3.5 Sine Rule, Cosine Rule and Area of a Triangle: 1-hour Pack

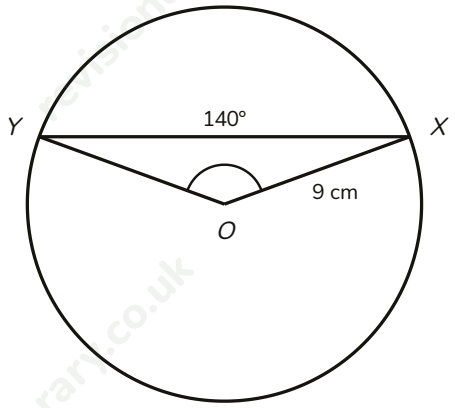
Total Marks

AQA 8365 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A circle has centre O and radius 9 cm. Points X and Y lie on the circumference such that angle XOY = 140 degrees.



(a) Calculate the length of chord XY, giving your answer correct to 3 significant figures. **(3)**

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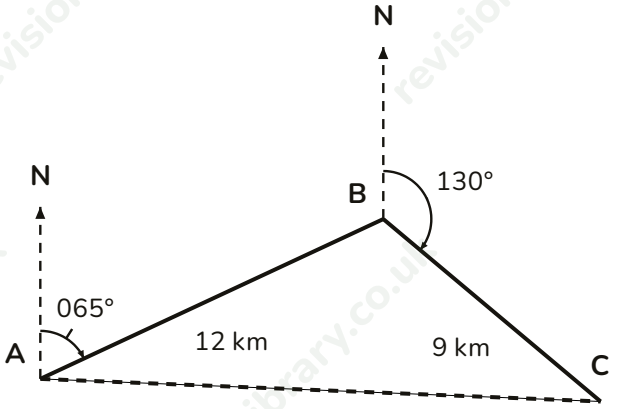
(b) Calculate the area of triangle OXY, giving your answer correct to 3 significant figures. **(2)**

.....

(Total for Question 1 is 5 marks)

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2 A ship sails from port A on a bearing of 065 degrees for 12 km to point B. At B it changes course and sails on a bearing of 130 degrees for 9 km to reach point C.



(a) Show that angle ABC = 115 degrees. **(2)**

(b) Calculate the distance AC, giving your answer correct to 3 significant figures. **(3)**

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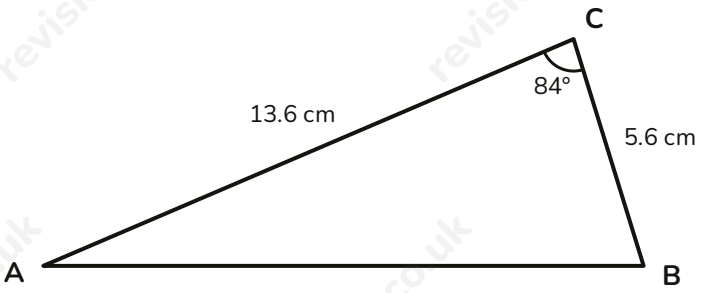
(c) Calculate the bearing of C from A, giving your answer to the nearest degree. **(3)**

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(Total for Question 2 is 8 marks)

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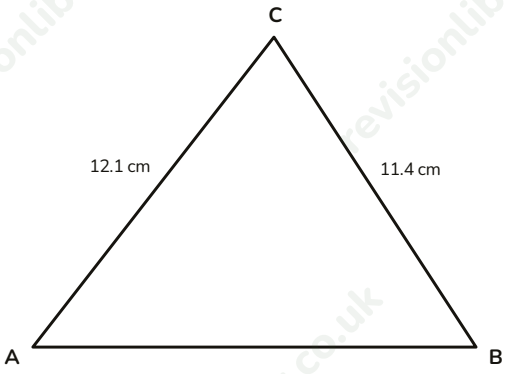
3 In triangle ABC, BC = 5.6 cm, AC = 13.6 cm and angle C = 84 degrees. Calculate the area of the triangle. Give your answer correct to 3 significant figures.



(Total for Question 3 is 3 marks)

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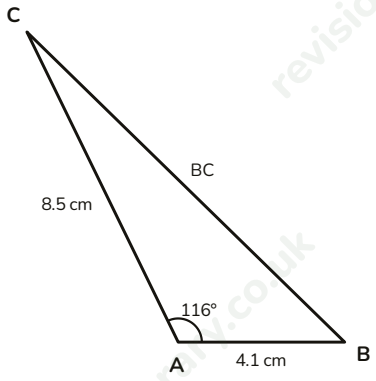
4 In triangle ABC, BC = 11.4 cm, AC = 12.1 cm and the area of the triangle is 65.2 cm². Angle C is acute. Calculate the size of angle C. Give your answer correct to 1 decimal place.



