3.5 Sine Rule, Cosine Rule and Area of a Triangle: 30-minute Pack

AQA 8365 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In triangle PQR, p = 10 cm, q = 14 cm and angle R = 90 degrees. State the value of sin(R).

(Total for Question 1 is 1 mark)

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2 Hence calculate the area of triangle PQR.

(Total for Question 2 is 2 marks)

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3 State the cosine rule used to find the length of side a.

(Total for Question 3 is 1 mark)

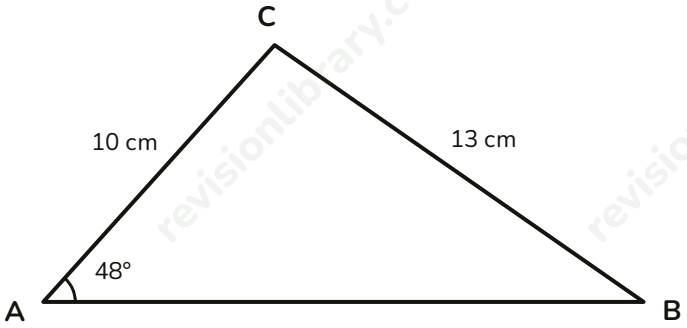
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4 State the formula for the area of a triangle in terms of two sides p and q and the included angle R.

(Total for Question 4 is 1 mark)

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5 In triangle ABC, angle A = 48 degrees, side a (opposite angle A, i.e. BC) = 13 cm and side b (opposite angle B, i.e. AC) = 10 cm.



(a) Calculate angle B, giving your answer correct to 1 decimal place. **(3)**

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(b) Hence calculate angle C. **(1)**

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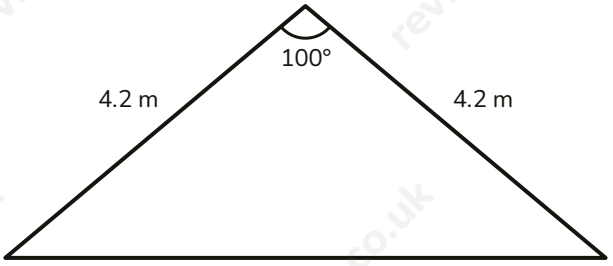
(c) Hence calculate the area of triangle ABC, giving your answer correct to 3 significant figures. **(3)**

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(Total for Question 5 is 7 marks)

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6 A symmetrical roof truss forms an isosceles triangle. The two equal sloping sides each have length 4.2 m, and the angle between them at the apex is 100 degrees.



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

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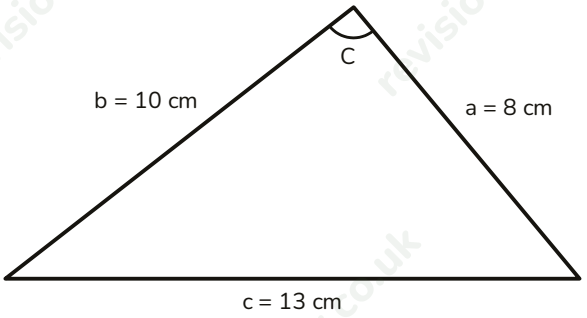
(b) Calculate the area enclosed by the truss, giving your answer correct to 3 significant figures. **(2)**

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(Total for Question 6 is 5 marks)

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7 A triangle has sides a = 8 cm, b = 10 cm and c = 13 cm, where angle C is opposite side c.



(a) Calculate the size of angle C, giving your answer correct to 1 decimal place. **(3)**

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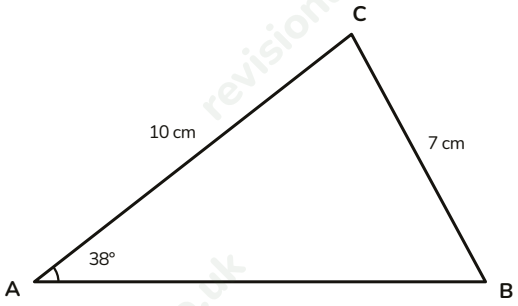
(b) Hence calculate the area of the triangle, giving your answer correct to 3 significant figures. **(3)**

