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7.11 Finding the Area of Any Triangle: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

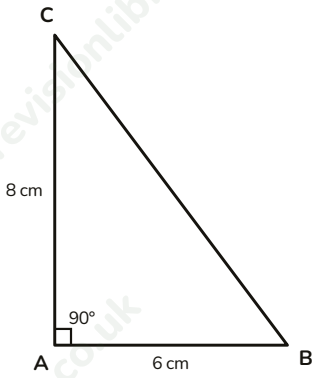
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out the area of a triangle with two sides 6 cm and 8 cm and included angle 90 degrees.

Diagram NOT accurately drawn



(Total for Question 1 is 1 mark)

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2 Which of these is the correct formula for finding the area of a triangle when you know two sides, a and b, and the included angle C between them?

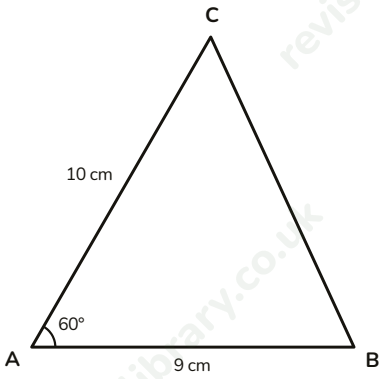
- ☐ A) Area = a x b x sin C
- ☐ B) Area = 1/2 x a x b x sin C
- ☐ C) Area = 1/2 x a x b x cos C
- ☐ D) Area = a x b x cos C

(Total for Question 2 is 1 mark)

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3 Find the exact area of a triangle with sides 9 cm and 10 cm and included angle 60 degrees.
Give your answer in surd form.

Diagram NOT accurately drawn

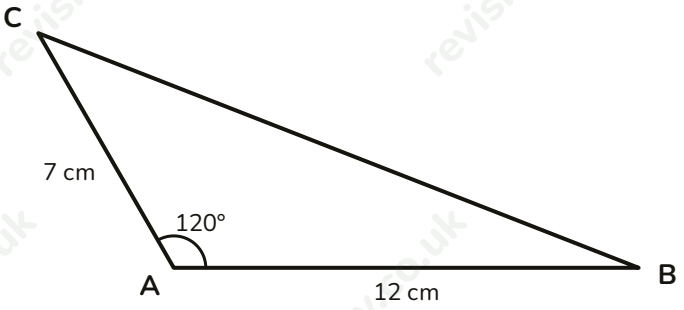


(Total for Question 3 is 2 marks)

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4 Calculate the area of a triangle with sides 12 cm and 7 cm and included angle 120 degrees.
Give your answer to 1 decimal place.

Diagram NOT accurately drawn



(Total for Question 4 is 2 marks)

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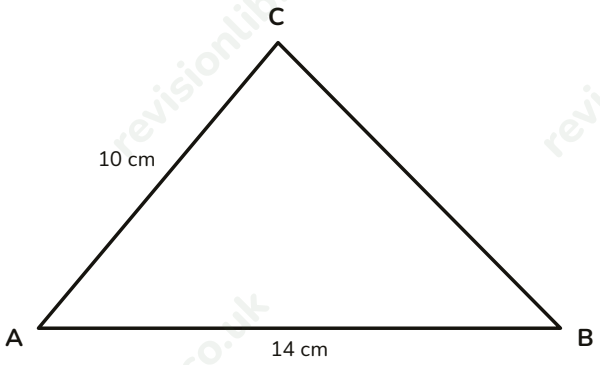
5 The area of a triangle is 21 cm². Two sides are 7 cm and 9 cm. The included angle is acute. Work out the included angle to 1 decimal place.

(Total for Question 5 is 3 marks)

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6 Triangle ABC has AB = 14 cm, AC = 10 cm and area 35 cm².

