3.5 Sine Rule, Cosine Rule and Area of a Triangle: Test Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In triangle ABC, angle A = 30 degrees and angle B = 90 degrees. State the size of angle C.

(Total for Question 1 is 1 mark)

---

2 A triangle has two known angles and one known side, and that side is not between the two given angles (an AAS triangle).

(a) Which rule should be used first to find one of the unknown sides? **(1)**

- ☐ A) Sine rule
- ☐ B) Cosine rule
- ☐ C) Area = 1/2 * a * b * sin(C)
- ☐ D) Pythagoras' theorem

(Total for Question 2 is 1 mark)

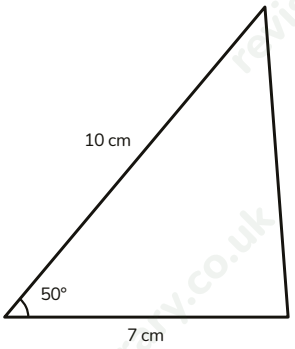
---

3 State the sine rule for a triangle with sides a, b, c opposite angles A, B, C respectively.

(Total for Question 3 is 1 mark)

© Revision Library | revisionlibrary.co.uk

4 Calculate the area of a triangle with sides 7 cm and 10 cm, and an included angle of 50 degrees, giving your answer correct to 3 significant figures.



(Total for Question 4 is 2 marks)

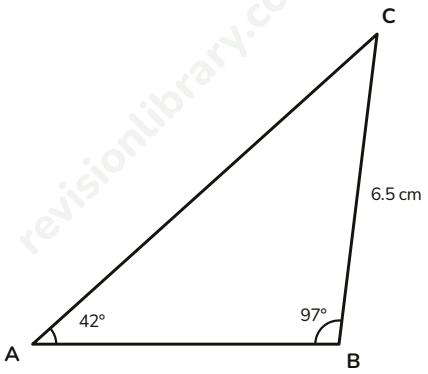
© Revision Library | revisionlibrary.co.uk

5 In triangle ABC, angle A = 42 degrees and angle B = 97 degrees. Find angle C.

(Total for Question 5 is 1 mark)

---

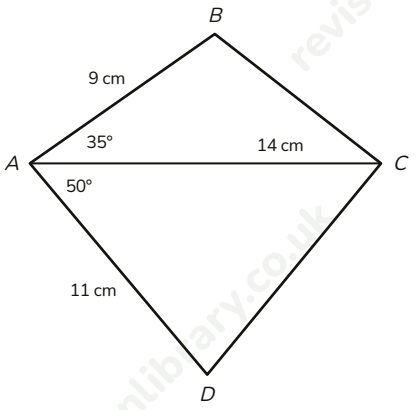
6 In triangle ABC, angle A = 42 degrees, angle B = 97 degrees and side a = 6.5 cm (opposite angle A). Calculate side c (opposite angle C), giving your answer correct to 3 significant figures.



(Total for Question 6 is 2 marks)

© Revision Library | revisionlibrary.co.uk

7 Quadrilateral ABCD has diagonal AC = 14 cm. In triangle ABC, AB = 9 cm and angle BAC = 35 degrees. In triangle ACD, AD = 11 cm and angle DAC = 50 degrees, with B and D on opposite sides of the diagonal AC.



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

.....

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

.....

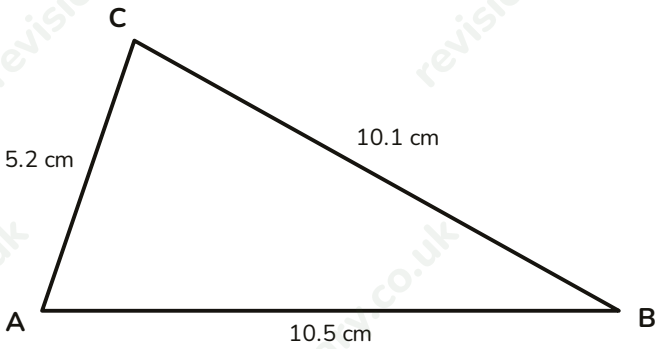
(c) Hence calculate the total area of quadrilateral ABCD, giving your answer correct to 3 significant figures. **(1)**

.....

