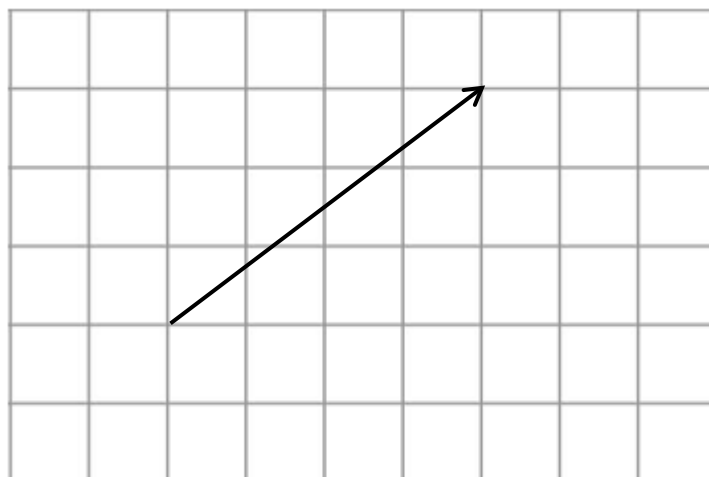


## OCR 09 Congruence and Similarity (Foundation)

1. Write down the vector shown on the grid below as a column vector.

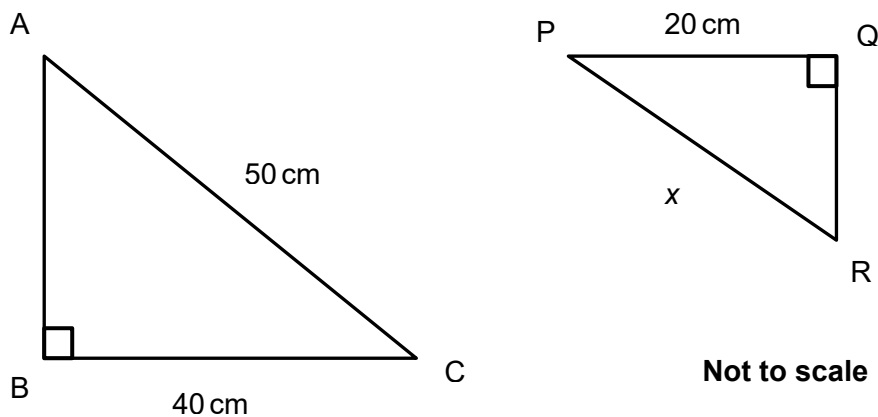


2. Write down the vector shown on the grid below as a column vector.

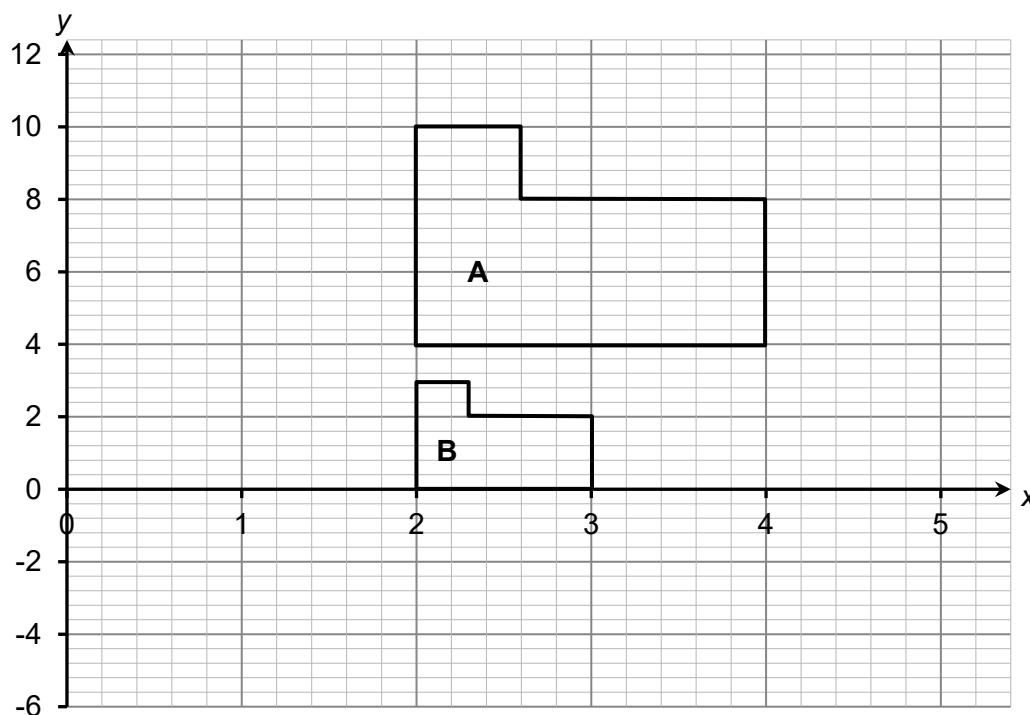


3. Calculate  $\begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ .
