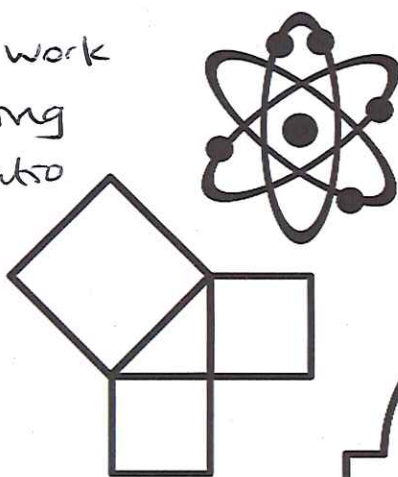


GCSE TOPIC BOOKLET SIMILAR TRIANGLES

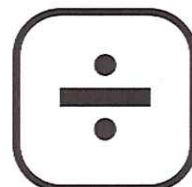
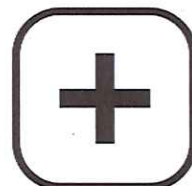
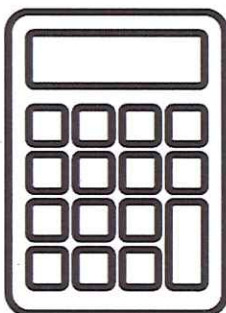
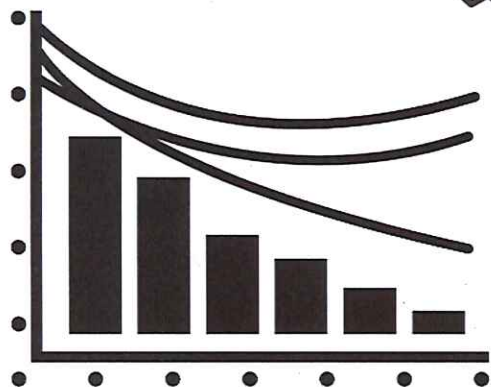
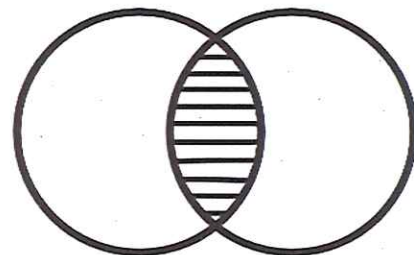
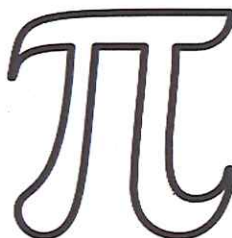
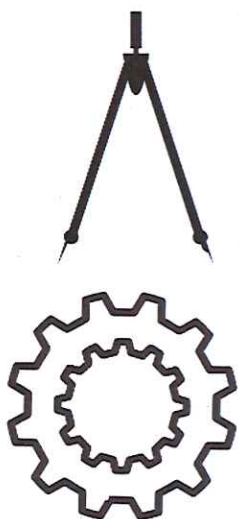
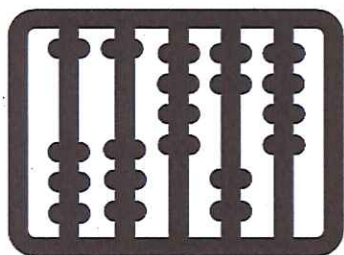
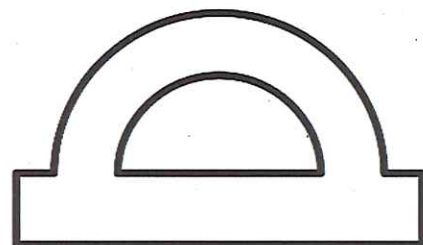
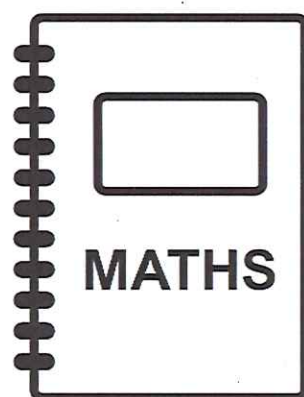
SOLUTIONS

Two triangles are **similar** if they have the **same angles**.