(Total for Question 4 is 3 marks)

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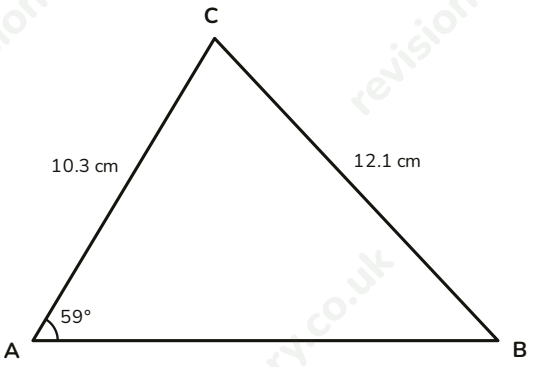
5 In triangle ABC, AB = 4.1 cm, AC = 8.5 cm and angle A = 116 degrees. Calculate the length of BC. Give your answer correct to 3 significant figures.



(Total for Question 5 is 3 marks)

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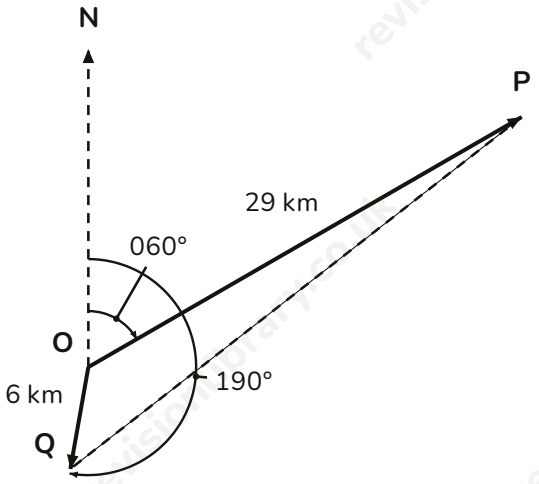
6 In triangle ABC, angle A = 59 degrees, BC = 12.1 cm and AC = 10.3 cm. Angle B is acute. Calculate the size of angle B. Give your answer correct to 1 decimal place.



(Total for Question 6 is 3 marks)

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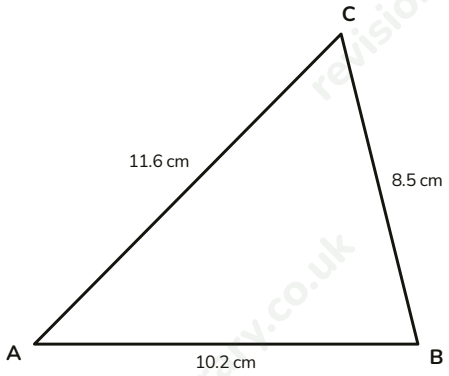
7 A ship leaves port O. Ship P sails 29 km on a bearing of 060 degrees. Ship Q sails 6 km on a bearing of 190 degrees. Calculate the distance between the two ships. Give your answer correct to 3 significant figures.



(Total for Question 7 is 4 marks)

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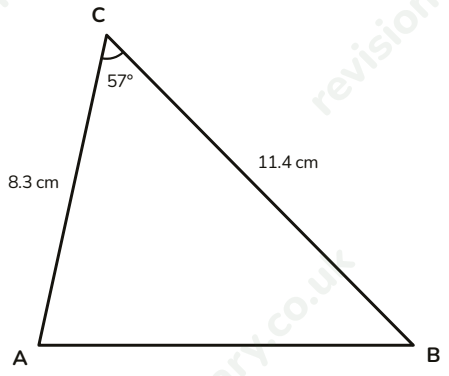
8 In triangle ABC, AB = 10.2 cm, AC = 11.6 cm and BC = 8.5 cm. Calculate the size of angle A. Give your answer correct to 1 decimal place.



(Total for Question 8 is 3 marks)

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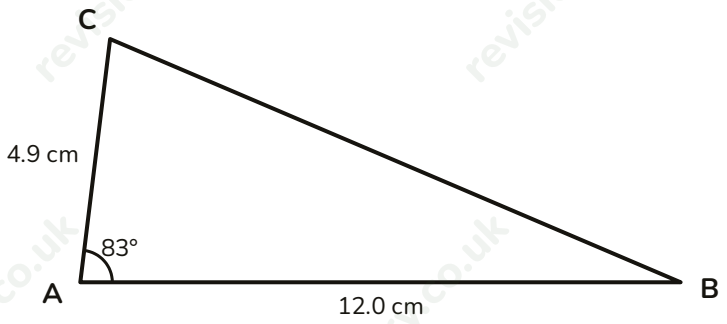
9 In triangle ABC, BC = 11.4 cm, AC = 8.3 cm and angle C = 57 degrees. Calculate the area of the triangle. Give your answer correct to 3 significant figures.



