



- 1 Here are the side lengths of four triangles.

Triangle A: 5 cm, 7 cm, 9 cm

Triangle B: 5 cm, 7 cm, 8 cm

Triangle C: 9 cm, 7 cm, 5 cm

Triangle D: 5 cm, 6 cm, 9 cm

Write down the letters of the two triangles that are congruent to each other.

(1 mark)

Congruent triangles have the same shape and size. SSS (side-side-side) says that three matching side lengths are enough to establish this, even if one triangle is rotated or reflected

Triangle A has sides 5 cm, 7 cm and 9 cm. Triangle C has sides 9 cm, 7 cm and 5 cm, which is the same set of three lengths

Triangle B (5, 7, 8) and Triangle D (5, 6, 9) each differ from this set, so the congruent pair is A and C

A and C

- 2 Lena says, "If two triangles have the same three angles, they must be congruent."

- Write down the four conditions that do show two triangles are congruent.
- Explain why Lena is wrong.

(2 marks)

a)

SSS, SAS, ASA, RHS

b)

Same angles = same shape, but not always the same size

e.g. sides 3, 4, 5 and sides 6, 8, 10 have equal angles

AAA only shows the triangles are similar

3

In triangles PQR and XYZ,

$$PQ = XY = 6 \text{ cm}$$

$$\text{angle } PQR = \text{angle } XYZ = 40^\circ$$

$$QR = YZ = 8 \text{ cm}$$

The two triangles are congruent.

Write down the congruence condition that shows the triangles are congruent.

(1 mark)

Two pairs of sides are equal

$$PQ = XY \text{ and } QR = YZ$$

The equal angles, angle PQR and angle XYZ, are between these pairs of sides at Q and at Y, so the angle is the included angle in each triangle

Two sides and the included angle match, so the condition is SAS

SAS

4

The diagram shows triangle PQR and triangle XYZ.

Are the two triangles congruent? Give a reason for your answer.

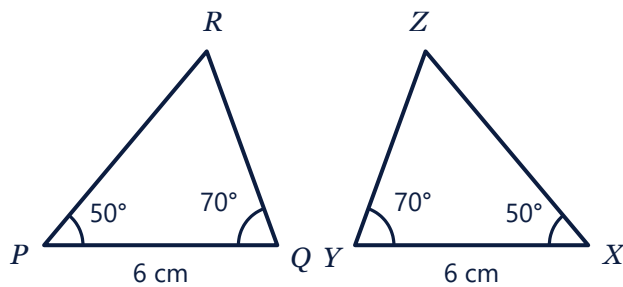


Diagram NOT accurately drawn

(2 marks)

$$PQ = XY = 6 \text{ cm}$$

$$\text{Angle } P = \text{angle } X = 50^\circ$$

$$\text{Angle } Q = \text{angle } Y = 70^\circ$$

The 6 cm side is between the two angles in both

Yes, congruent (ASA)

5

Triangle ABC is congruent to triangle DEF.

A corresponds to D, B corresponds to E and C corresponds to F.

AB = 7 cm, BC = 9 cm, angle ABC = 48° and angle BCA = 71° .

a. Write down the length of EF.

b. Write down the size of angle DEF.

c. Work out the size of angle EDF.

(3 marks)

a) EF matches BC

$$EF = 9 \text{ cm}$$

b) angle DEF matches angle ABC

$$\text{angle DEF} = 48^\circ$$

c) angle EDF matches angle BAC

$$180^\circ - 48^\circ - 71^\circ = 61^\circ$$

$$\boxed{\text{a) } 9 \text{ cm b) } 48^\circ \text{ c) } 61^\circ}$$

6

Rectangle A measures 4 cm by 6 cm.

Rectangle B is mathematically similar to rectangle A. The shorter side of rectangle B is 10 cm.

a. Work out the scale factor of the enlargement from A to B.

b. Work out the length of the longer side of rectangle B.

(2 marks)

a)

$$\text{scale factor} = 10 \div 4 = 2.5$$

b)

$$6 \times 2.5 = 15$$

$$\boxed{\text{a) } 2.5 \text{ b) } 15 \text{ cm}}$$

7

Triangle ABC is similar to triangle PQR.

AB corresponds to PQ, and BC corresponds to QR.

AB = 6 cm, PQ = 9 cm and BC = 8 cm.

Work out the length of QR.

(2 marks)

$$\text{Scale factor from ABC to PQR} = PQ \div AB = 9 \div 6 = 1.5$$

$$QR = BC \times 1.5 = 8 \times 1.5 = 12 \text{ cm}$$

$$\boxed{12 \text{ cm}}$$

8

Triangles ABC and PQR are mathematically similar.

Angle ABC = angle PQR and angle BCA = angle QRP.

- Work out the length of QR.
- Work out the length of AC.

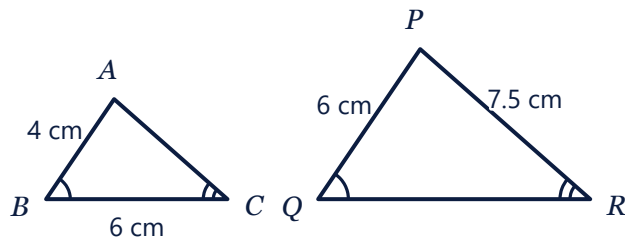


Diagram NOT accurately drawn

(3 marks)

Scale factor small to large

$$6 \div 4 = 1.5$$

a)

$$QR = 6 \times 1.5 = 9$$

b) large to small: divide

$$AC = 7.5 \div 1.5 = 5$$

a) 9 cm b) 5 cm

9

Jamal is 1.6 m tall. At 4 pm his shadow is 2 m long.

