



7.11D Finding the Area of Any Triangle: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 55 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.

(Total for Question 1 is 1 mark)

- 2** Find the area of a triangle with sides 7 cm and 5 cm and included angle 30 degrees.

(Total for Question 2 is 1 mark)

- 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.

(Total for Question 3 is 2 marks)

- 4** The area of triangle ABC is 10 cm^2 . Side AB = 5 cm and side AC = 6 cm. Work out the size of angle A. Give your answer to the nearest degree.

(Total for Question 4 is 3 marks)

- 5 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.

(Total for Question 5 is 2 marks)

- 6 The area of a triangle is 28 cm^2 . One side is 9 cm and the included angle is 50 degrees. Work out the length of the other side, correct to 2 decimal places.

(Total for Question 6 is 3 marks)

- 7 In a triangle, two sides are 8 cm and 13 cm and the area is 26 cm^2 . Find all possible measures of the included angle x , in degrees.

(Total for Question 7 is 3 marks)

- 8 A triangular sail has sides 6.5 m and 4.2 m with included angle 37 degrees. Calculate the area of the sail, giving your answer to 2 decimal places.

(Total for Question 8 is 3 marks)

- 9 A triangle has area 15 cm^2 . One side is 4 cm and the included angle is 40 degrees. Work out the length of the other side, correct to 2 decimal places.

(Total for Question 9 is 3 marks)

- 10** The area of a triangle is 21 cm^2 . Two sides are 7 cm and 9 cm. Work out the included angle to 1 decimal place.

(Total for Question 10 is 3 marks)

- 11** Triangle ABC has $AB = 14 \text{ cm}$, $AC = 10 \text{ cm}$ and area 35 cm^2 .

(a) Find all possible values of angle A.

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

(a) Find all possible values of angle A.

(2)

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

(2)

(Total for Question 11 is 4 marks)

- 12** Triangle ABC has $AB = 12 \text{ m}$, angle A = 60 degrees and area 84 m^2 . Work out AC, correct to 2 decimal places.

(Total for Question 12 is 5 marks)

- 13** Two sides of a triangle are 10 cm and 8 cm and the area is 20 cm^2 .
- (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.

(Total for Question 13 is 5 marks)

- 14** A triangular garden has sides 7.5 m and 11.2 m with included angle 142° .
- (a) Calculate the area of the garden to 2 decimal places.
 - (b) If turf costs £3.50 per square metre, calculate the cost to the nearest penny.

(a) Calculate the area to 2 decimal places. (3)

(b) Calculate the cost of turf at £3.50 per m^2 to the nearest penny. (2)

(Total for Question 14 is 5 marks)

- 15** Triangle ABC has $AB = 15 \text{ cm}$, $AC = 10 \text{ cm}$ and area 36 cm^2 .
Work out angle A and then calculate the length BC. Give the final length BC to the nearest whole number.

(Total for Question 15 is 5 marks)

Mark scheme · 7.11D Finding the Area of Any Triangle: Fluency and Exam Drill

Question 1

- **B1** 24 cm^2 cao
- **Answer: 24 cm^2**

Question 2

- **B1** 8.75 cm^2 cao
- **Answer: 8.75 cm^2**

Question 3

- **M1** use $\frac{1}{2} * 9 * 10 * \sin 60$ or equivalent method
- **A1** $45 * \frac{\sqrt{3}}{2} \text{ cm}^2$ cao
- **Answer: $45 * \frac{\sqrt{3}}{2} \text{ cm}^2$**

Question 4

- **M1** use $\frac{1}{2} * 5 * 6 * \sin A = 10$ and form $\sin A = \frac{2 * \text{area}}{(ab)} = \frac{20}{30} = \frac{2}{3}$
- **M1** take $\arcsin: A = \arcsin(\frac{2}{3})$ oe
- **A1** 42 degrees cao
- **Answer: 42 degrees**

Question 5

- **M1** use $\frac{1}{2} * 12 * 7 * \sin 120$ ($\sin 120 = \sin 60 = \frac{\sqrt{3}}{2}$) oe
- **A1** 36.4 cm^2 awrt
- **Answer: 36.4 cm^2 (awrt)**

