

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Geometry

Similarity and congruence – Mixed problems: Understanding similarity and congruence

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments
- A calculator



Information

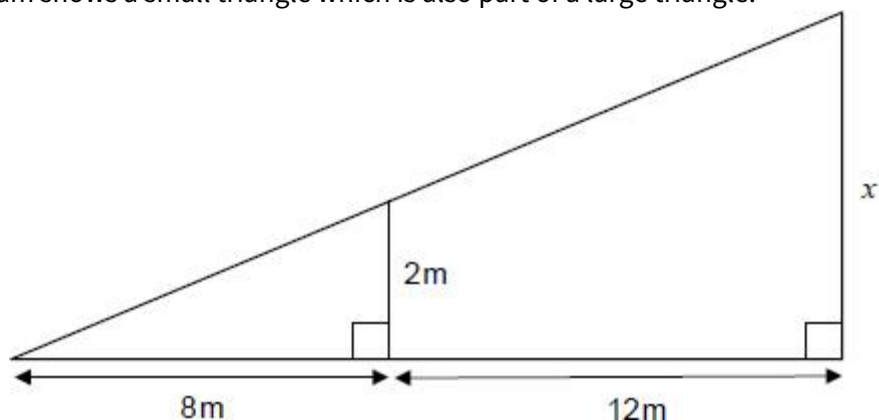
- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

Q1.

The diagram shows a small triangle which is also part of a large triangle.

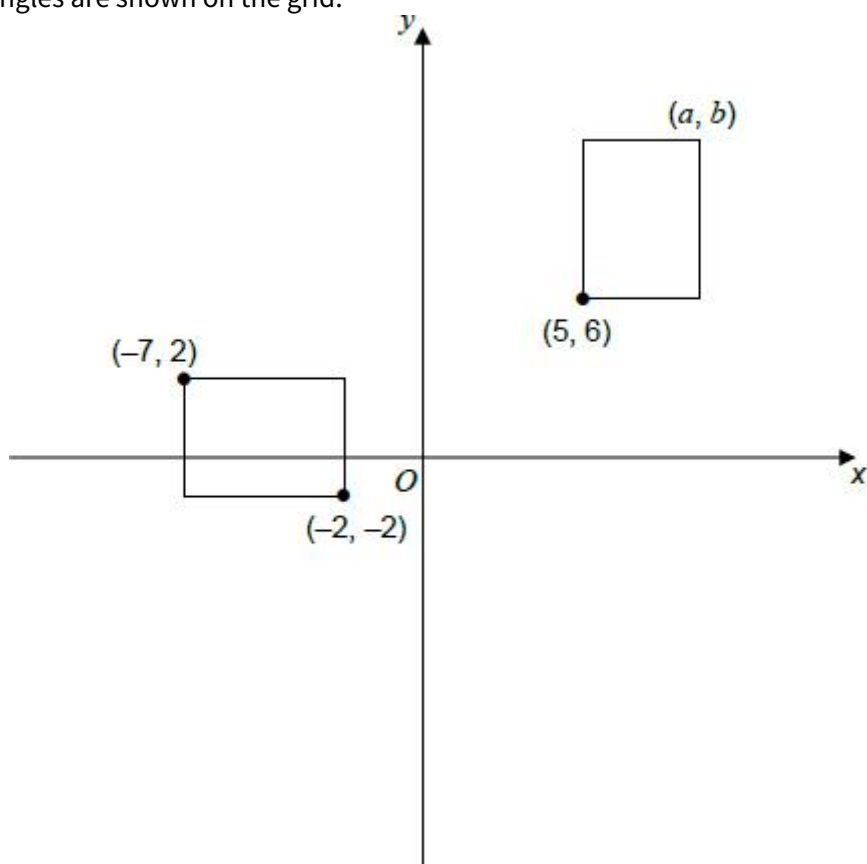


Work out the value of x .

(Total 2 marks)

Q2.

Two rectangles are shown on the grid.