At the same time, a flagpole next to him casts a shadow 9 m long.

The sun makes similar triangles with Jamal and with the flagpole, as shown in the diagram.

Work out the height of the flagpole.

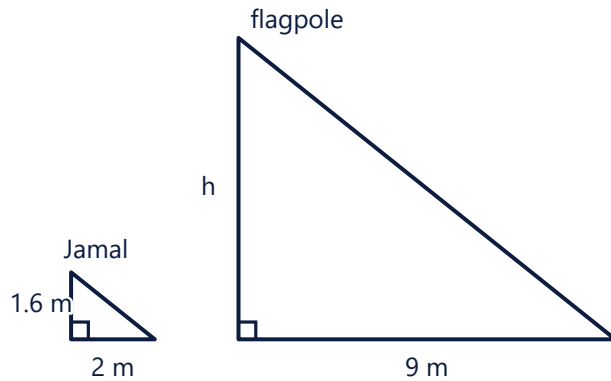


Diagram NOT accurately drawn

(3 marks)

Scale factor from the shadows

$$9 \div 2 = 4.5$$

$$1.6 \times 4.5 = 7.2$$

7.2 m

10

ABCD is a kite in which $AB = AD$ and $CB = CD$.

The diagonal AC is drawn.

Prove that triangle ABC is congruent to triangle ADC.

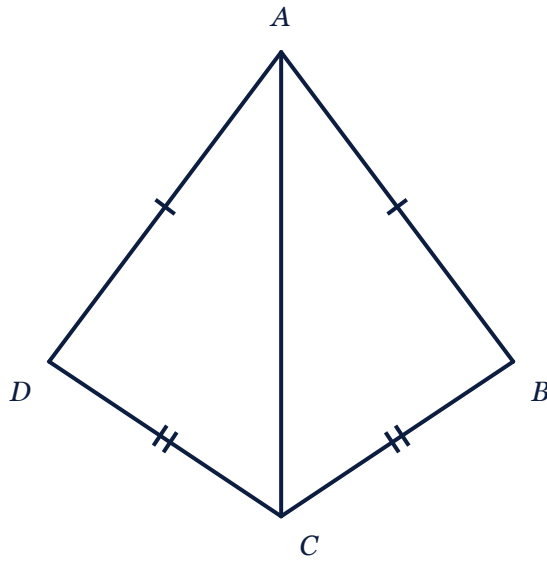


Diagram NOT accurately drawn

(3 marks)

$AB = AD$ because ABCD is a kite (given)

$CB = CD$ because ABCD is a kite (given)

AC is common to both triangles, so $AC = AC$

Three pairs of sides are equal, so triangle ABC is congruent to triangle ADC (SSS)

11

The straight lines AD and BC cross at M.

$AM = MD$ and $BM = MC$.

Prove that triangle ABM is congruent to triangle DCM.

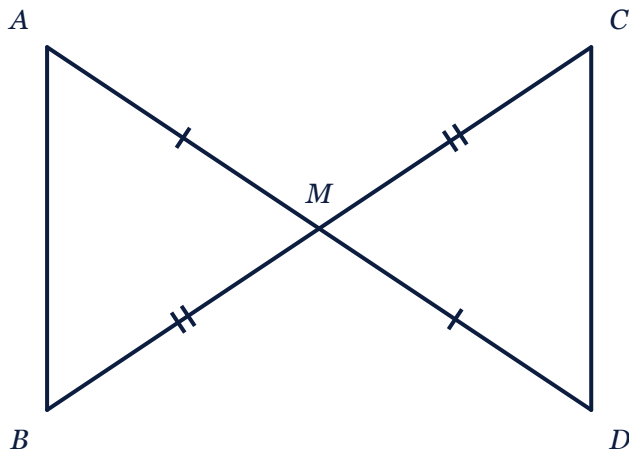


Diagram NOT accurately drawn

(3 marks)

$$AM = DM \text{ (given)}$$

$$BM = CM \text{ (given)}$$

angle $AMB = \text{angle } DMC$ (vertically opposite angles)

Congruent by SAS

- 12 In triangle ABC, D is a point on AB and E is a point on AC.
DE is parallel to BC.
AD = 4 cm, DB = 6 cm and DE = 5 cm.
Work out the length of BC.

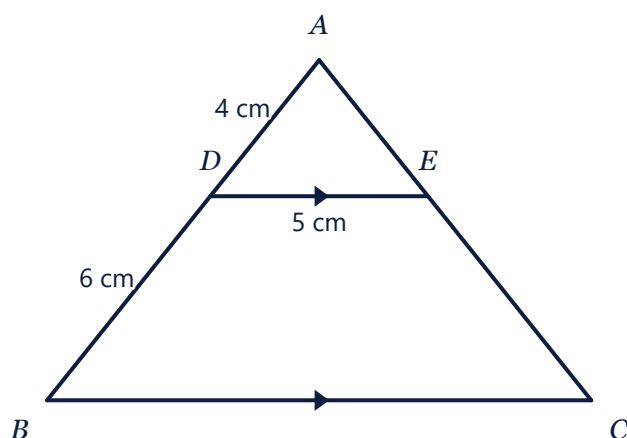


Diagram NOT accurately drawn

(3 marks)

The triangles share angle A, and the parallel lines give equal corresponding angles at D and B. Matching angles establish similarity before using a scale factor

Because DE is parallel to BC, triangle ADE is similar to triangle ABC

$AB = AD + DB = 4 + 6 = 10$ cm, so the scale factor from ADE to

$ABC = AB \div AD = 10 \div 4 = 2.5$

$BC = DE \times 2.5 = 5 \times 2.5 = 12.5$ cm

12.5 cm