4. Calculate  $\begin{pmatrix} -3 \\ 4 \end{pmatrix} - \begin{pmatrix} -5 \\ -3 \end{pmatrix}$ .
5. Give two vectors parallel to  $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ .

6. In the diagram below, triangle ABC is similar to triangle PQR. Find the length  $x$ .

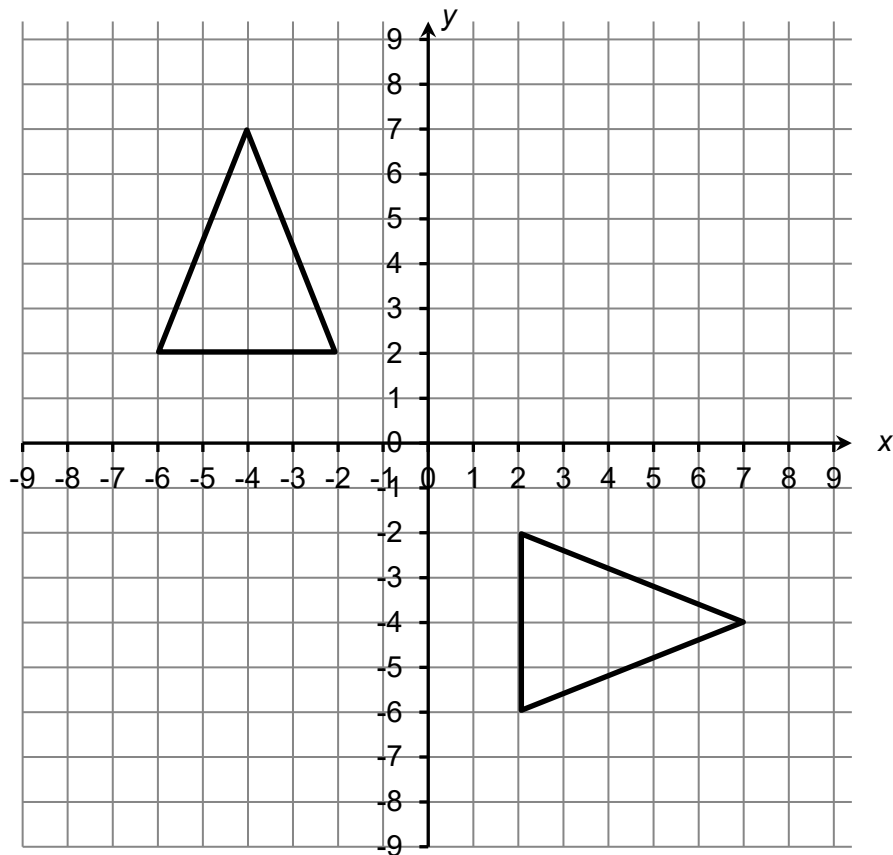


7. On the grid below, shape **A** has been enlarged to give shape **B**. Identify the centre of enlargement from shape **A** to shape **B**.

