HIGHER

7.12 The Sine Rule: Test Pack

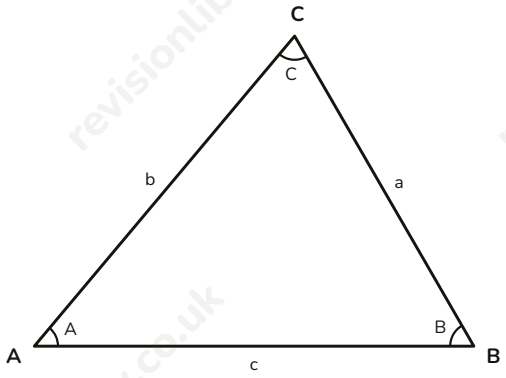
EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

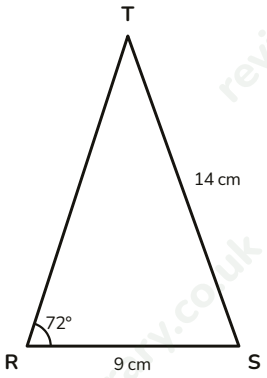
1 In triangle ABC, side a is opposite angle A and side b is opposite angle B. Write down the sine rule connecting a, angle A, b and angle B.



(Total for Question 1 is 1 mark)

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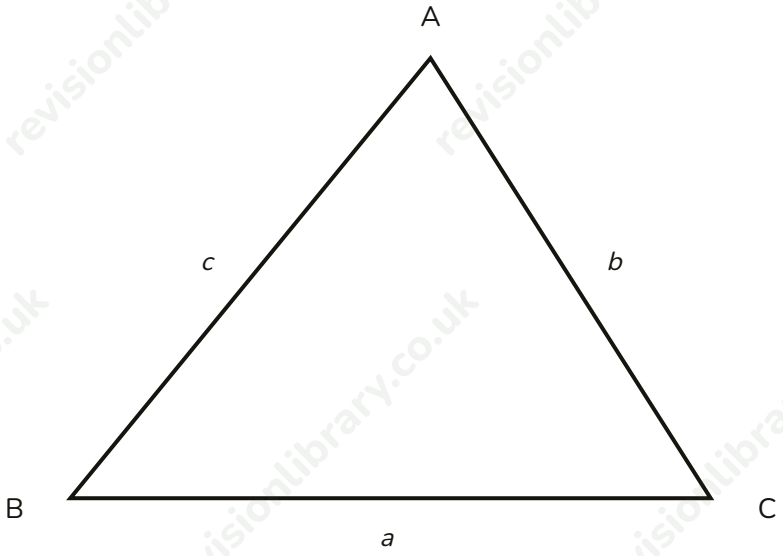
2 In triangle RST, angle R = 72 degrees, ST = 14 cm (opposite angle R), and RS = 9 cm (opposite angle T). Calculate the size of angle T. Give your answer correct to 1 decimal place.



(Total for Question 2 is 2 marks)

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3 In triangle ABC, angle A and the side a opposite it are known, and angle B is known. Which equation correctly applies the sine rule to find the side b opposite angle B?



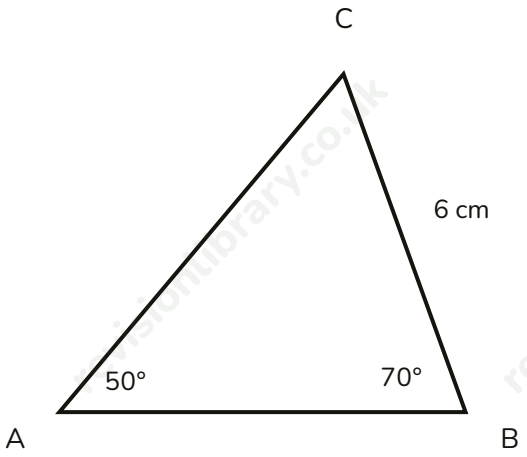
- ☐ A) a/sinA = b/sinB
- ☐ B) a/sinB = b/sinA
- ☐ C) a x sinA = b x sinB
- ☐ D) sinA/a = sinB x b

(Total for Question 3 is 1 mark)

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4 In triangle ABC, angle A = 50 degrees, angle B = 70 degrees and BC = 6 cm (BC is opposite angle A). Calculate the length of AC (opposite angle B). Give your answer correct to 3 significant figures.