Diagram NOT accurately drawn



(a) Find all possible values of angle A. **(2)**

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(b) For angle A = 30 degrees, find the length BC, correct to 2 decimal places. **(2)**

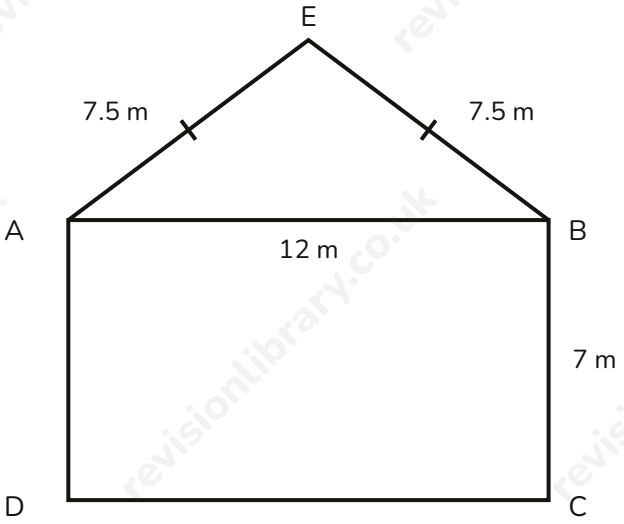
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(Total for Question 6 is 4 marks)

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7 A rectangular lawn ABCD has AB = 12 m and BC = 7 m. An isosceles triangular flower bed is attached to side AB, outside the rectangle, with the two equal slant sides of the triangle each measuring 7.5 m. Work out the total area of the lawn and the flower bed together.

Diagram NOT accurately drawn

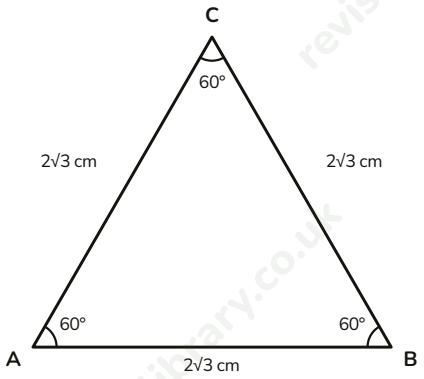


(Total for Question 7 is 5 marks)

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8 An equilateral triangle has sides of length $2*\sqrt{3}$ cm and each interior angle is 60 degrees. Show that the area of the triangle is $3*\sqrt{3}$ cm^2.

Diagram NOT accurately drawn

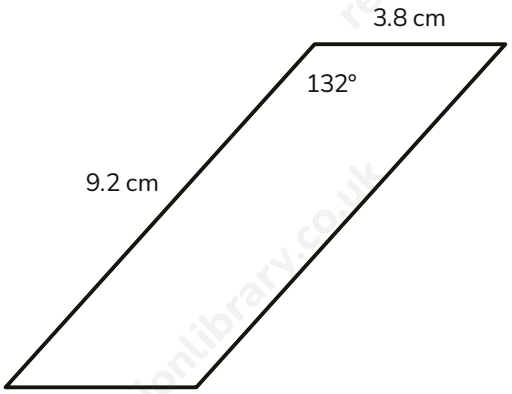


(Total for Question 8 is 3 marks)

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9 A parallelogram has sides of length 3.8 cm and 9.2 cm. The angle between these two sides is 132 degrees. Work out the area of the parallelogram. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

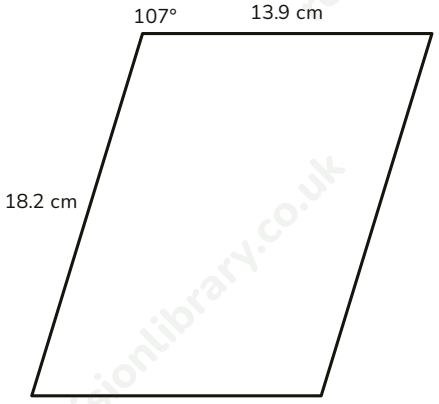


(Total for Question 9 is 2 marks)