(Total for Question 7 is 5 marks)

© Revision Library | revisionlibrary.co.uk

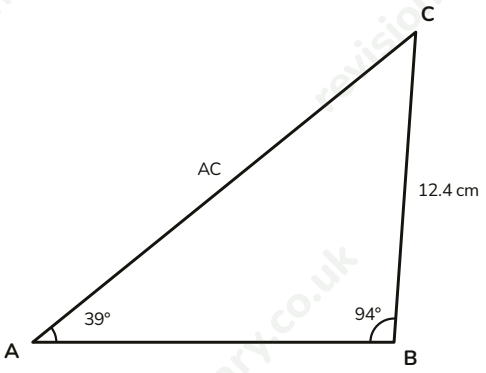
8 In triangle ABC, AB = 10.5 cm, AC = 5.2 cm and BC = 10.1 cm. Calculate the size of angle A. Give your answer correct to 1 decimal place.



(Total for Question 8 is 3 marks)

---

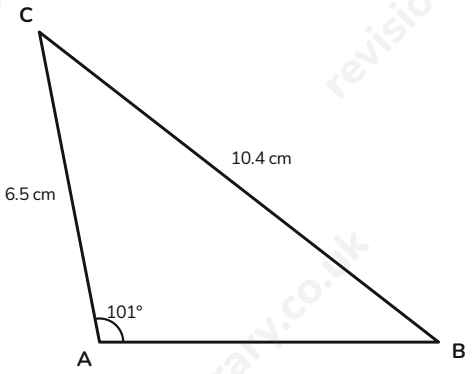
9 In triangle ABC, angle A = 39 degrees, angle B = 94 degrees and BC = 12.4 cm. Calculate the length of AC. Give your answer correct to 3 significant figures.



(Total for Question 9 is 3 marks)

© Revision Library | revisionlibrary.co.uk

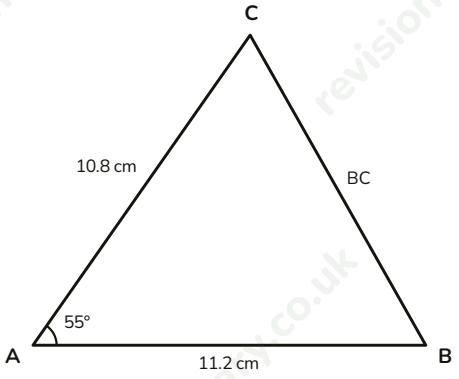
10 In triangle ABC, angle A = 101 degrees, BC = 10.4 cm and AC = 6.5 cm. Angle B is acute. Calculate the size of angle B. Give your answer correct to 1 decimal place.



(Total for Question 10 is 3 marks)

---

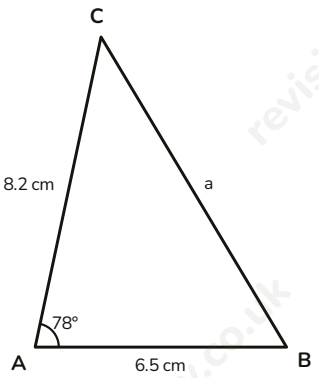
11 In triangle ABC, AB = 11.2 cm, AC = 10.8 cm and angle A = 55 degrees. Calculate the length of BC. Give your answer correct to 3 significant figures.



(Total for Question 11 is 3 marks)

© Revision Library | revisionlibrary.co.uk

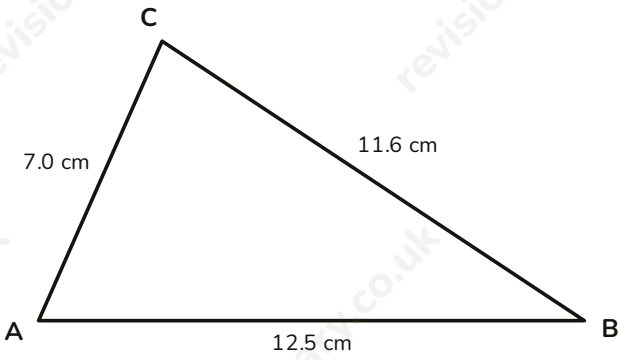
12 In triangle ABC, b = 8.2 cm, c = 6.5 cm and the angle between them, angle A, = 78 degrees.



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

(Total for Question 12 is 3 marks)

13 In triangle ABC, AB = 12.5 cm, AC = 7.0 cm and BC = 11.6 cm. Calculate the size of angle A. Give your answer correct to 1 decimal place.



