HIGHER ONLY

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Name ..... Class .....

G22: Sine and cosine rules

Reason with the sine rule and cosine rule

20 marks · 25 minutes · Calculator allowed

1) Explain when you would use the sine rule and when you would use the cosine rule.

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[Question 1: 2 marks]

2) Show that the cosine rule becomes Pythagoras' theorem when the angle is 90°.

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[Question 2: 2 marks]

3) A triangle has sides 7, 8 and 9 cm. Show that its largest angle is 73.4° and explain why it is opposite the 9 cm side.

[Question 3: 3 marks]

4) In triangle ABC, $a = 5$, $b = 8$ and $A = 30°$. Kim finds $\sin B = 0.8$, so $B = 53.1°$. Explain why there is another possible value of B and find it.

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[Question 4: 3 marks]

5) In triangle ABC, $a = 10$ cm, $A = 40°$ and $B = 60°$. Show that $b = 13.5$ cm to 3 s.f.

[Question 5: 2 marks]

6) Explain why the side opposite an obtuse angle is longer than it would be in a right-angled triangle with the same two other sides.

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[Question 6: 2 marks]

7) Use the cosine rule to show that a triangle with sides 3, 4 and 8 cannot exist.

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[Question 7: 3 marks]

8) Explain how checking that the angles add up to 180° helps after using the sine rule.

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[Question 8: 1 marks]

9) Show that $c = 7$ when $a = 5$, $b = 8$ and $C = 60°$

[Question 9: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	Sine rule: pairs of opposite sides and angles (C1); cosine rule: three sides, or two sides and the included angle (C1).
2	Shown	$\cos 90° = 0$ (M1); $c^2 = a^2 + b^2$ (C1).
3	Shown	$\cos C = \frac{32}{112}$ (M1); 73.4° (A1); largest angle opposite the longest side (C1).
4	126.9°	$\sin(180 - x) = \sin x$ (C1); $180 - 53.1$ (M1); still gives angle sum under 180 (C1).
5	Shown	$\frac{10 \sin 60°}{\sin 40°}$ (M1); C1.
6	Explanation	cos of an obtuse angle is negative (C1); so $-2ab \cos C$ adds to c^2 (C1).
7	Shown	$\cos C = \frac{9 + 16 - 64}{24} = -1.625$ (M1, M1); cos cannot be less than -1 (C1).
8	Explanation	It catches errors, e.g. the wrong one of two possible angles (C1).
9	Shown	$25 + 64 - 40$ (M1); $\sqrt{49}$ (C1).