The rectangles are **congruent**.
Work out the values of a and b .

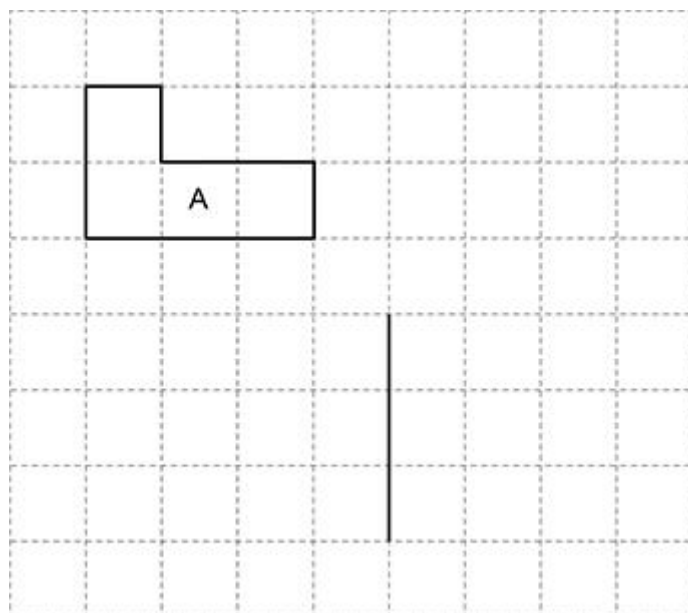
Not drawn accurately

(Total 4 marks)

Q3.

On the grid, shape A is shown.

One side of shape B is also shown.