(Total for Question 13 is 3 marks)

© Revision Library | revisionlibrary.co.uk

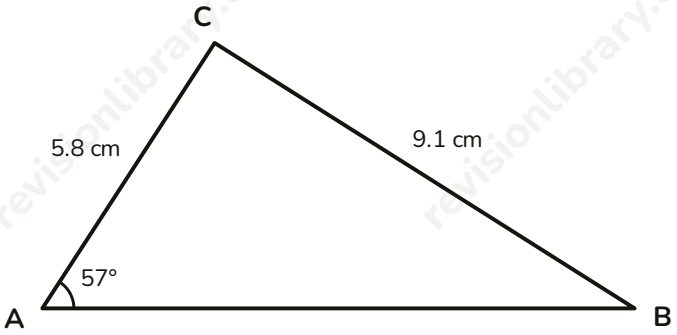
14 In triangle ABC, AB = 11.2 cm, AC = 3.0 cm and angle A = 57 degrees. Calculate the length of BC. Give your answer correct to 3 significant figures.



(Total for Question 14 is 3 marks)

---

15 In triangle ABC, angle A = 57 degrees, BC = 9.1 cm and AC = 5.8 cm. Angle B is acute. Calculate the size of angle B. Give your answer correct to 1 decimal place.



(Total for Question 15 is 3 marks)

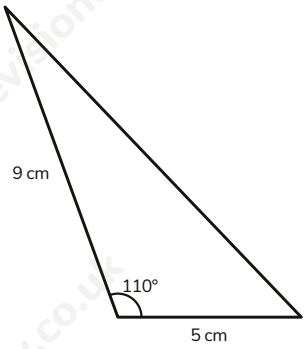
© Revision Library | revisionlibrary.co.uk

16 A triangle has all three side lengths known but none of its angles are known.

(a) Explain why the cosine rule, rather than the sine rule, must be used to find one of the angles. **(2)**

(Total for Question 16 is 2 marks)

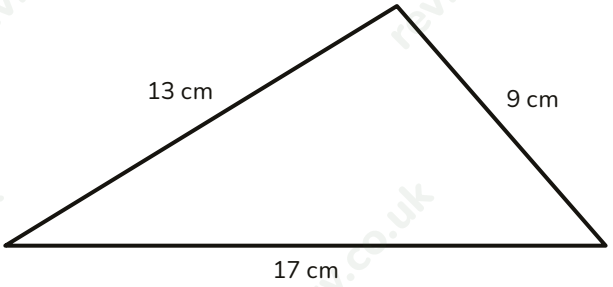
17 A triangle has sides of length 5 cm and 9 cm with an included angle of 110 degrees. Calculate the area of the triangle, giving your answer correct to 3 significant figures.



(Total for Question 17 is 2 marks)

© Revision Library | revisionlibrary.co.uk

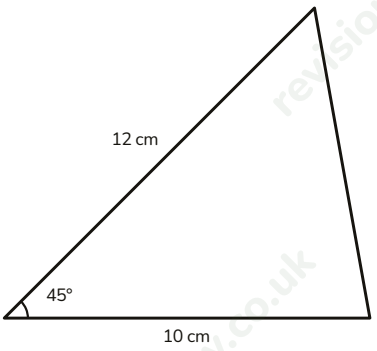
18 A triangle has sides 9 cm, 13 cm and 17 cm. Calculate the size of the smallest angle, giving your answer correct to 1 decimal place.



(Total for Question 18 is 3 marks)

© Revision Library | revisionlibrary.co.uk

19 A triangle has two sides of length 10 cm and 12 cm with an included angle of 45 degrees.

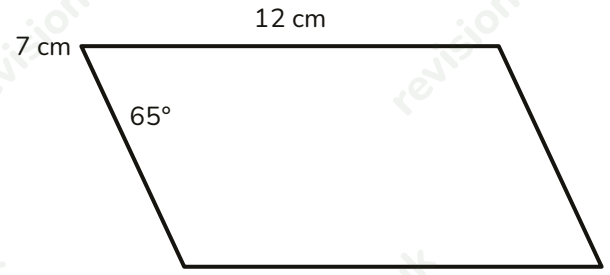


(a) Show that the exact area of the triangle is $30*\sqrt{2}$ cm^2. **(3)**

(Total for Question 19 is 3 marks)

---

20 A parallelogram has sides of length 7 cm and 12 cm, with one interior angle of 65 degrees.
Calculate the area of the parallelogram, giving your answer correct to 3 significant figures.



