

GCSE Mathematics

Worksheet: Similar shapes and matching lengths · Calculator

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Similar shapes and matching lengths

NAME

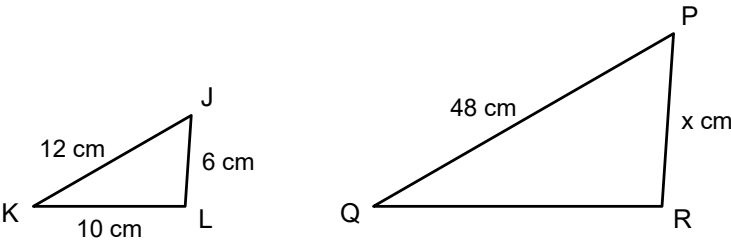
CLASS

DATE

- Use black ink or ball-point pen.
- Answer all questions. Answer the questions in the spaces provided – there may be more space than you need.
- Calculators may be used. If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working.

1

Triangle JKL is similar to triangle PQR.
Diagram NOT accurately drawn.



Work out the value of x .

$x =$

(2)

2

In triangle ABC, $AB = 4$ cm and $AC = 5$ cm.

In triangle DEF, $DE = 12$ cm and $DF = 15$ cm.

Angle BAC = angle EDF.

(a) Which condition shows that triangle ABC is similar to triangle DEF?

Tick (✓) **one** box.

AA (two pairs of equal angles)

☐

SAS (two pairs of sides in the same ratio, and the angles between them equal)

☐

SSS (all three pairs of sides in the same ratio)

☐

None of these: the information does not show that the triangles are similar

☐

(1)

(b) $BC = 4$ cm.

Work out the length of EF.

.....

.....

.....

.....

.....

.....

..... cm

(2)

3

In triangle JKL, JK = 5 cm and JL = 4 cm.

In triangle XYZ, XY = 10 cm and XZ = 8 cm.

Angle KJL = angle YXZ.

(a) Which condition shows that triangle JKL is similar to triangle XYZ?

Tick (✓) **one** box.

AA (two pairs of equal angles)

☐

SAS (two pairs of sides in the same ratio, and the angles between them equal)

☐

SSS (all three pairs of sides in the same ratio)

☐

None of these: the information does not show that the triangles are similar

☐

(1)

(b) KL = 4 cm.

Work out the length of YZ.

.....

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..... cm

(2)

(Total for Question 3 is 3 marks)

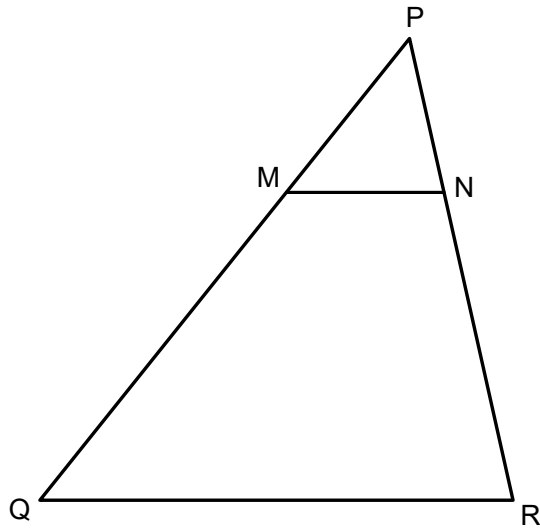
4

The diagram shows triangle PQR.

M is a point on PQ and N is a point on PR.

PM = 5 cm, PQ = 15 cm, PN = 4 cm and PR = 12 cm.

Diagram NOT accurately drawn.



(a) Show that $\frac{PM}{PQ} = \frac{PN}{PR}$.

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(2)

(b) Explain why triangle PMN is similar to triangle PQR.

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(2)

(c) $QR = 12\text{ cm}$.
Work out the length of MN .

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.....

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..... cm

(2)

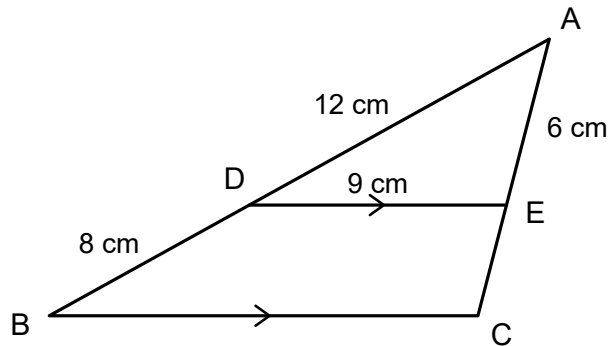
(Total for Question 4 is 6 marks)

5

D is a point on AB and E is a point on AC.

DE is parallel to BC.

Diagram NOT accurately drawn.



(a) Work out the length of BC.

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..... cm

(2)

(b) Work out the length of EC.

