

GCSE Maths: Constructing triangles (Higher): answers

GCSE Maths - Loci, Bearings and Vectors - Higher - Lesson 22.3

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch22-constructions-loci-bearings-vectors/higher/constructing-triangles/

Exercise 22D Constructing triangles and measuring

Calculator allowed

1 Is there enough information to construct exactly one triangle? Write "Yes" or "No" and say why.

- (a) Three sides: 5 cm, 6 cm, 7 cm.

Answer: Yes (SSS)

- (b) Three angles: 40° , 60° , 80° .

Answer: No (AAA)

- (c) $AB = 6$ cm, angle $A = 35^\circ$, $AC = 4$ cm.

Answer: Yes (SAS)

- (d) Sides 3 cm, 4 cm and 8 cm.

Answer: No ($3 + 4 < 8$)

2 Construct each triangle with sides of the lengths given. Measure the largest angle in each.

- (a) Sides 4 cm, 5 cm and 6 cm.

Answer: 83° (accept 82° to 84°)

- (b) Sides 6 cm, 6 cm and 6 cm.

Answer: 60° (accept 59° to 61°)

- (c) Sides 3 cm, 4 cm and 5 cm.

Answer: 90° (accept 89° to 91°)

- (d) Sides 5 cm, 5 cm and 8 cm.

Answer: 106° (accept 105° to 107°)

3 Construct each triangle ABC. AB, the angle at A, and AC are given. Measure BC.

- (a) $AB = 7$ cm, angle $A = 40^\circ$, $AC = 5$ cm.

Answer: 4.5 cm (accept 4.4 to 4.6)

- (b) $AB = 6$ cm, angle $A = 90^\circ$, $AC = 8$ cm.

Answer: 10.0 cm (accept 9.9 to 10.1)

- (c) $AB = 5$ cm, angle $A = 60^\circ$, $AC = 5$ cm.

Answer: 5.0 cm (accept 4.9 to 5.1)

- (d) $AB = 8$ cm, angle $A = 120^\circ$, $AC = 6$ cm.

Answer: 12.2 cm (accept 12.1 to 12.3)

4 Construct each triangle ABC. Measure the length asked for.

- (a) Angle A = 40° , AB = 7 cm, angle B = 70° . Measure AC.

Answer: 7.0 cm (accept 6.9 to 7.1)

- (b) Angle A = 60° , AB = 6 cm, angle B = 60° . Measure AC.

Answer: 6.0 cm (accept 5.9 to 6.1)

- (c) Angle A = 30° , AB = 8 cm, angle B = 45° . Measure AC.

Answer: 5.9 cm (accept 5.8 to 6.0)

5 Construct a right-angled triangle with a right angle at B, AB = 6 cm and hypotenuse AC = 10 cm. Measure BC.

Answer: 8.0 cm

6 Triangle ABC is isosceles with AB = AC = 6 cm and BC = 4 cm. Construct the triangle. Measure angle BAC and one of the base angles.

Answer: angle A $\approx 39^\circ$, base angle $\approx 71^\circ$

7 A triangular plot of land has sides of 40 m, 50 m and 60 m. Make a scale drawing using a scale of 1 cm to 10 m. Measure the largest angle of the plot. Give your answer to the nearest degree.

Answer: 83° (accept 82° to 84°)

8 Two lighthouses A and B are 6 km apart. A boat C is seen from A at an angle of 50° from the line AB, and from B at an angle of 60° from the line BA, with the boat on the same side of AB. Make a scale drawing using 1 cm to 1 km. How far is the boat from A?

Answer: 5.5 cm (accept 5.4 to 5.6)

9 Katie says: "I can make a triangle with sides of 4 cm, 5 cm and 10 cm." Show that Katie is wrong.

Answer: $4 + 5 = 9$, which is less than 10

10 Two triangles both have angles of 50° , 60° and 70° . One has its shortest side 5 cm long and the other has its shortest side 8 cm long. Explain why these triangles are **not** congruent, and say what you can say about their shapes.

Answer: Same shape (similar) but different size, so not congruent

11 Construct triangle ABC with AB = 6 cm, AC = 4.5 cm and angle A = 50° . Measure BC. Then use the cosine rule to calculate BC, and show that your measurement agrees with the calculation to the nearest millimetre.

Answer: measured about 4.6 cm; calculated 4.64 cm

12 Challenge. Triangle ABC has angle A = 30° , AB = 7 cm and BC = 4 cm. Show that **two** different triangles are possible. Find the two possible lengths of AC.

Answer: AC = 8.0 cm or 4.1 cm

13 A rhombus has sides of 5 cm and one angle of 60° . Construct the rhombus. Measure its longer diagonal.

Answer: 8.7 cm

14 Challenge. A triangle has sides in the ratio 3 : 4 : 5 and a perimeter of 24 cm. Construct it. Show that it has a right angle.

Answer: Sides 6, 8, 10. $36 + 64 = 100$, so it is right-angled.