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10 A parallelogram has sides of length 13.9 cm and 18.2 cm. The angle between these two sides is 107 degrees. Work out the area of the parallelogram. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn

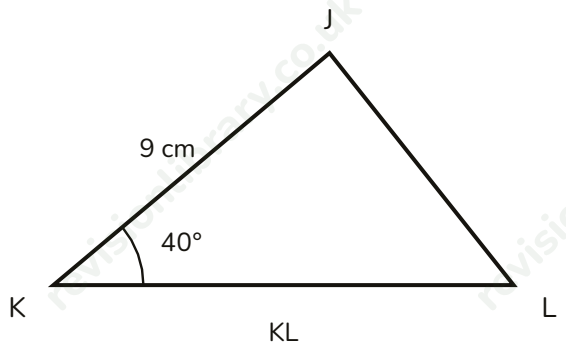


(Total for Question 10 is 2 marks)

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11 The area of triangle JKL is 34 cm². JK = 9 cm and angle JKL = 40 degrees. Calculate the length of KL. Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



(Total for Question 11 is 3 marks)

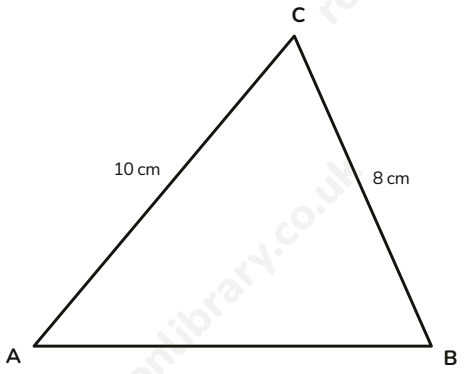
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12 Two sides of a triangle are 10 cm and 8 cm and the area is 20 cm².

(a) Find the two possible values of the included angle C.

(b) For each possible angle, find the length of the third side to 2 decimal places.

Diagram NOT accurately drawn

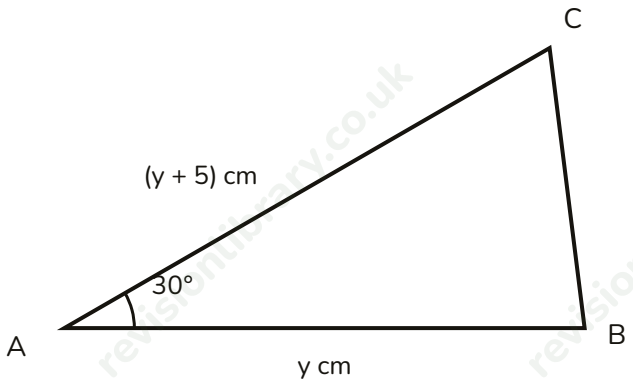


(Total for Question 12 is 5 marks)

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13 The area of triangle ABC is 51 cm². AB = y cm, AC = (y + 5) cm, and angle BAC = 30 degrees.

Diagram NOT accurately drawn



(a) Show that $y^2 + 5y - 204 = 0$ **(3)**

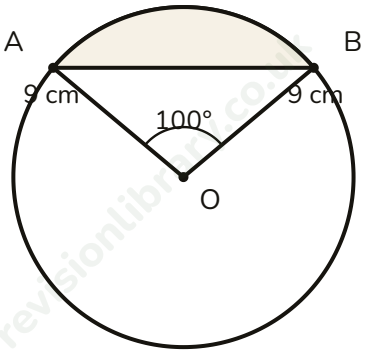
(b) Hence find the length of AC. **(3)**

(Total for Question 13 is 6 marks)

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14 A sector of a circle with centre O has radius 9 cm and an angle of 100 degrees at the centre. Calculate the area of the shaded segment (the region between the chord and the arc). Give your answer correct to 3 significant figures.