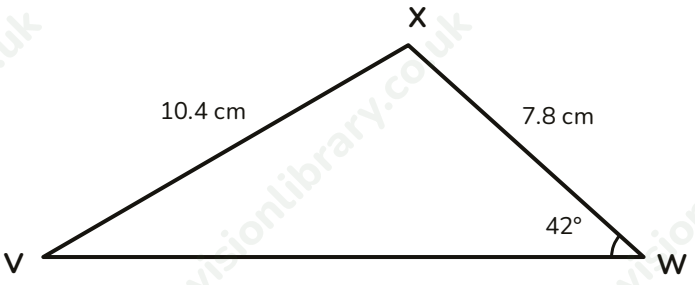
Diagram NOT accurately drawn



(Total for Question 4 is 2 marks)

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5 In triangle VWX, angle W = 42 degrees, VX = 10.4 cm (opposite angle W), and WX = 7.8 cm (opposite angle V). Calculate the size of angle V. Give your answer correct to 1 decimal place.



(Total for Question 5 is 2 marks)

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6 In triangle ABC, angle A and sides a and b are given (side a is opposite angle A). Which condition guarantees that the ambiguous case (two possible triangles) cannot occur?

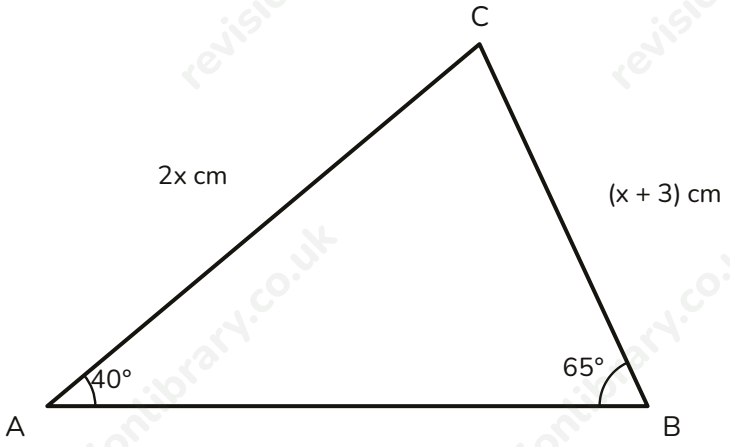
- ☐ A) angle A is acute and $a < b$
- ☐ B) angle A is acute and $a \geq b$
- ☐ C) angle A is obtuse and $a < b$
- ☐ D) angle A = 90 degrees and $a < b$

(Total for Question 6 is 1 mark)

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7 In triangle ABC, angle A = 40 degrees, angle B = 65 degrees, BC = (x + 3) cm (opposite angle A) and AC = 2x cm (opposite angle B). Find the value of x. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

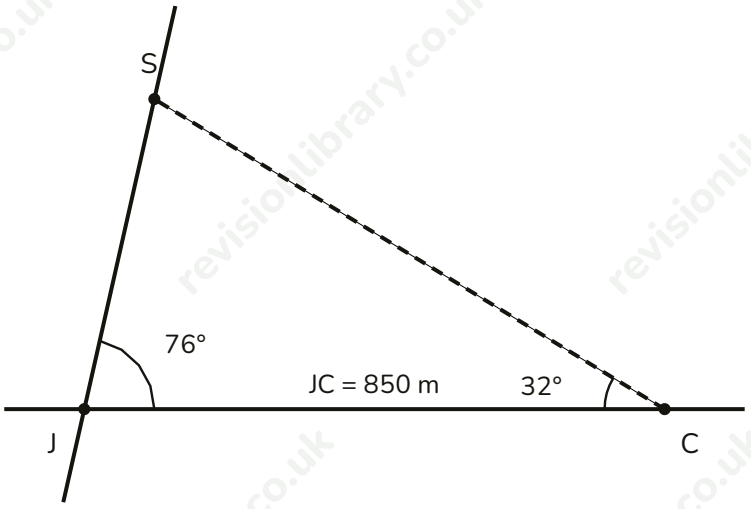


(Total for Question 7 is 4 marks)

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8 Two straight roads cross at a junction J, at an angle of 76 degrees. A cafe C is on one road, 850 m from J. A school S is on the other road, with angle JCS = 32 degrees.

Diagram NOT accurately drawn



(a) Calculate the distance CS between the cafe and the school. Give your answer correct to 3 significant figures. **(4)**

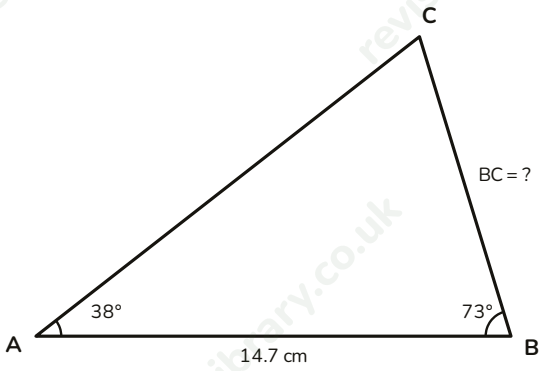
(b) Hence find the shortest distance from the school to the road JC. Give your answer correct to 3 significant figures. **(2)**