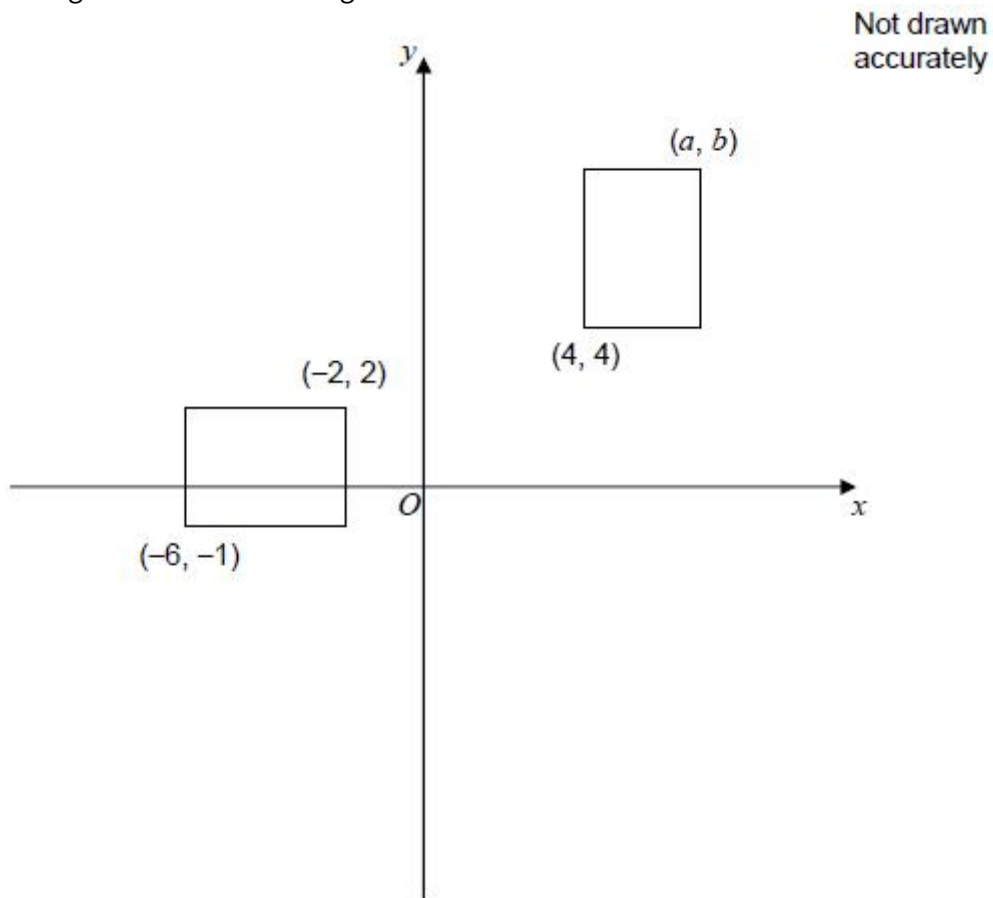


Complete shape B so that it is congruent to shape A.

(Total 1 mark)

Q4.

Two rectangles are shown on the grid.

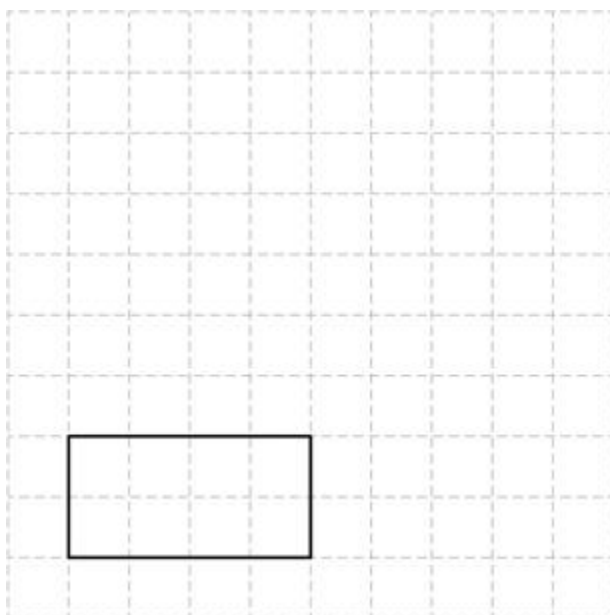


The rectangles are **congruent**.
Work out the values of a and b

(Total 4 marks)

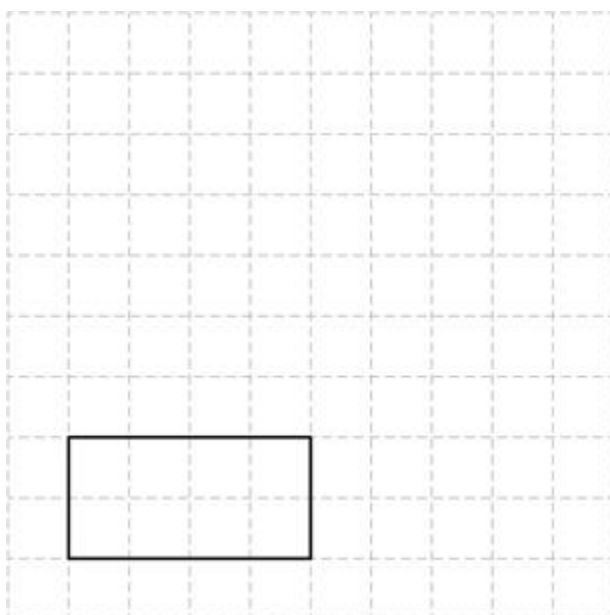
Q5.

- (a) A rectangle is drawn on a square grid.
On the grid, draw a **congruent** rectangle.



(1)

- (b) Here is the rectangle on a different square grid.
On this grid, draw a **similar** rectangle which is **not** congruent.

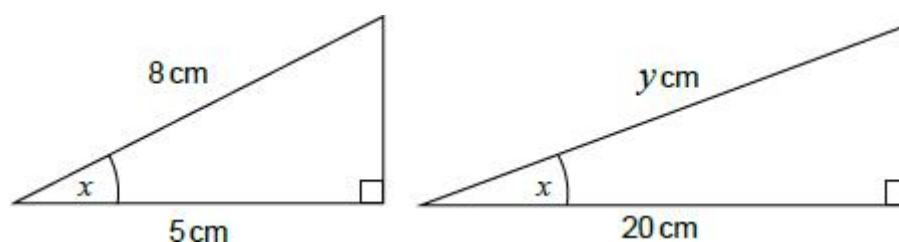


(1)

(Total 2 marks)

Q6.