Diagram NOT accurately drawn



(Total for Question 14 is 5 marks)

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Mark scheme · 7.11 Finding the Area of Any Triangle: Test Pack

Question 1

24 cm² cao **B1**

Answer: 24 cm²

Question 2

B oe **B1**

Answer: B) Area = 1/2 x a x b x sin C

Question 3

use 1/2 * 9 * 10 * sin60 or equivalent method **M1**

$45*\sqrt{3}/2$ cm² cao **A1**

Answer: $45*\sqrt{3}/2$ cm²

Question 4

use 1/2 * 12 * 7 * sin120 (sin120 = sin60 = $\sqrt{3}/2$) oe **M1**

36.4 cm² awrt **A1**

Answer: 36.4 cm² (awrt)

Question 5

use 1/2 * 7 * 9 * sin C = 21 so sin C = 42/63 = 2/3 **M1**

take inverse sine to find C = arcsin(2/3) oe **M1**

41.8 degrees cao **A1**

Answer: 41.8 degrees

Question 6

(a) use sin A = 2*area/(AB*AC) = 70/140 = 0.5 **M1**

(a) 30 degrees and 150 degrees cao **A1**

(a) Answer: 30 degrees or 150 degrees

(b) use law of cosines: $BC^2 = 14^2 + 10^2 - 2*14*10*\cos30$ **M1**

(b) 7.32 cm cao **A1**

(b) Answer: 7.32 cm

Question 7

half base = 6 m identified **M1**

$height^2 = 7.5^2 - 6^2$ (Pythagoras) **M1**

height = 4.5 m cao **A1**

triangle area = 1/2 x 12 x 4.5 (=27) and rectangle area = 12 x 7 (=84) **M1**

111 m² cao **A1**

Answer: 111 m²

Question 8

$1/2 \times 2\sqrt{3} \times 2\sqrt{3} \times \sin60$ oe **M1**

1/2 x 12 x sin60 (=6sin60), $\sin60 = \sqrt{3}/2$ used **M1**

$3\sqrt{3}$ cm² cso (all steps shown, answer given) **A1**

Answer: $3*\sqrt{3}$ cm² (answer given)

Question 9

uses ab sin C or twice the area of a triangle **M1**

26.0 cm² cao **A1**

Answer: 26.0 cm²

Question 10

uses ab sin C or twice the area of a triangle **M1**

242 cm² cao **A1**

Answer: 242 cm²

Question 11

34 = 1/2 x 9 x KL x sin40 oe **M1**

KL = 34 / (4.5 x sin40) **M1**

11.8 cm awrt **A1**

Answer: 11.8 cm (3 sf)

Question 12

use 1/2 * 10 * 8 * sin C = 20 so sin C = 20/40 = 0.5 **M1**

state C = 30 degrees or 150 degrees **M1**

use law of cosines for first case: $c^2 = 10^2 + 8^2 - 2*10*8*\cos30$ **M1**

calculate first c = 5.04 cm (awrt) and for second case set up $c^2 = 10^2 + 8^2 - 2*10*8*\cos150$ **M1**

second c = 17.39 cm cao **A1**

Answer: C = 30 degrees or 150 degrees; third side lengths approx 5.04 cm and 17.39 cm

Question 13

(a) 51 = 1/2 x y x (y+5) x sin30 oe **M1**

(a) sin30 = 0.5 used, 51 = 0.25y(y+5) **M1**

(a) $y^2 + 5y - 204 = 0$ cso (answer given, all steps shown) **A1**

(a) Answer: $y^2 + 5y - 204 = 0$ (answer given)

(b) (y-12)(y+17) = 0 oe, or use of the quadratic formula **M1**

(b) y = 12 (rejecting y = -17 as a length cannot be negative) **A1**

(b) AC = 17 cm cao **A1**

(b) Answer: AC = 17 cm

Question 14

sector area = 100/360 x π x 9^2 oe **M1**

70.7 cm² awrt (sector area) **A1**

triangle area = 1/2 x 9 x 9 x sin100 oe **M1**

39.9 cm² awrt (triangle area) **A1**

30.8 cm² awrt (segment = sector - triangle, ft) **A1**

Answer: 30.8 cm² (3 sf)

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