(Total for Question 8 is 6 marks)

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9 In triangle ABC, angle A = 38 degrees, angle B = 73 degrees and AB = 14.7 cm. Work out the length of BC. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

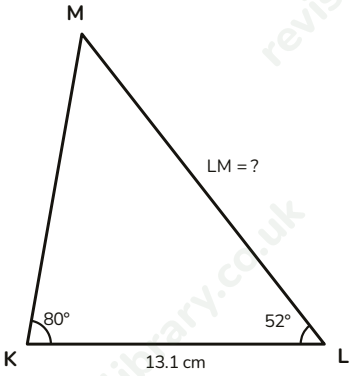


(Total for Question 9 is 4 marks)

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10 In triangle KLM, angle K = 80 degrees, angle L = 52 degrees and KL = 13.1 cm. Work out the length of LM. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

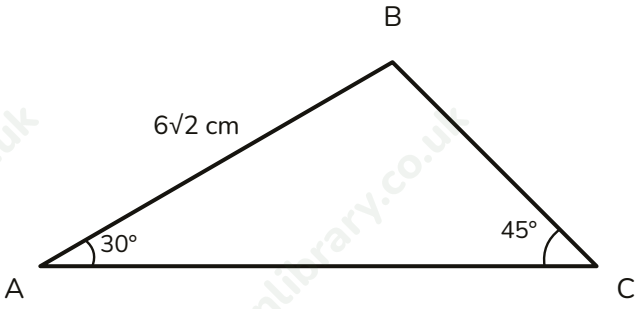


(Total for Question 10 is 4 marks)

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11 In triangle ABC, angle A = 30 degrees, angle C = 45 degrees, and side AB = $6*\sqrt{2}$ cm (AB is opposite angle C). Show that the length of BC (opposite angle A) is exactly 6 cm.

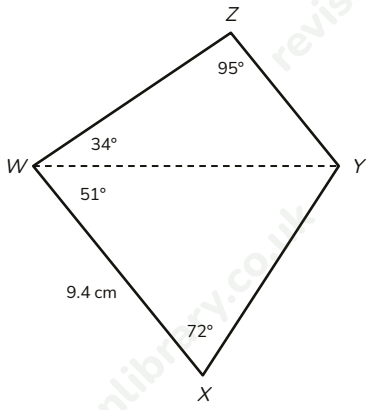
Diagram NOT accurately drawn



(Total for Question 11 is 3 marks)

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12 The diagram shows quadrilateral WXYZ, made up of triangle WXY and triangle WYZ joined along the diagonal WY. In triangle WXY, angle XWY = 51 degrees, angle WXY = 72 degrees, and WX = 9.4 cm. In triangle WYZ, angle ZWY = 34 degrees and angle WZY = 95 degrees.



(a) Calculate the length of the diagonal WY. Give your answer correct to 3 significant figures. **(3)**

.....

(b) Hence calculate the length of YZ. Give your answer correct to 3 significant figures. **(3)**

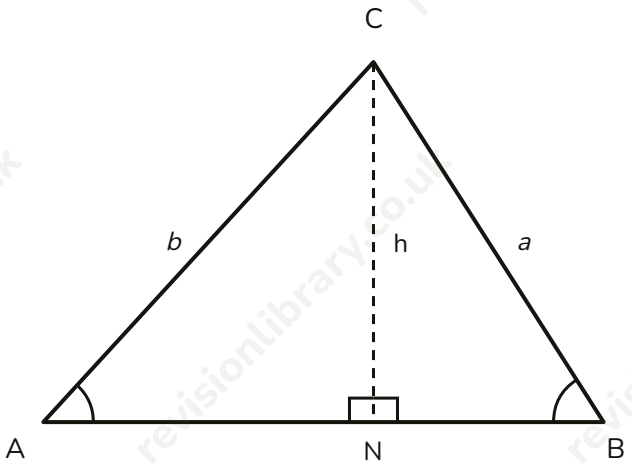
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(Total for Question 12 is 6 marks)

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13 Triangle ABC has angle C not equal to 90 degrees. The perpendicular from C meets line AB (extended if necessary) at N, with CN = h. Prove that a/sinA = b/sinB, where a = BC and b = AC.