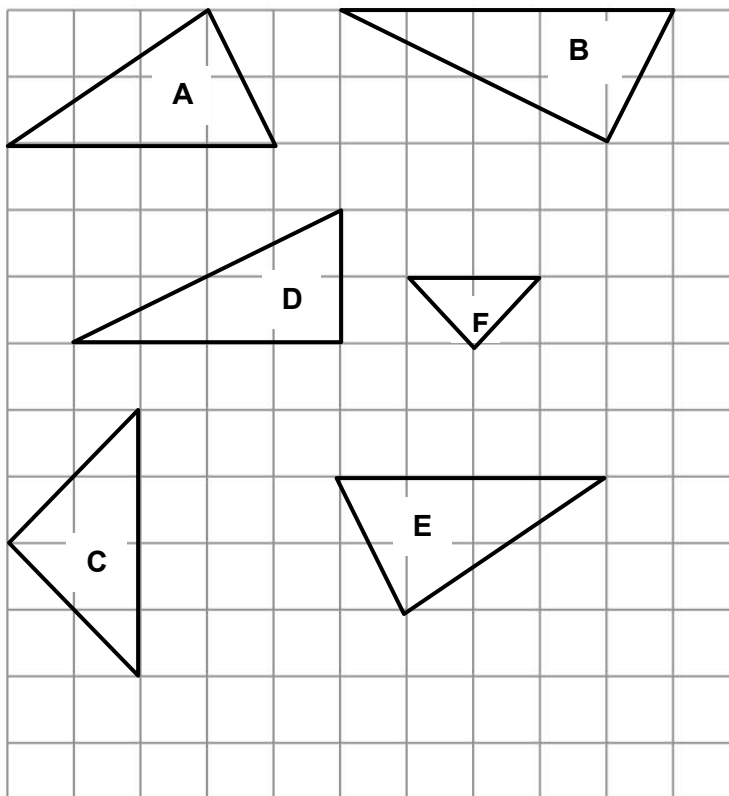


8. On the grid in question 7, what scale factor is used to enlarge shape **A** to give shape **B**?

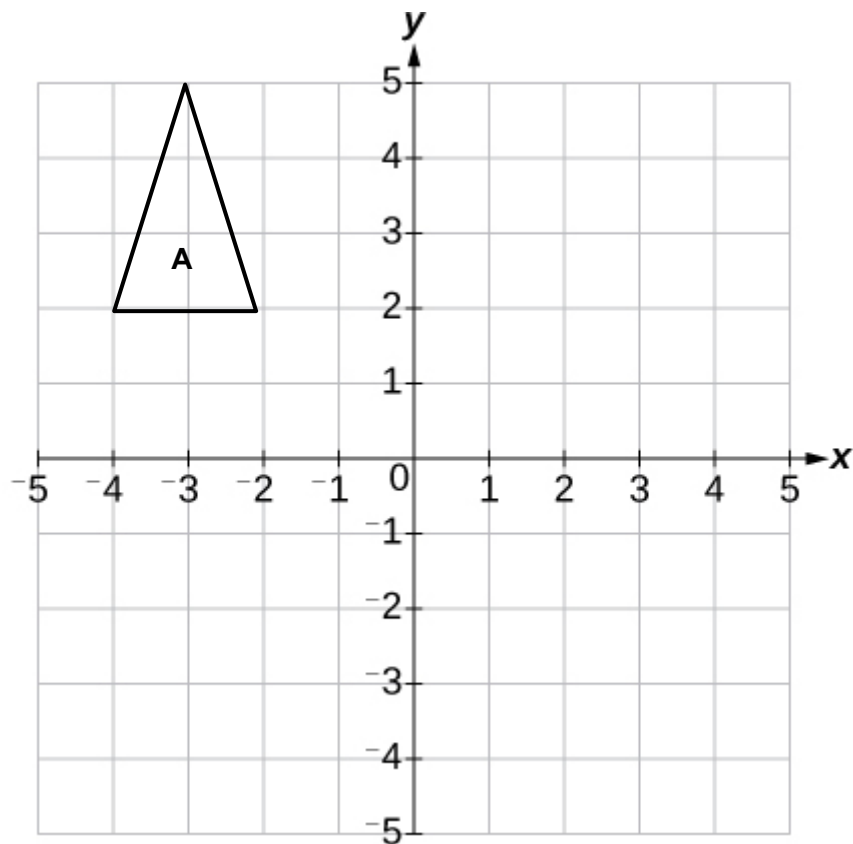
9. Identify the line of reflection between the two triangles in the diagram below.