If they are similar, you can work out the **ratio** of corresponding sides. Once you know the ratio you can find any side that you have been asked to calculate.



$$a^2 = b^2 + c^2$$



1. The diagram shows two similar triangles, ABC and PQR .

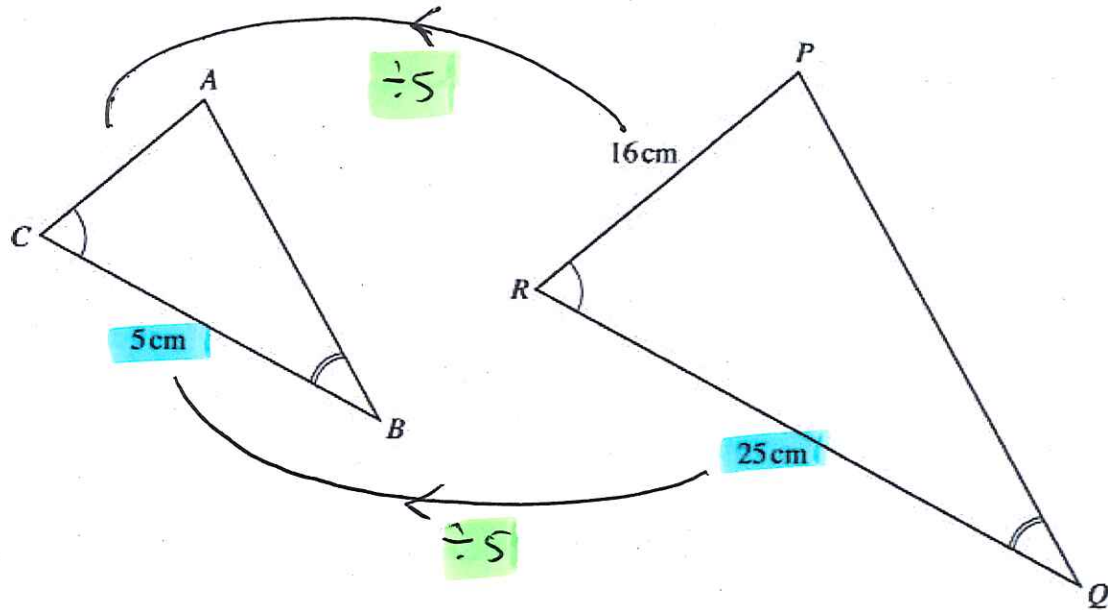


Diagram not drawn to scale.

Given that $CB = 5\text{ cm}$, $RQ = 25\text{ cm}$ and $PR = 16\text{ cm}$, find the length of AC .