(Total for Question 9 is 3 marks)

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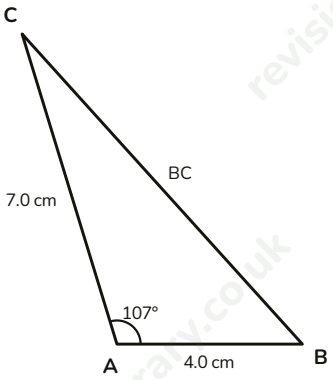
10 In triangle ABC, AB = 12.0 cm, AC = 4.9 cm and angle A = 83 degrees. Calculate the size of angle B. Give your answer correct to 1 decimal place.



(Total for Question 10 is 5 marks)

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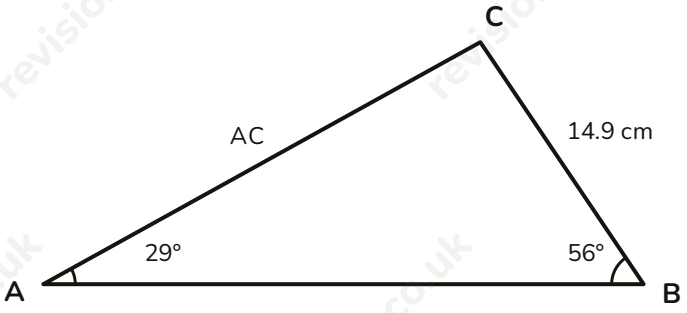
11 In triangle ABC, AB = 4.0 cm, AC = 7.0 cm and angle A = 107 degrees. Calculate the length of BC. Give your answer correct to 3 significant figures.



(Total for Question 11 is 3 marks)

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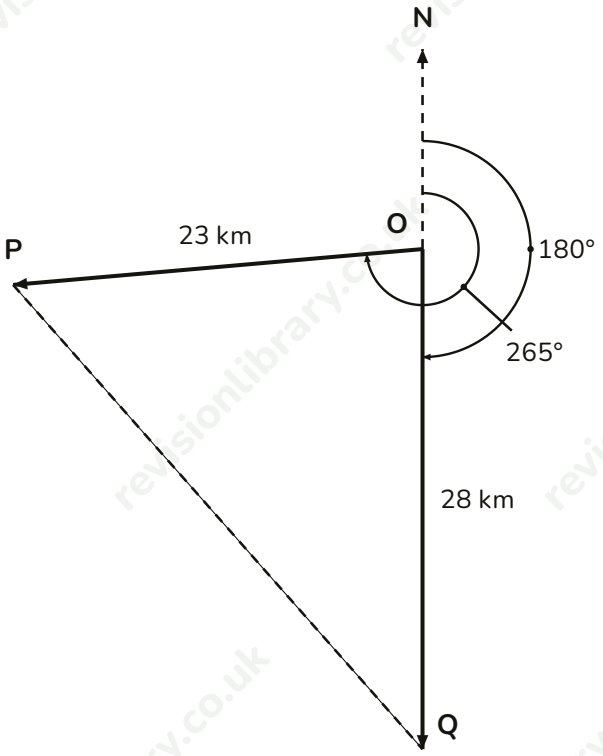
12 In triangle ABC, angle A = 29 degrees, angle B = 56 degrees and BC = 14.9 cm. Calculate the length of AC. Give your answer correct to 3 significant figures.



(Total for Question 12 is 3 marks)

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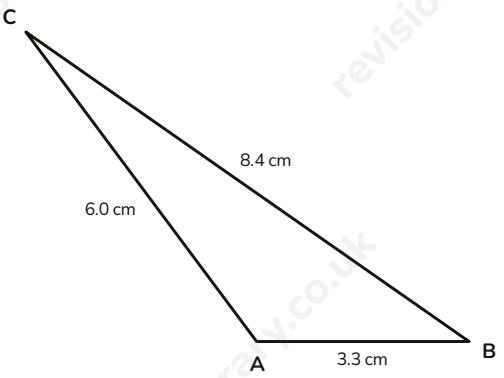
13 A ship leaves port O. Ship P sails 23 km on a bearing of 265 degrees. Ship Q sails 28 km on a bearing of 180 degrees. Calculate the distance between the two ships. Give your answer correct to 3 significant figures.



(Total for Question 13 is 4 marks)

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14 In triangle ABC, AB = 3.3 cm, AC = 6.0 cm and BC = 8.4 cm. Calculate the size of angle A. Give your answer correct to 1 decimal place.