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..... cm

(2)

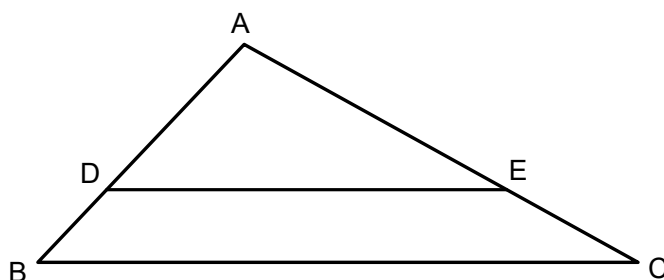
6

The diagram shows triangle ABC.

D is a point on AB and E is a point on AC.

AD = 4 cm, AB = 6 cm, AE = 6 cm and AC = 9 cm.

Diagram NOT accurately drawn.



(a) Show that $\frac{AD}{AB} = \frac{AE}{AC}$.

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(2)

(b) Explain why triangle ADE is similar to triangle ABC.

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(2)

(c) $BC = 12\text{ cm}$.

Work out the length of DE .

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..... cm

(2)

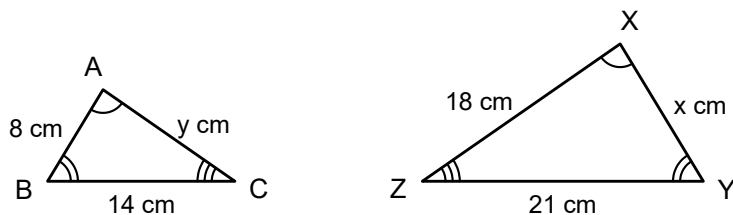
(Total for Question 6 is 6 marks)

7

Triangle ABC is similar to triangle XYZ.

Diagram NOT accurately drawn.

Angles marked with the same number of arcs are equal.



(a) Work out the value of x .

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$x =$

(2)

(b) Work out the value of y .

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.....

$y =$

(2)

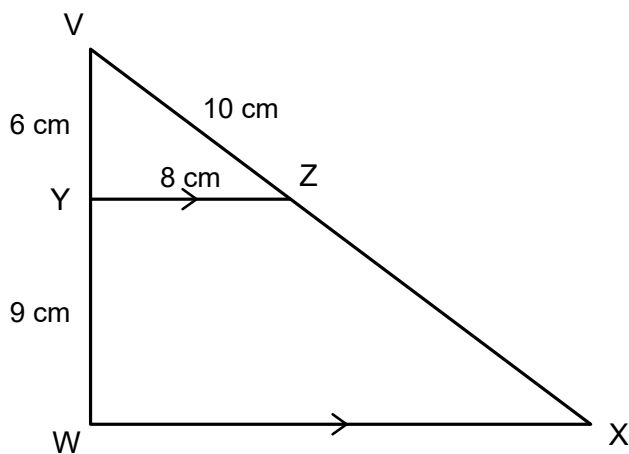
(Total for Question 7 is 4 marks)

8

Y is a point on VW and Z is a point on VX.

YZ is parallel to WX.

Diagram NOT accurately drawn.



(a) Work out the length of WX .

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..... cm

(2)

(b) Work out the length of ZX.

.....

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.....

.....

.....

..... cm

(2)

(Total for Question 8 is 4 marks)

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by Pearson Edexcel.

Mark scheme

GCSE Mathematics · Worksheet: Similar shapes and matching lengths · 32 marks

Question 1 (2 marks)

[2 marks]

Answer: $x = 24$

- **M1** for $48 \div 12 (= 4)$ or $6 \times 48 \div 12$
- **A1** for 24

Worked solution: Scale factor = $48 \div 12 = 4$

$$x = 6 \times 4 = 24$$

Question 2 (3 marks)

(a) [1 mark]

Correct: SAS (two pairs of sides in the same ratio, and the angles between them equal)

(b) [2 marks]

Answer: 12 cm

- **M1** for the scale factor 3 oe (e.g. $12 \div 4$)
- **A1** for 12

Worked solution: $\frac{DE}{AB} = \frac{12}{4} = 3$ and $\frac{DF}{AC} = \frac{15}{5} = 3$, and the angles between these sides are equal, so the triangles are similar (SAS).

$$EF = 4 \times 3 = 12 \text{ cm.}$$

Question 3 (3 marks)

(a) [1 mark]

Correct: SAS (two pairs of sides in the same ratio, and the angles between them equal)

(b) [2 marks]

Answer: 8 cm

- **M1** for the scale factor 2 oe (e.g. $10 \div 5$)
- **A1** for 8

Worked solution: $\frac{XY}{JK} = \frac{10}{5} = 2$ and $\frac{XZ}{JL} = \frac{8}{4} = 2$, and the angles between these sides are equal, so the triangles are similar (SAS).

$$YZ = 4 \times 2 = 8 \text{ cm.}$$

Question 4 (6 marks)

(a) [2 marks]

Answer: $\frac{PM}{PQ} = \frac{5}{15} = \frac{1}{3}$ and $\frac{PN}{PR} = \frac{4}{12} = \frac{1}{3}$.