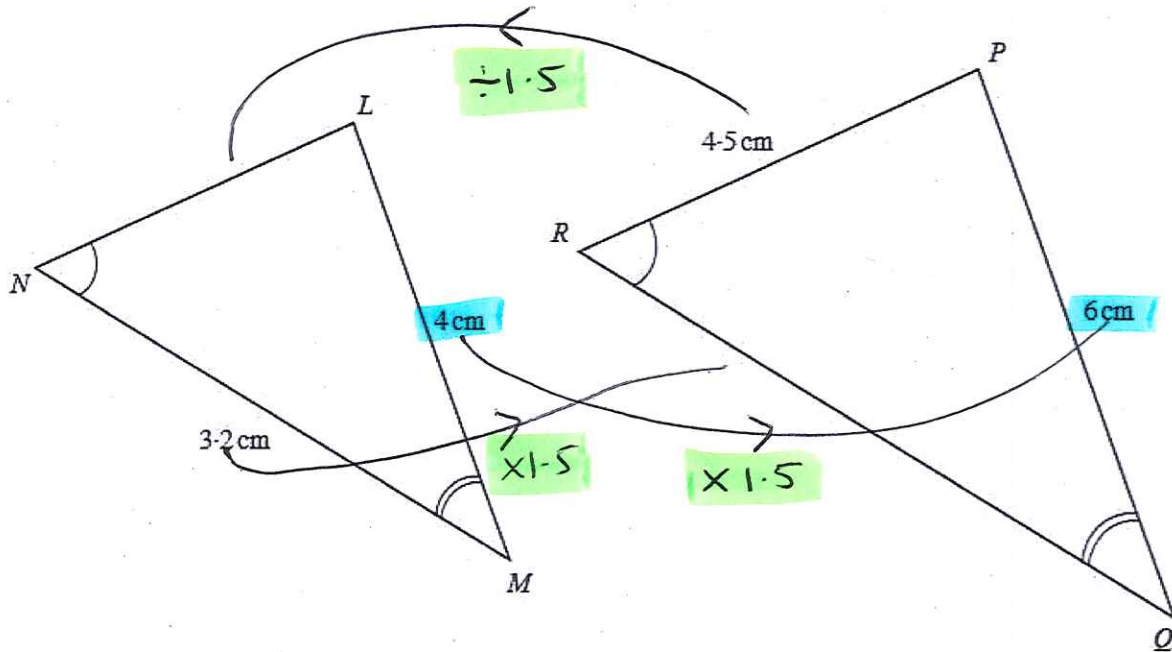
$$AC = PR \div 5$$

$$AC = 16 \div 5$$

$$AC = 3.2\text{ cm}$$

[2]

2. Triangles LMN and PQR are similar, with $\widehat{LMN} = \widehat{PQR}$, $\widehat{MNL} = \widehat{QRP}$, $LM = 4$ cm, $MN = 3.2$ cm, $PR = 4.5$ cm and $PQ = 6$ cm.



Diagrams not drawn to scale.

Showing all your working, find the length of

(a) RQ .

$$RQ = NM \times 1.5$$

$$RQ = 3.2 \times 1.5$$

$$RQ = \underline{\underline{4.8 \text{ cm}}}$$

[2]

(b) LN .

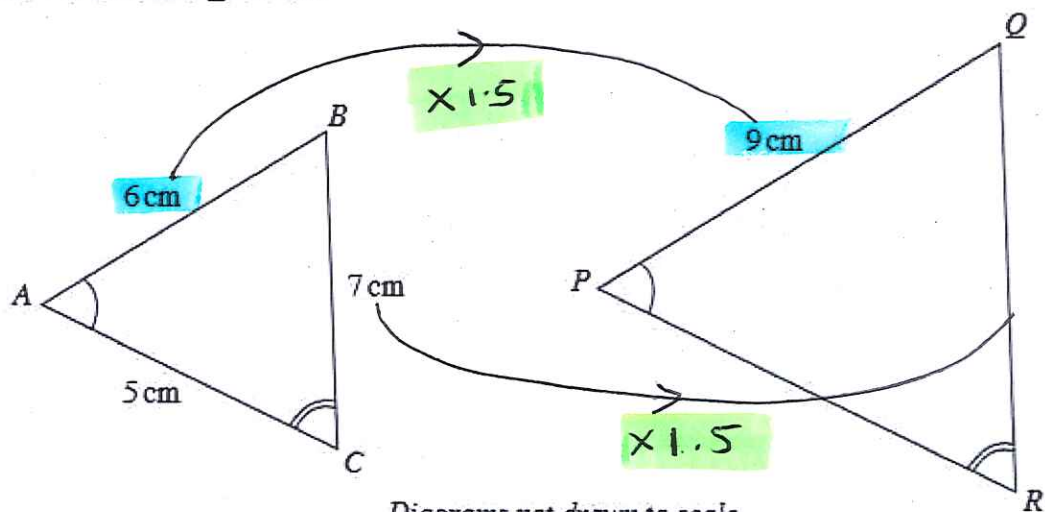
$$LN = RP \div 1.5$$

$$LN = 4.5 \div 1.5$$

$$LN = \underline{\underline{3 \text{ cm}}}$$

[2]

3. Triangles ABC and PQR are similar, with $\hat{BAC} = \hat{QPR}$, $\hat{BCA} = \hat{QRP}$, $AB = 6$ cm, $BC = 7$ cm, $AC = 5$ cm and $PQ = 9$ cm.