10. Identify a pair of congruent triangles on the grid below.

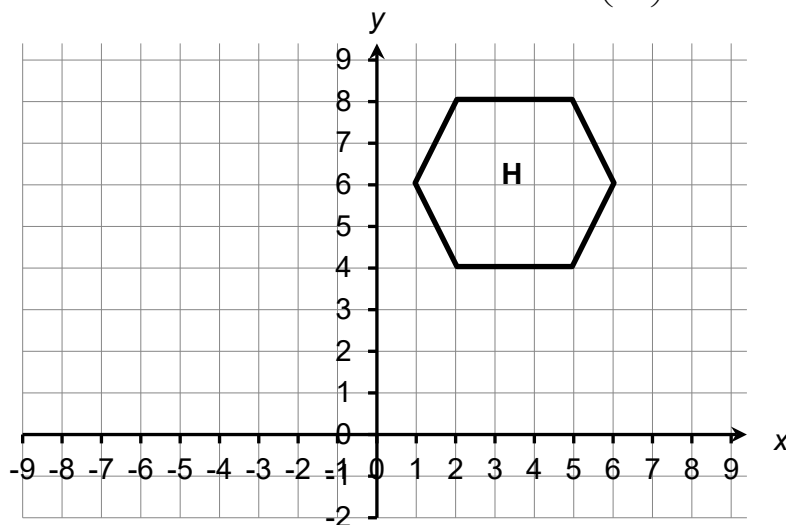


11. On the grid below, reflect shape **A** in the line  $x = -1$  and label this shape **B**. Then reflect shape **B** in the line  $y = 1$  and label this shape **C**.

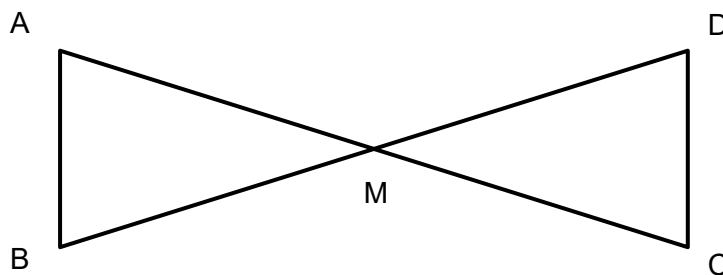


12. Using your answer from question 11, describe a single transformation that maps shape **A** to shape **C**.

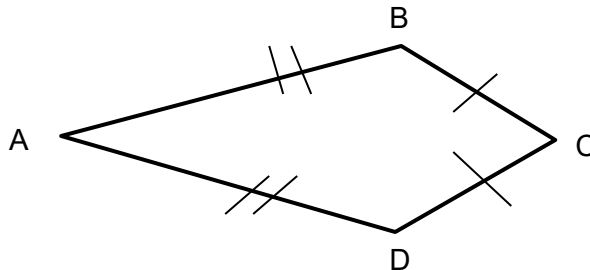
13. Draw the image of hexagon **H** after a translation of  $\begin{pmatrix} 1 \\ \frac{1}{2} \\ -5 \end{pmatrix}$ .



14. In the diagram below, M is the midpoint of straight lines AC and BD.  
Prove that triangles AMB and CMD are congruent giving full reasoning.