(Total for Question 20 is 3 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 3.5 Sine Rule, Cosine Rule and Area of a Triangle: Test Pack

Question 1

60 degrees cao **B1**

Answer: 60 degrees

Question 2

(a) A cao **B1**

(a) Answer: A) Sine rule

Question 3

a/sin(A) = b/sin(B) = c/sin(C) oe (reciprocal form also accepted) **B1**

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

Question 4

Area = 1/2 * 7 * 10 * sin(50) **M1**

26.8 cm² awrt **A1**

Answer: 26.8 cm^2

Question 5

41 degrees cao **B1**

Answer: 41 degrees

Question 6

correct sine rule setup: c/sin(41) = 6.5/sin(42), using angle C = 180 - 42 - 97 = 41 **M1**

6.37 cm awrt **A1**

Answer: 6.37 cm

Question 7

(a) Area = 1/2 * 9 * 14 * sin(35) **M1**

(a) 36.1 cm² awrt **A1**

(a) Answer: 36.1 cm^2

(b) Area = 1/2 * 11 * 14 * sin(50) **M1**

(b) 59.0 cm² awrt **A1**

(b) Answer: 59.0 cm^2

(c) 95.1 cm² ft from parts (a) and (b) **B1**

(c) Answer: 95.1 cm^2

Question 8

cos A = $(5.2^2 + 10.5^2 - 10.1^2) / (2 \times 5.2 \times 10.5)$ **M1**

cos A = 0.3231 **M1**

71.2 degrees cao **A1**

Answer: 71.2 degrees

Question 9

AC / sin B = BC / sin A or equivalent **M1**

AC = 12.4 x sin 94 / sin 39 **M1**

19.7 cm cao **A1**

Answer: 19.7 cm

Question 10

sin B / AC = sin A / BC or equivalent **M1**

sin B = 6.5 x sin 101 / 10.4 **M1**

37.8 degrees cao **A1**

Answer: 37.8 degrees

Question 11

$BC^2 = 11.2^2 + 10.8^2 - 2 \times 11.2 \times 10.8 \times \cos 55$ **M1**

BC^2 = 103.32 (or a correct evaluation) **M1**

10.2 cm cao **A1**

Answer: 10.2 cm

Question 12

(a) correct substitution $a^2 = 8.2^2 + 6.5^2 - 2(8.2)(6.5)\cos(78)$ **M1**

(a) a^2 = 109.49 - 22.16 = 87.3 (awrt) oe **M1**

(a) a = 9.34 cm awrt **A1**

(a) Answer: a = 9.34 cm

Question 13

cos A = $(7.0^2 + 12.5^2 - 11.6^2) / (2 \times 7.0 \times 12.5)$ **M1**

cos A = 0.4039 **M1**

66.2 degrees cao **A1**

Answer: 66.2 degrees

Question 14

$BC^2 = 11.2^2 + 3.0^2 - 2 \times 11.2 \times 3.0 \times \cos 57$ **M1**

BC^2 = 97.84 (or a correct evaluation) **M1**

9.89 cm cao **A1**

Answer: 9.89 cm

Question 15

sin B / AC = sin A / BC or equivalent **M1**

sin B = 5.8 x sin 57 / 9.1 **M1**

32.3 degrees cao **A1**

Answer: 32.3 degrees

Question 16

(a) states that the sine rule needs at least one known angle-side pair (an angle and its opposite side) to set up a valid ratio oe **B1**

(a) states that the cosine rule, rearranged to find an angle, only requires the three side lengths, which are all known here oe **B1**

(a) Answer: The sine rule needs a known angle to form a ratio with its opposite side; here no angles are known, so it cannot be used. The cosine rule, rearranged as cos(A) = $(b^2+c^2-a^2)/(2bc)$, needs only the three sides, all of which are given, so it can be used to find an angle directly.

Question 17

Area = 1/2 * 5 * 9 * sin(110) **M1**

21.1 cm² awrt **A1**

Answer: 21.1 cm^2

Question 18

identifies that the smallest angle is opposite the shortest side, 9 cm **M1**

correct rearranged cosine rule: $\cos(\theta) = (13^2 + 17^2 - 9^2)/(2*13*17)$ oe **M1**

31.5 degrees awrt **A1**

Answer: 31.5 degrees

© Revision Library | revisionlibrary.co.uk

Question 19

(a) Area = 1/2 * 10 * 12 * sin(45)	**M1**
(a) sin(45) = $\sqrt{2}/2$ used exactly oe	**M1**
(a) Area = $60*\sqrt{2}/2 = 30*\sqrt{2}$ cm^2, fully shown cso	**A1**

(a) Answer: $30*\sqrt{2}$ cm^2 (shown)

Question 20

recognises the area of a parallelogram with sides p, q and included angle θ is Area = p*q*sin(θ) (twice the area of the triangle formed by a diagonal)	**M1**
correct substitution: Area = 7*12*sin(65)	**M1**
76.1 cm^2 awrt	**A1**

Answer: 76.1 cm^2

© Revision Library | revisionlibrary.co.uk