Diagrams not drawn to scale.

Showing all your working, find the length of QR .

$$QR = 7 \times 1.5$$

$$QR = \underline{\underline{10.5 \text{ cm}}}$$

[2]

4. In the diagram, AB is parallel to DE .

(a) Show that triangles ABC and EDC are similar.

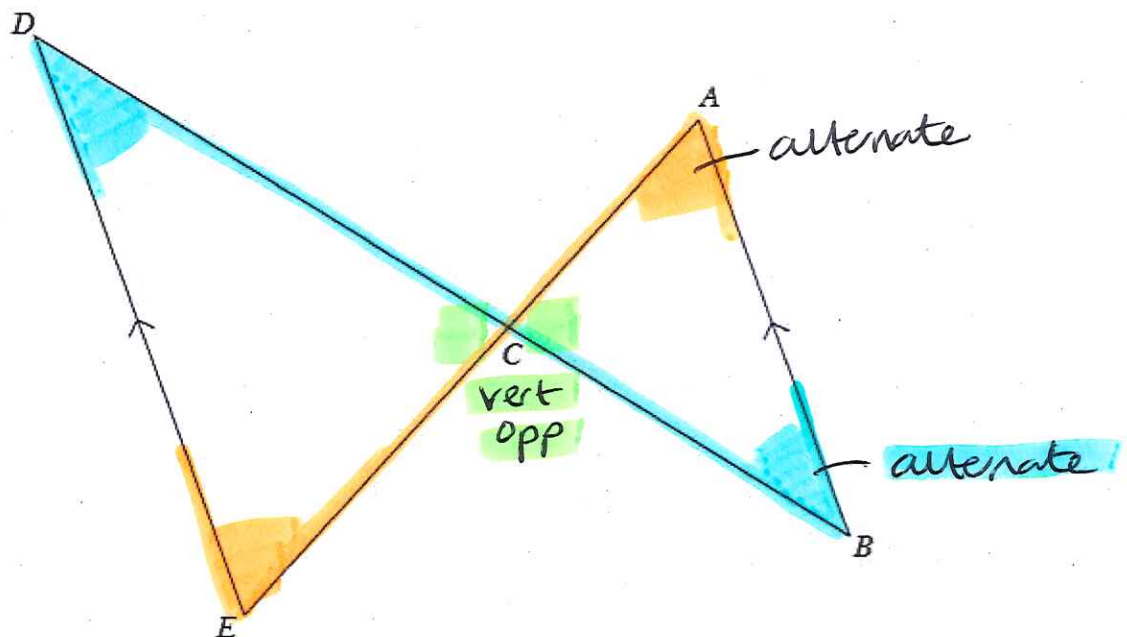


Diagram not drawn to scale.

$$\hat{DCE} = \hat{BCA} \quad \text{vertically opposite angles}$$

$$\hat{CDE} = \hat{CBA} \quad \text{alternate angles}$$

$$\hat{DEC} = \hat{BAC} \quad \text{alternate angles}$$

Three sets of equal angles $\therefore$ similar triangles

[2]

(b) The lengths $AB = 8$ cm, $BC = 10$ cm and $DC = 15$ cm.
Calculate the length of DE .