(Total for Question 14 is 3 marks)

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Mark scheme · 3.5 Sine Rule, Cosine Rule and Area of a Triangle: 1-hour Pack

Question 1

(a) correct substitution $XY^2 = 9^2 + 9^2 - 2(9)(9)\cos(140)$	**M1**
(a) = 162 - 162*(-0.76604) = 286 (awrt) oe	**M1**
(a) XY = 16.9 cm awrt	**A1**
(a) Answer: 16.9 cm	
(b) Area = 1/2 * 9 * 9 * sin(140)	**M1**
(b) 26.0 cm² awrt	**A1**
(b) Answer: 26.0 cm^2	

Question 2

(a) correct reasoning: the bearing of A from B is 065+180 = 245 degrees oe	**B1**
(a) angle ABC = 245-130 = 115 degrees, fully shown cso	**B1**
(a) Answer: 115 degrees (shown)	
(b) correct substitution $AC^2 = 12^2 + 9^2 - 2(12)(9)\cos(115)$, ft from part (a)	**M1**
(b) = 225 - 216*(-0.42262) = 316 (awrt) oe	**M1**
(b) AC = 17.8 km awrt	**A1**
(b) Answer: 17.8 km	
(c) correct sine rule setup sin(BAC)/9 = sin(115)/17.8, ft from part (b)	**M1**
(c) sin(BAC) = 9*sin(115)/17.8 = 0.459 (awrt), giving angle BAC = 27.3 (awrt)	**M1**
(c) bearing = 065 + 27.3 = 092 degrees (nearest degree) awrt	**A1**
(c) Answer: 092 degrees	

Question 3

1/2 x 5.6 x 13.6 x sin 84	**M1**
37.871 or better	**A1**
37.9 cm² cao	**A1**
Answer: 37.9 cm^2	

Question 4

1/2 x 11.4 x 12.1 x sin C = 65.2	**M1**
sin C = 0.9453	**M1**
71.0 degrees cao	**A1**
Answer: 71.0 degrees	

Question 5

$BC^2 = 4.1^2 + 8.5^2 - 2 \times 4.1 \times 8.5 \times \cos 116$	**M1**
$BC^2 = 119.61$ (or a correct evaluation)	**M1**
10.9 cm cao	**A1**
Answer: 10.9 cm	

Question 6

sin B / AC = sin A / BC or equivalent	**M1**
sin B = 10.3 x sin 59 / 12.1	**M1**
46.9 degrees cao	**A1**
Answer: 46.9 degrees	

Question 7

angle POQ = 130 degrees	**B1**
$PQ^2 = 29^2 + 6^2 - 2 \times 29 \times 6 \times \cos 130$	**M1**
square root taken	**M1**
33.2 km cao	**A1**
Answer: 33.2 km	

Question 8

$\cos A = (11.6^2 + 10.2^2 - 8.5^2) / (2 \times 11.6 \times 10.2)$	**M1**
cos A = 0.7030	**M1**
45.3 degrees cao	**A1**
Answer: 45.3 degrees	

Question 9

1/2 x 11.4 x 8.3 x sin 57	**M1**
39.678 or better	**A1**
39.7 cm² cao	**A1**
Answer: 39.7 cm^2	

Question 10

$BC^2 = 12.0^2 + 4.9^2 - 2 \times 12.0 \times 4.9 \times \cos 83$	**M1**
BC = 12.40 or better	**A1**
sin B / 4.9 = sin 83 / BC	**M1**
sin B = 4.9 x sin 83 / BC	**M1**
23.1 degrees cao	**A1**
Answer: 23.1 degrees	

Question 11

$BC^2 = 4.0^2 + 7.0^2 - 2 \times 4.0 \times 7.0 \times \cos 107$	**M1**
$BC^2 = 81.37$ (or a correct evaluation)	**M1**
9.02 cm cao	**A1**
Answer: 9.02 cm	

Question 12

AC / sin B = BC / sin A or equivalent	**M1**
AC = 14.9 x sin 56 / sin 29	**M1**
25.5 cm cao	**A1**
Answer: 25.5 cm	

Question 13

angle POQ = 85 degrees	**B1**
$PQ^2 = 23^2 + 28^2 - 2 \times 23 \times 28 \times \cos 85$	**M1**
square root taken	**M1**
34.7 km cao	**A1**
Answer: 34.7 km	

Question 14

$\cos A = (6.0^2 + 3.3^2 - 8.4^2) / (2 \times 6.0 \times 3.3)$	**M1**
cos A = -0.5977	**M1**
126.7 degrees cao	**A1**
Answer: 126.7 degrees	

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