times7} = \frac{-7}{70} = -0.1$
3. $\theta = 95.73\ldots^\circ$

Question 7

3 marks

Answer: 14.4 cm

M1

$BC^2 = 10^2 + 7^2 - 2 \times 10 \times 7 \times \cos 115^\circ$

A1 $BC^2 = 208.16\ldots$

A1 14.4 cm

Question 8

Answer: $B = 53.4^\circ$ or $B = 126.6^\circ$

1. $\sin B = \frac{14\sin 35^\circ}{10} = 0.8030\ldots$
2. $B = 53.42\ldots^\circ$ or $B = 180^\circ - 53.42\ldots^\circ = 126.57\ldots^\circ$.
3. Both are possible, because $126.57\ldots^\circ + 35^\circ < 180^\circ$ (the ambiguous case).

Question 9

Answer: 48.6°

1. $\frac{1}{2} \times 8 \times 10 \times \sin C = 30$, so $\sin C = 0.75$.
2. $C = \sin^{-1} 0.75 = 48.59\ldots^\circ$

Question 10

Answer: 10.8 km

1. At the turning point, the direction back to the start is 230° and the new direction is 170°, so the angle between the two legs is 60°.
2. $d^2 = 12^2 + 9^2 - 2 \times 12 \times 9\cos 60^\circ = 225 - 108 = 117$
3. $d = 10.81\ldots$ km

Question 11

4 marks

Answer: $55.0°$ or $125.0°$

M1 $\sin\frac{C}{10} = \sin 35°/7$

A1 $\sin C = 0.819\ldots$

A1 $55.0°$

A1 $180 - 55.0 = 125.0°$

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