$$BC \rightarrow DC$$

$$\times 1.5$$

$$AB \rightarrow ED$$

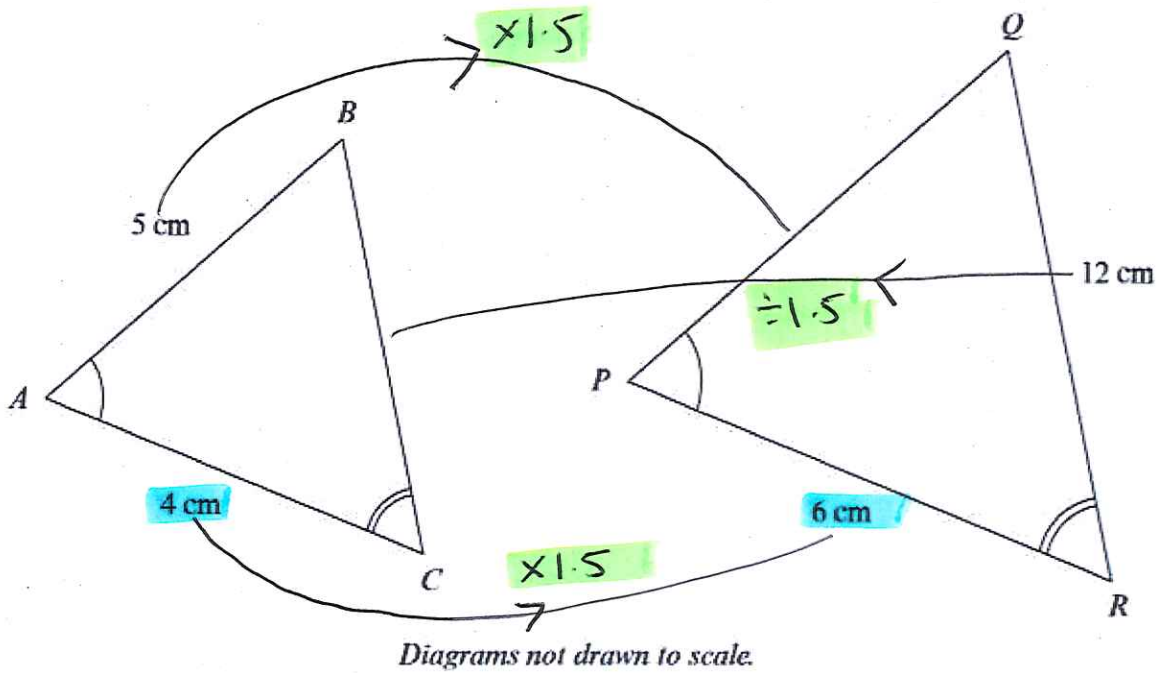
$$\times 1.5$$

$$\therefore DE = 8 \times 1.5$$

$$DE = 12 \text{ cm}$$

[2]

5. Triangles ABC and PQR are similar, with $\hat{BAC} = \hat{QPR}$, $\hat{BCA} = \hat{RQP}$, $AB = 5$ cm, $AC = 4$ cm, $PR = 6$ cm and $RQ = 12$ cm.



Showing all your working, find

- (a) the length of QP ,

$$QP = AB \times 1.5$$

$$QP = 5 \times 1.5$$

$$\underline{\underline{QP = 7.5 \text{ cm}}}$$

[2]

- (b) the length of BC .