Question 6

- **M1** use $\frac{1}{2} * 9 * b * \sin 50 = 28$ and rearrange to $b = \frac{56}{(9 \sin 50)}$
- **M1** substitute and evaluate denominator correctly oe
- **A1** 8.12 cm cao
- **Answer: 8.12 cm**

Question 7

- **M1** use $\frac{1}{2} * 8 * 13 * \sin x = 26$ so $\sin x = \frac{26}{52} = 0.5$
- **M1** know that $\sin x = 0.5$ gives $x = 30 \text{ degrees}$ or $x = 150 \text{ degrees}$ oe
- **A1** 30 degrees and 150 degrees cao
- **Answer: 30 degrees or 150 degrees**

Question 8

- **M1** use $\frac{1}{2} * 6.5 * 4.2 * \sin 37$ or equivalent substitution
- **M1** evaluate $\sin 37$ and multiply correctly
- **A1** 8.21 m^2 cao
- **Answer: 8.21 m^2**

Question 9

- **M1** rearrange $\frac{1}{2} * 4 * b * \sin 40 = 15$ to $b = \frac{30}{(4 \sin 40)}$ or equivalent
- **M1** substitute value for $\sin 40$ and evaluate numerator/denominator correctly
- **A1** 11.67 cm cao
- **Answer: 11.67 cm**

Question 10

- **M1** use $\frac{1}{2} * 7 * 9 * \sin C = 21$ so $\sin C = 42/63 = 2/3$
- **M1** take inverse sine to find $C = \arcsin(2/3)$ oe
- **A1** 41.8 degrees cao
- **Answer: 41.8 degrees**

Question 11

- (a) **M1** use $\sin A = 2 * \text{area} / (AB * AC) = 70/140 = 0.5$
- (a) **A1** 30 degrees and 150 degrees cao
- (a) **Answer: 30 degrees or 150 degrees**
- (b) **M1** use law of cosines: $BC^2 = 14^2 + 10^2 - 2 * 14 * 10 * \cos 30$
- (b) **A1** 7.32 cm cao
- (b) **Answer: 7.32 cm**

Question 12

- **M1** use $\frac{1}{2} * AB * AC * \sin A = \text{area}$
- **M1** substitute: $\frac{1}{2} * 12 * AC * \sin 60 = 84$
- **M1** rearrange to $AC = 84 / (0.5 * 12 * \sin 60)$ or equivalent
- **M1** evaluate denominator correctly ($\sin 60 = \sqrt{3}/2$) and compute AC
- **A1** 16.17 m cao
- **Answer: 16.17 m**

Question 13

- **M1** use $\frac{1}{2} * 10 * 8 * \sin C = 20$ so $\sin C = 20/40 = 0.5$
- **M1** state $C = 30$ degrees or 150 degrees
- **M1** use law of cosines for first case: $c^2 = 10^2 + 8^2 - 2 * 10 * 8 * \cos 30$
- **M1** calculate first $c = 5.04$ cm (awrt) and for second case set up $c^2 = 10^2 + 8^2 - 2 * 10 * 8 * \cos 150$
- **A1** second $c = 17.39$ cm cao
- **Answer: C = 30 degrees or 150 degrees; third side lengths approx 5.04 cm and 17.39 cm**

Question 14

- (a) **M1** use $\frac{1}{2} * 7.5 * 11.2 * \sin 142$
- (a) **M1** evaluate $\sin 142$ correctly ($\sin 142 = \sin 38$) and multiply
- (a) **A1** 25.86 m² awrt
- (a) **Answer: 25.86 m²**
- (b) **M1** multiply the exact area (25.8578 m²) by 3.50
- (b) **A1** £90.50 cao
- (b) **Answer: £90.50**

Question 15

- **M1** use $\frac{1}{2} * 15 * 10 * \sin A = 36$ so $\sin A = 72/150 = 0.48$
- **M1** take inverse sine to find $A = \arcsin(0.48)$ oe
- **M1** use law of cosines: $BC^2 = 15^2 + 10^2 - 2 * 15 * 10 * \cos A$
- **M1** substitute $\cos A$ and evaluate BC
- **A1** 8 cm cao
- **Answer: 8 cm**