**Not to scale**

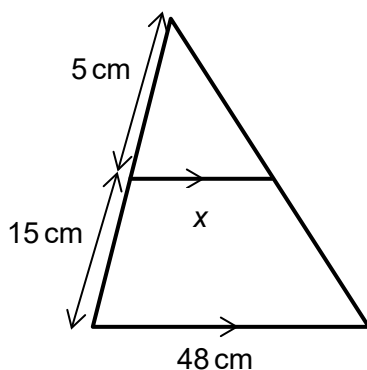
15. In the diagram below, quadrilateral ABCD is a kite.  
Prove that triangles ABC and ADC are congruent giving full reasoning.

**Not to scale**

16. A model is made of a sculpture. The model has height 30 cm and is an enlargement with scale factor 0.25 of the sculpture. The sculpture is on a podium with height 1 m. Calculate the height of the sculpture and the podium together.

17. Three points, A, B and C, are on a grid. The vector  $\begin{pmatrix} 2 \\ 6 \end{pmatrix}$  represents travel from A to B. The vector  $\begin{pmatrix} -4 \\ 8 \end{pmatrix}$  represents travel from B to C. Calculate the vector representing travel from A to C.

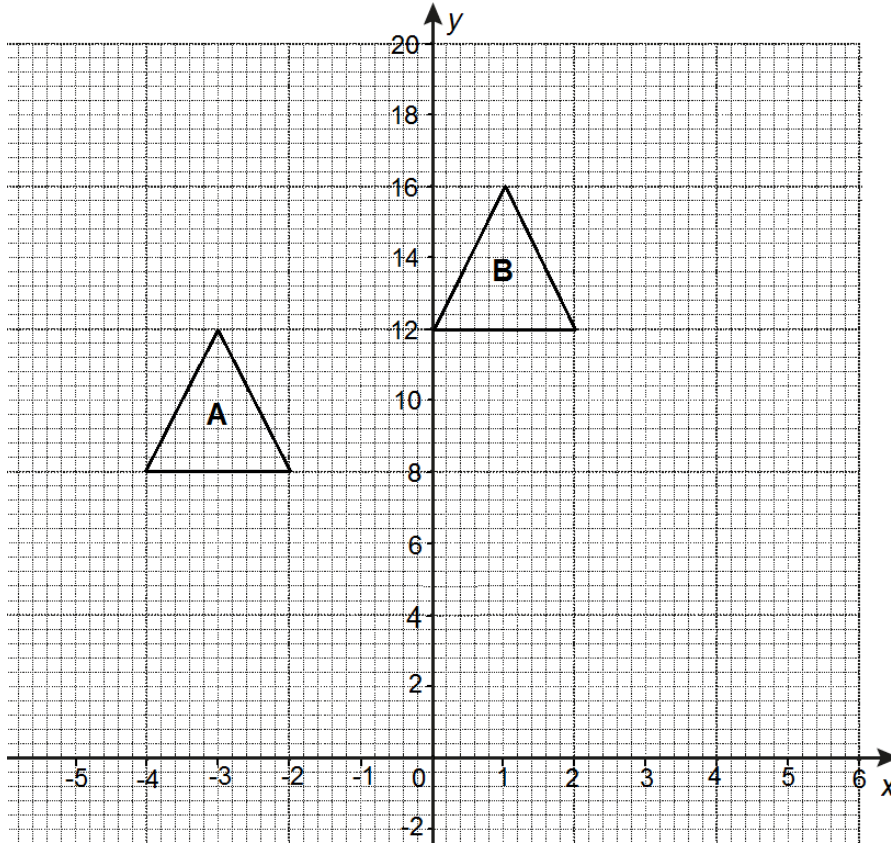
18. Find the missing length  $x$  in the diagram below.

**Not to scale**

19. A rectangle, **A**, has length 10 cm and width 6 cm. A similar rectangle, **B**, has length 2.5 cm. What is the area of rectangle **B**?

20. Triangle **A** can be mapped onto triangle **B** by translation  $\begin{pmatrix} 2c \\ \frac{1}{2}d \end{pmatrix}$ .

Find  $c$  and  $d$ .