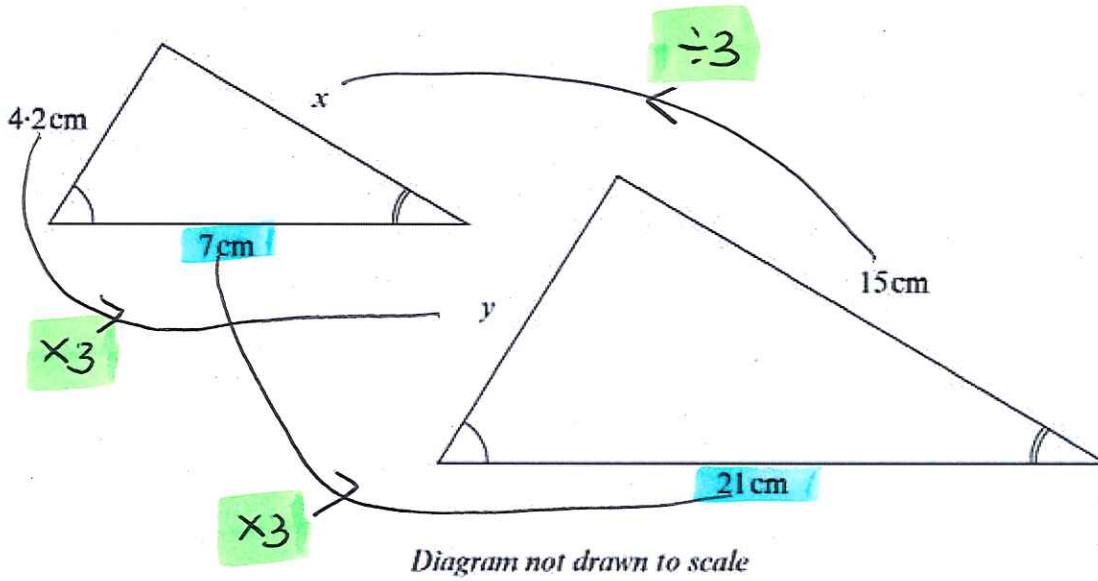
$$BC = RQ \div 1.5$$

$$BC = 12 \div 1.5$$

$$\underline{\underline{BC = 8 \text{ cm}}}$$

[1]

6. The diagram shows two similar triangles.



Calculate the lengths of the sides marked x and y .

$$y = 4.2 \times 3$$

$$y = 12.6 \text{ cm}$$

$$x = 15 \div 3$$

$$x = 5 \text{ cm}$$

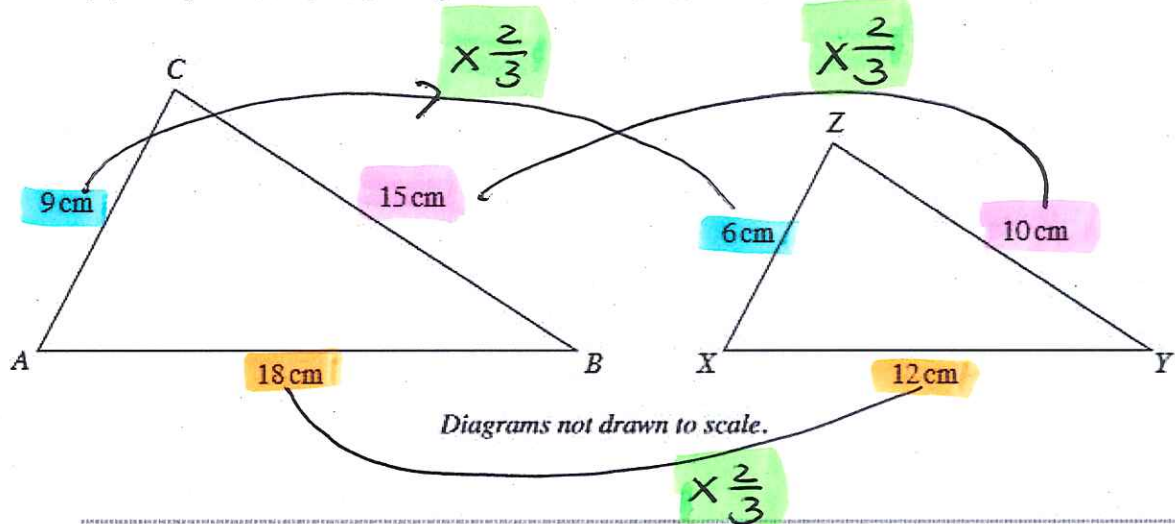
$$x = 5 \text{ cm}$$

$$y = 12.6 \text{ cm}$$

[4]

7.

(a) Explain clearly why triangles ABC and XYZ are similar.



The two triangles are similar because all of the pairs of sides are in the same ratio 3:2

or

The sides are in the same proportion with $\triangle XYZ$ sides always $\frac{2}{3}$ of $\triangle ABC$ sides. [2]

(b) Triangle PQR , in which $PQ = 15$ cm, is similar to both triangles ABC and XYZ . Calculate the length of QR .