These two right-angled triangles are similar



Not drawn accurately

- (a) Write down the value of $\cos x$
Give your answer as a fraction.

(1)

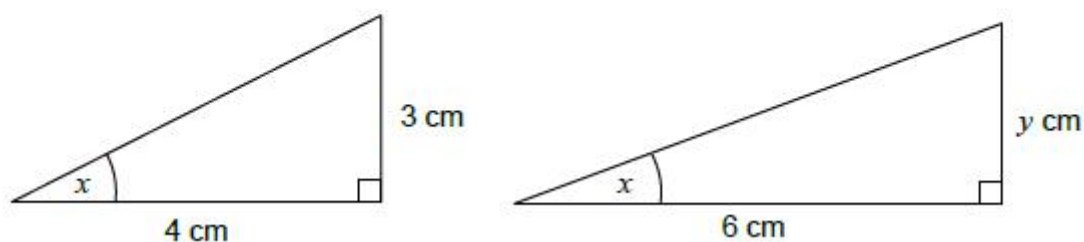
- (b) Work out the value of y

(2)

(Total 3 marks)

Q7.

These two right-angled triangles are similar.



Not drawn accurately

- (a) Write down the value of $\tan x$.
Give your answer as a fraction.

(1)

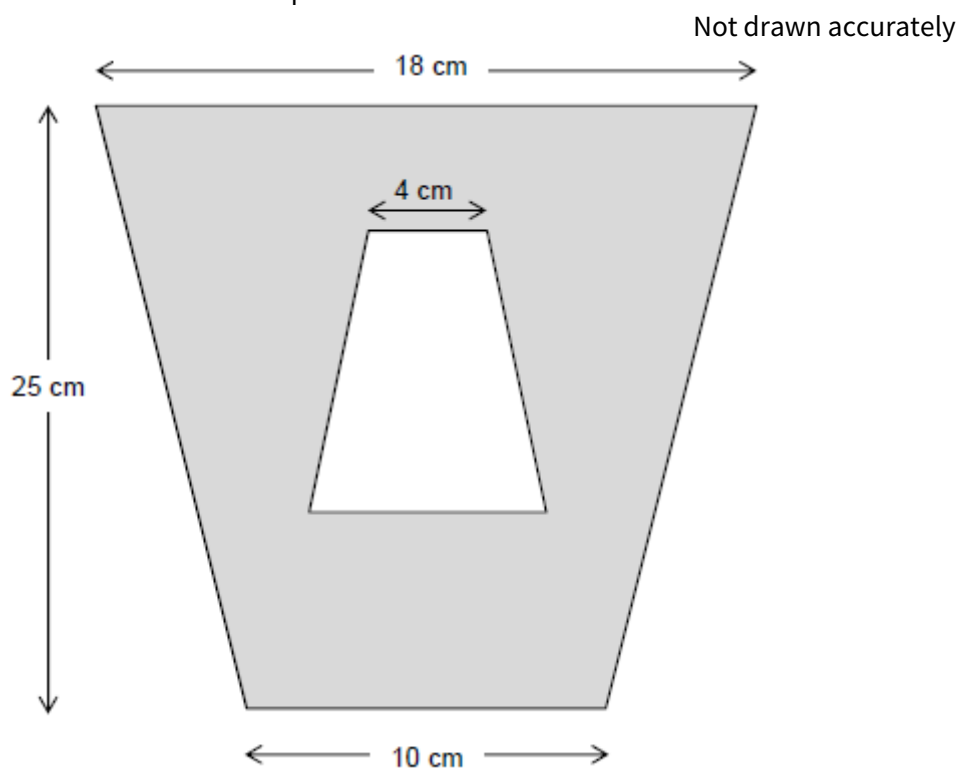
- (b) Work out the value of y .