**Answers**

1.  $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$

2.  $\begin{pmatrix} -1 \\ -2 \end{pmatrix}$

3.  $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$

4.  $\begin{pmatrix} 2 \\ -7 \end{pmatrix}$

5. Any multiple of the vector i.e.  $\begin{pmatrix} 4 \\ -6 \end{pmatrix}$

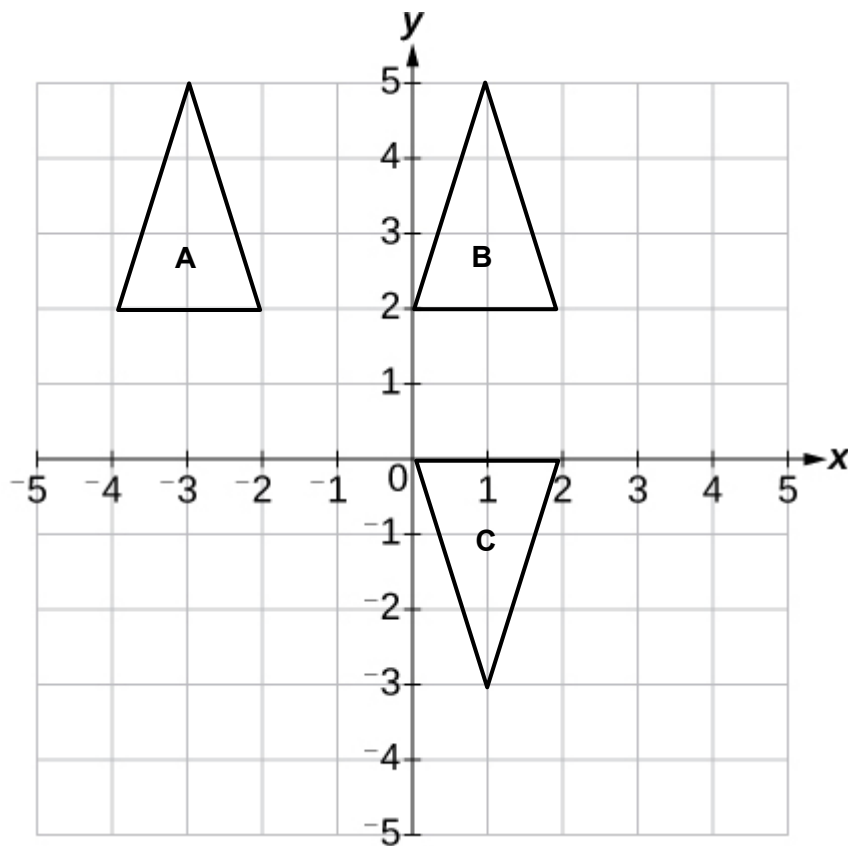
6. 25 cm

7. Centre of enlargement (2, -4)

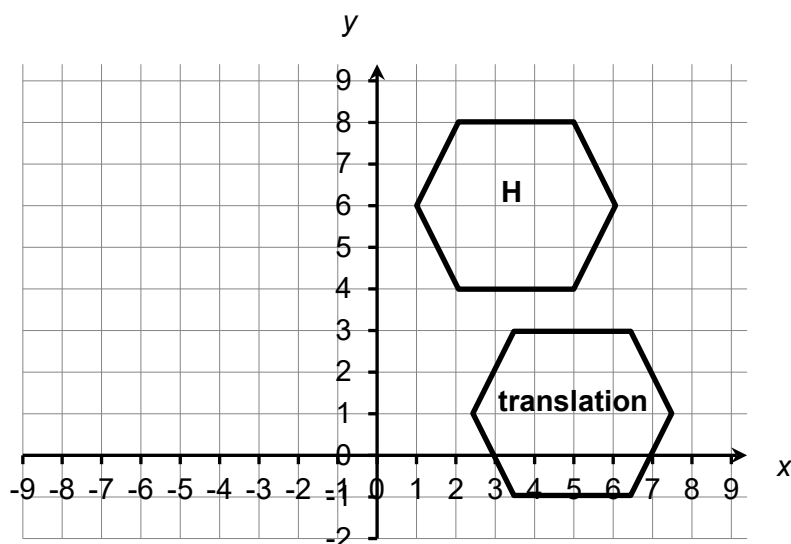
8. Scale factor  $\frac{1}{2}$ 9.  $y = x$ 

10. A and E

11.