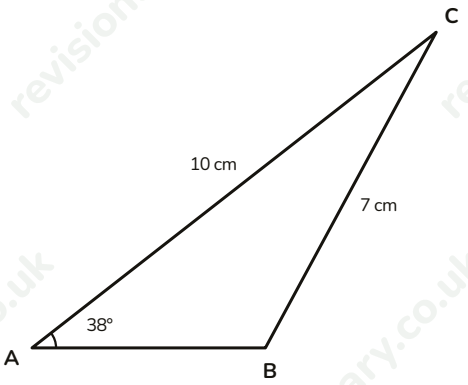
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(Total for Question 7 is 6 marks)

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8 In triangle ABC, angle A = 38 degrees, side a = 7 cm and side b = 10 cm.





(a) There are two possible values for angle B. Calculate both, giving your answers correct to 1 decimal place. **(4)**

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(b) Hence find the two corresponding values of angle C. **(2)**

.....

(Total for Question 8 is 6 marks)

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Mark scheme · 3.5 Sine Rule, Cosine Rule and Area of a Triangle: 30-minute Pack

Question 1

1 cao **B1**

Answer: 1

Question 2

Area = 1/2 * 10 * 14 * sin(90), ft from part above **M1**

70 cm² cao **A1**

Answer: 70 cm^2

Question 3

$a^2 = b^2 + c^2$ - 2bc*cos(A) oe **B1**

Answer: $a^2 = b^2 + c^2$ - 2bc*cos(A)

Question 4

Area = 1/2 * p * q * sin(R) oe **B1**

Answer: Area = (1/2)*p*q*sin(R)

Question 5

(a) correct sine rule setup sin(B)/10 = sin(48)/13 oe **M1**

(a) sin(B) = 10*sin(48)/13 = 0.572 (awrt) **M1**

(a) B = 34.9 degrees awrt **A1**

(a) Answer: B = 34.9 degrees

(b) C = 180 - 48 - 34.9 = 97.1 degrees ft from part (a) **B1**

(b) Answer: C = 97.1 degrees

(c) Area = 1/2 * 13 * 10 * sin(97.1), ft from part (b) **M1**

(c) = 65*sin(97.1) = 65*0.9923 (awrt) **M1**

(c) Area = 64.5 cm² awrt **A1**

(c) Answer: 64.5 cm^2

Question 6

(a) correct substitution $base^2 = 4.2^2 + 4.2^2$ - 2(4.2)(4.2)cos(100) **M1**

(a) = 35.28 - 35.28*(-0.17365) = 41.4 (awrt) oe **M1**

(a) base = 6.43 m awrt **A1**

(a) Answer: 6.43 m

(b) Area = 1/2 * 4.2 * 4.2 * sin(100) **M1**

(b) 8.69 m² awrt **A1**

(b) Answer: 8.69 m^2

Question 7

(a) correct rearranged cosine rule cos(C) = $(8^2 + 10^2 - 13^2)/(2*8*10)$ oe **M1**

(a) cos(C) = -5/160 = -0.03125 (awrt) **M1**

(a) C = 91.8 degrees awrt **A1**

(a) Answer: C = 91.8 degrees

(b) Area = 1/2 * 8 * 10 * sin(91.8), ft from part (a) **M1**

(b) = 40*sin(91.8) = 40*0.9995 (awrt) **M1**

(b) Area = 40.0 cm² awrt **A1**

(b) Answer: 40.0 cm^2

Question 8

(a) correct sine rule setup sin(B)/10 = sin(38)/7 oe **M1**

(a) sin(B) = 10*sin(38)/7 = 0.8795 (awrt), giving B = 61.6 (awrt) **M1**

(a) recognises the ambiguous case applies since b > a and b*sin(A) < a < b, giving a second value B = 180 - 61.6 **M1**

(a) B = 61.6 degrees or B = 118.4 degrees (both required) awrt **A1**

(a) Answer: B = 61.6 degrees or 118.4 degrees

(b) C = 180 - 38 - B for each value of B, ft from part (a) **M1**

(b) C = 80.4 degrees or C = 23.6 degrees (both required) awrt **A1**

(b) Answer: C = 80.4 degrees or 23.6 degrees

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