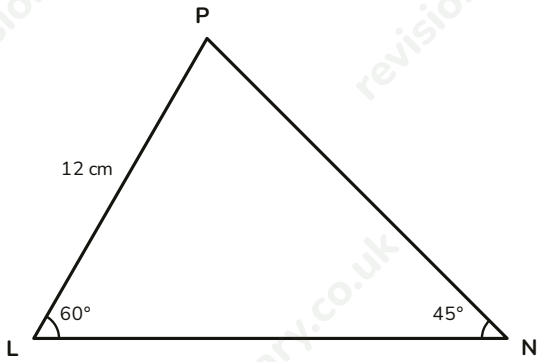
Diagram NOT accurately drawn



(Total for Question 13 is 4 marks)

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14 In triangle LNP, angle L = 60 degrees, angle N = 45 degrees, and LP = 12 cm (LP is opposite angle N). Show that the length of NP (opposite angle L) is exactly $6*\sqrt{6}$ cm.



(Total for Question 14 is 3 marks)

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Mark scheme · 7.12 The Sine Rule: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

a/sin(A) = b/sin(B) oe (accept sin(A)/a = sin(B)/b)	**B1**

Answer: a/sin(A) = b/sin(B)

Question 2

sin(T)/9 = sin(72)/14 oe	**M1**
awrt 37.7 (degrees)	**A1**

Answer: angle T = 37.7 degrees (1 d.p.)

Question 3

A oe	**B1**

Answer: A) a/sinA = b/sinB

Question 4

AC/sin70 = 6/sin50 oe	**M1**
7.36 cm awrt	**A1**

Answer: 7.36 cm (3 sf)

Question 5

sin(V)/7.8 = sin(42)/10.4 oe	**M1**
awrt 30.1 (degrees)	**A1**

Answer: angle V = 30.1 degrees (1 d.p.)

Question 6

B oe	**B1**

Answer: B) angle A is acute and a ≥ b

Question 7

(x+3)/sin40 = 2x/sin65 oe	**M1**
(x+3) x sin65 = 2x x sin40, i.e. 0.9063(x+3) = 1.2856x oe (values seen)	**M1**
correctly collects x terms, e.g. 2.719 = 0.3793x oe	**M1**
7.17 awrt	**A1**

Answer: x = 7.17 (3 sf)

Question 8

(a) angle JSC = 180 - 76 - 32 (=72 degrees)	**B1**
(a) CS/sin76 = 850/sin72 oe	**M1**
(a) CS = 850 x sin76 / sin72	**M1**
(a) 867 m awrt	**A1**

(a) Answer: 867 m (3 sf)

(b) shortest distance = their CS x sin32 (perpendicular from S to line JC) ft	**M1**
(b) 460 m awrt (ft their CS)	**A1**

(b) Answer: 460 m (3 sf)

Question 9

angle C = 69 degrees	**M1**
BC/sin 38 = 14.7/sin 69	**M1**
rearranges	**M1**
9.69 cm cao	**A1**

Answer: 9.69 cm

Question 10

angle M = 48 degrees	**M1**
LM/sin 80 = 13.1/sin 48	**M1**
rearranges	**M1**
17.4 cm cao	**A1**

Answer: 17.4 cm

Question 11

BC/sin30 = $6\sqrt{2}$/sin45 oe	**M1**
exact values sin30 = 1/2 and sin45 = $\sqrt{2}/2$ used, BC = $6\sqrt{2}$ x (1/2) / ($\sqrt{2}/2$)	**M1**
BC = 6 cm cso (all steps shown with exact values, answer given)	**A1**

Answer: 6 cm (answer given)

Question 12

(a) angle WYX = 180 - 51 - 72 = 57 (degrees)	**M1**
(a) WY/sin(72) = 9.4/sin(57) oe	**M1**
(a) awrt 10.7 (cm)	**A1**

(a) Answer: WY = 10.7 cm (3 s.f.)

(b) angle ZYW = 180 - 34 - 95 = 51 (degrees)	**M1**
(b) YZ/sin(34) = their WY/sin(95) oe (ft their WY)	**M1**
(b) awrt 5.98 (cm) ft their WY	**A1**

(b) Answer: YZ = 5.98 cm (3 s.f.)

Question 13

in right triangle ANC, h = b x sinA	**M1**
in right triangle BNC, h = a x sinB	**M1**
equates both expressions for h: b sinA = a sinB	**M1**
divides both sides by sinA sinB to reach a/sinA = b/sinB cso	**A1**

Answer: a/sinA = b/sinB (proven)

Question 14

NP/sin(60) = 12/sin(45) oe	**M1**
substitute exact values sin(60) = $\sqrt{3}/2$ and sin(45) = $\sqrt{2}/2$	**M1**
NP = 12 x $\sqrt{3}/\sqrt{2}$ = $6*\sqrt{6}$ cm, correctly simplified (cso)	**A1**

Answer: NP = $6*\sqrt{6}$ cm (exact)

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