(2)

(Total 3 marks)

Q8.

A pattern is made from two **similar** trapeziums.



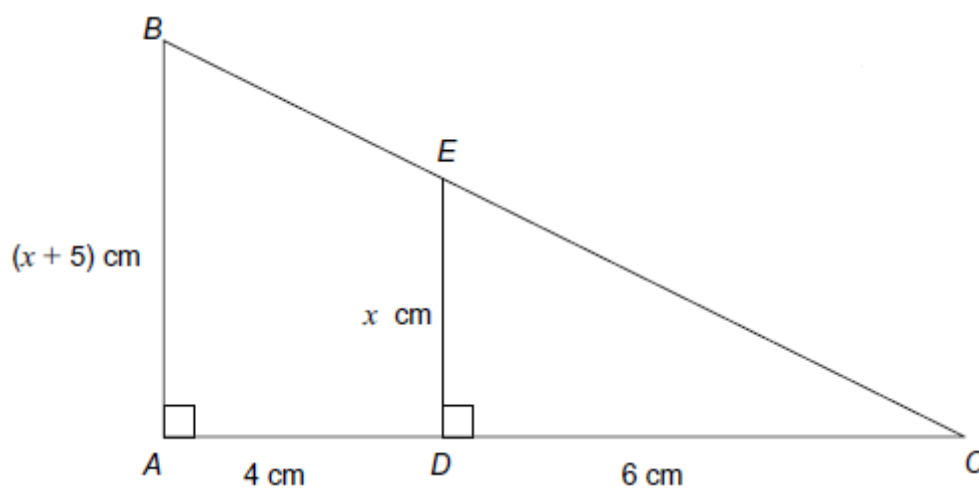
Show that the shaded area is 294 cm^2

(Total 4 marks)

Q9.

ABC and DEC are similar triangles.

Not drawn accurately

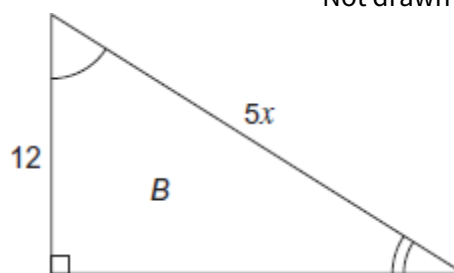
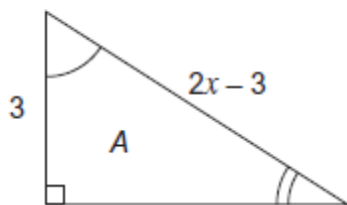


Work out the value of x .

(Total 4 marks)

Q10.

A and B are similar triangles.
All measurements are in centimetres.

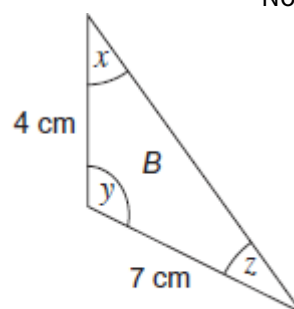
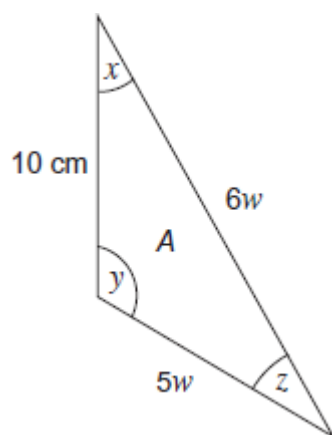


Work out the area of triangle B .

(Total 7 marks)

Q11.

A and B are similar triangles.



(a) Circle the scale factor from A to B .

☐ -6
☐ $\frac{2}{5}$
☐ $\frac{5}{2}$
☐ 6

(1)

(b) Work out the perimeter of triangle B .

(4)

(Total 5 marks)

Q12.