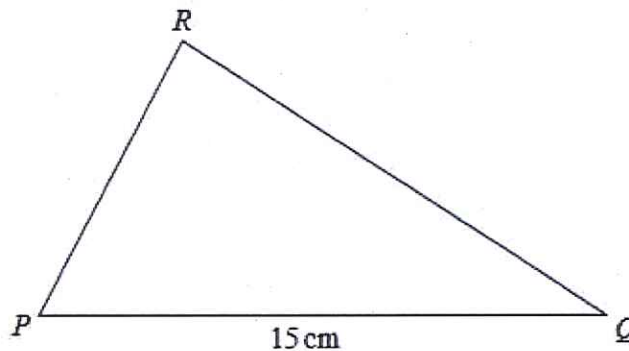


Diagram not drawn to scale.

$$XY \rightarrow PQ$$

$$12 \rightarrow 15$$

$$\times 1.25$$

$$YZ \rightarrow QR$$

$$\therefore 10 \rightarrow 12.5$$

$$\times 1.25$$

$$\underline{\underline{QR = 12.5 \text{ cm}}}$$

[2]

8. Triangles ABC and EFG are similar.
 Their corresponding sides are in the ratio $2:3$.
 Calculate the length of EF .

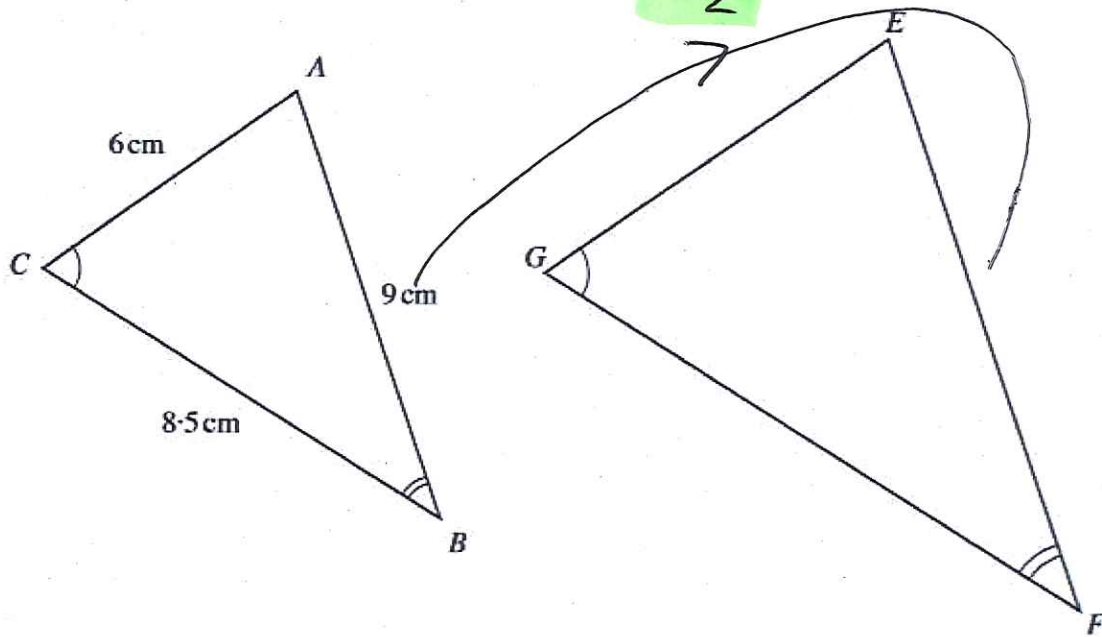


Diagram not drawn to scale.

ratio $2:3$

ratio $1:\frac{3}{2}$

$\therefore \times \frac{3}{2}$

$$EF = AB \times \frac{3}{2}$$

$$= 9 \times \frac{3}{2} = 13.5$$

$$\underline{\underline{EF = 13.5\text{cm}}}$$

[2]