- **M1** for $\frac{5}{15}$ or $\frac{4}{12}$ simplified to $\frac{1}{3}$ (or both written as equivalent decimals)
- **A1** for both fractions shown equal to $\frac{1}{3}$

Worked solution: $\frac{PM}{PQ} = \frac{5}{15} = \frac{1}{3}$ and $\frac{PN}{PR} = \frac{4}{12} = \frac{1}{3}$, so the two fractions are equal.

(b) [2 marks]

Answer: Angle MPN = angle QPR (the same angle), and it is between the two pairs of sides in the same ratio, so the triangles are similar (SAS).

- **C1** for angle MPN = angle QPR (common angle)
- **C1** for the equal angle is between the sides in the same ratio (from part (a)), so the triangles are similar (SAS)

Worked solution: The angle at P is in both triangles, so angle MPN = angle QPR. It is the angle between PM and PN and between PQ and PR, and by part (a) these pairs of sides are in the same ratio. So the triangles are similar (SAS).

(c) [2 marks]

Answer: 4 cm

- **M1** for $12 \times \frac{1}{3}$ oe
- **A1** for 4

Notes: Using $PM \div MQ (= \frac{1}{2})$ as the scale factor scores M0 A0.

Worked solution: MN corresponds to QR, so $MN = 12 \times \frac{1}{3} = 4 \text{ cm.}$

Question 5 (4 marks)

(a) [2 marks]

Answer: 15 cm

- **M1** for $20 \div 12 (= 5/3)$ or $9 \times 20 \div 12$
- **A1** for 15

Notes: M0 for $9 \times 8 \div 12$ (using DB instead of AB).

Worked solution: Triangles ADE and ABC are similar. $AB = 12 + 8 = 20$ cm

Scale factor = $20 \div 12 = \frac{5}{3}$

$BC = 9 \times \frac{5}{3} = 15$ cm

(b) [2 marks]

Answer: 4 cm

- **M1** for $6 \times 5/3 (= 10)$ or $6 \times 8 \div 12$
- **A1** for 4

Worked solution: $AC = 6 \times \frac{5}{3} = 10$ cm

$EC = 10 - 6 = 4$ cm

Question 6 (6 marks)

(a) [2 marks]

Answer: $\frac{AD}{AB} = \frac{4}{6} = \frac{2}{3}$ and $\frac{AE}{AC} = \frac{6}{9} = \frac{2}{3}$.

- **M1** for $\frac{4}{6}$ or $\frac{6}{9}$ simplified to $\frac{2}{3}$ (or both written as equivalent decimals)
- **A1** for both fractions shown equal to $\frac{2}{3}$

Worked solution: $\frac{AD}{AB} = \frac{4}{6} = \frac{2}{3}$ and $\frac{AE}{AC} = \frac{6}{9} = \frac{2}{3}$, so the two fractions are equal.

(b) [2 marks]

Answer: Angle DAE = angle BAC (the same angle), and it is between the two pairs of sides in the same ratio, so the triangles are similar (SAS).

- **c1** for angle DAE = angle BAC (common angle)
- **c1** for the equal angle is between the sides in the same ratio (from part (a)), so the triangles are similar (SAS)

Worked solution: The angle at A is in both triangles, so angle DAE = angle BAC. It is the angle between AD and AE and between AB and AC, and by part (a) these pairs of sides are in the same ratio. So the triangles are similar (SAS).

(c) [2 marks]

Answer: 8 cm

- **M1** for $12 \times \frac{2}{3}$ oe
- **A1** for 8

Notes: Using $AD \div DB (= 2)$ as the scale factor scores M0 A0.

Worked solution: DE corresponds to BC, so $DE = 12 \times \frac{2}{3} = 8$ cm.

Question 7 (4 marks)

(a) [2 marks]

Answer: $x = 12$

- **M1** for a correct scale factor, e.g. $21 \div 14 (= 1.5)$, or $8 \times 21 \div 14$
- **A1** for 12

Worked solution: Corresponding sides: BC and YZ, so the scale factor is $21 \div 14 = 1.5$
 $x = 8 \times 1.5 = 12$

(b) [2 marks]

Answer: $y = 12$

- **M1** for $18 \div 1.5$ or $18 \times 14 \div 21$
- **A1** for 12

Worked solution: $y = 18 \div 1.5 = 12$

Question 8 (4 marks)

(a) [2 marks]

Answer: 20 cm

- **M1** for $15 \div 6 (= 2.5)$ or $8 \times 15 \div 6$
- **A1** for 20

Notes: M0 for $8 \times 9 \div 6$ (using YW instead of VW).

Worked solution: Triangles VYZ and VWX are similar. $VW = 6 + 9 = 15$ cm
Scale factor = $15 \div 6 = 2.5$
 $WX = 8 \times 2.5 = 20$ cm

(b) [2 marks]

Answer: 15 cm

- **M1** for $10 \times 2.5 (= 25)$ or $10 \times 9 \div 6$
- **A1** for 15

Worked solution: $VX = 10 \times 2.5 = 25$ cm
 $ZX = 25 - 10 = 15$ cm