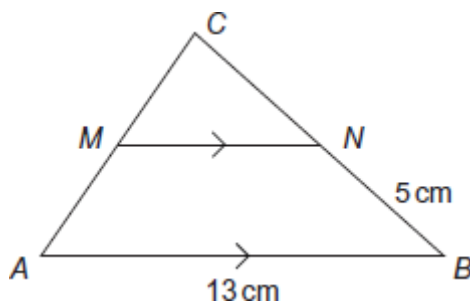
The perimeter of the triangle ABC is 30 cm.

M is the midpoint of side AC .

MN is parallel to AB .

$NB = 5$ cm, $AB = 13$ cm

Not drawn accurately



Work out the length MA .

(Total 3 marks)

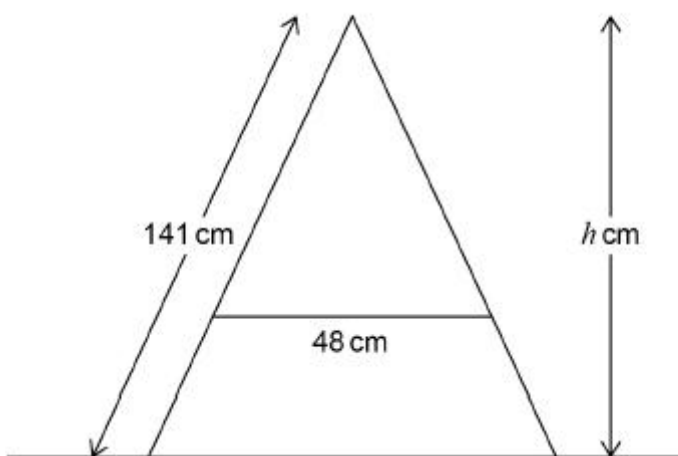
Q13.

The diagram shows the side view of a step ladder with a horizontal strut of length 48 cm

The strut is one third of the way up the ladder.

The symmetrical cross section of the ladder shows two similar triangles.

Not drawn accurately

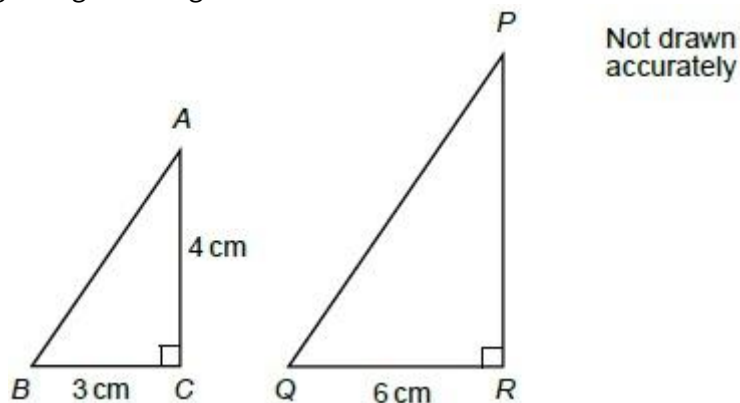


Work out the vertical height, h cm, of the ladder.

(Total 5 marks)

Q14.

Here are two right-angled triangles.



- (a) Assume that triangles ABC and PQR are similar.

Work out the area of triangle PQR .

(3)

- (b) In fact, PR is longer than it would be if the triangles were similar.

How does the actual area of PQR compare to the answer to part (a)?