12.  $180^\circ$  rotation about  $(-1, 1)$ 

13.



14.  $AM = CM$  and  $BM = DM$  as  $M$  is the midpoint of lines  $AC$  and  $BD$ .  
 Angle  $AMB =$  angle  $CMD$  using opposite angles.  
 Triangles  $ABM$  and  $CMD$  are congruent (SAS).

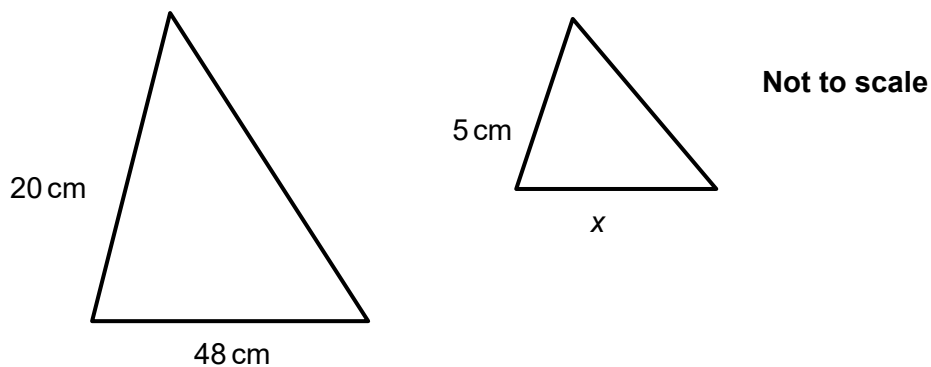


15. AC is common to both triangle ABC and triangle ADC.  
 AB = AD and BC = DC.  
 Triangle ABC and triangle ADC are congruent (SSS).

16.  $30 \text{ cm} \div 0.25 = 120 \text{ cm}$   
 $1 \text{ m} = 100 \text{ cm}$   
 $120 \text{ cm} + 100 \text{ cm} = 220 \text{ cm}$

$$17. \begin{pmatrix} 2 \\ 6 \end{pmatrix} + \begin{pmatrix} -4 \\ 8 \end{pmatrix} = \begin{pmatrix} -2 \\ 14 \end{pmatrix}$$

18. Separate the triangles to see them more clearly.



It is then easy to see that  $x$  must be  $\frac{1}{4}$  of 48 so  $x = 12 \text{ cm}$ .

19. Width of rectangle **B** =  $6 \div \frac{10}{2.5} = 1.5 \text{ cm}$   
 Area of rectangle **B** =  $1.5 \times 2.5 = 3.75 \text{ cm}^2$

20. Translation of 4 horizontally =  $2c$ , so  $c = 2$ .  
 Translation of 4 vertically =  $\frac{1}{2}d$ , so  $d = 8$ .

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Represent a 2D vector as a column vector			
AO1	2	Represent a 2D vector as a column vector			
AO1	3	Calculate with vectors			
AO1	4	Calculate with vectors			
AO1	5	Find parallel vectors			
AO1	6	Find a length in similar shapes			
AO1	7	Find centre of enlargement			
AO1	8	Identify a scale factor			
AO1	9	Identify a line of reflection			
AO1	10	Identify congruent triangles			
AO2	11	Reflect a shape			
AO2	12	Describe a single transformation			
AO2	13	Translate a shape using a column vector			
AO2	14	Prove that two triangles are congruent using SAS			
AO2	15	Prove that two triangles are congruent using SSS			
AO3	16	Solve a real-life problem with scale factors			
AO3	17	Calculate with vectors			
AO3	18	Find a missing side length using similar triangles			
AO3	19	Calculate an area using similar shapes			
AO3	20	Translate with column vectors			

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