It is larger than the answer to part (a)

It is the same as the answer to part (a)

It is smaller than the answer to part (a)

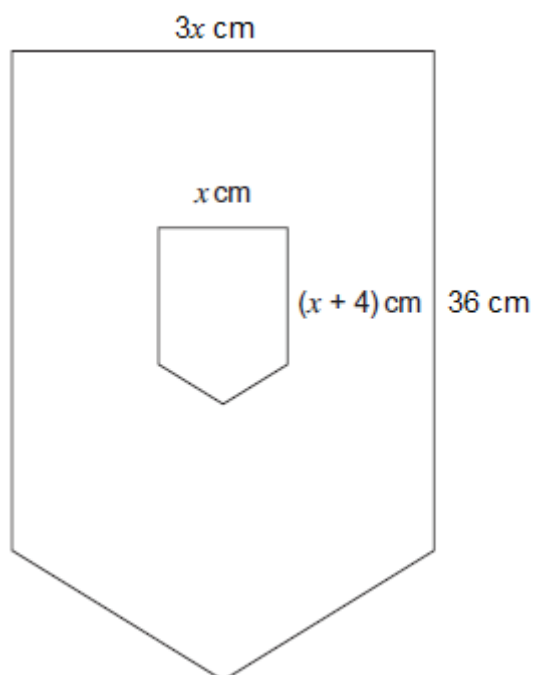
(1)

(Total 4 marks)

Q15.

The diagram shows a badge made from two similar pentagons.

Not drawn
accurately



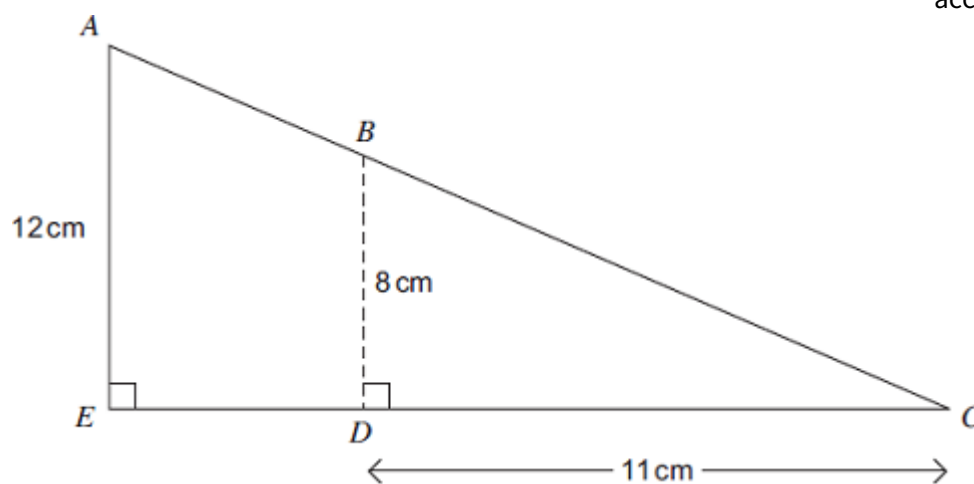
Work out the width of the badge.

(Total 5 marks)

Q16.

The diagram shows a triangle cut into a smaller triangle and a trapezium.

Not drawn
accurately



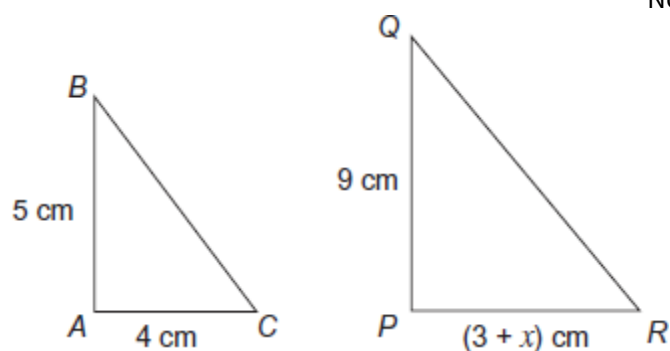
Work out the area of the trapezium $ABDE$.

(Total 5 marks)

Q17.(H)

ABC and PQR are similar triangles.

Not drawn accurately



- (a) Which **one** of the following equations is correct for these triangles?
Circle your answer.

$$\frac{3+x}{4} = \frac{5}{9}$$

$$\frac{3+x}{9} = \frac{5}{4}$$

$$\frac{3+x}{5} = \frac{9}{4}$$

$$\frac{3+x}{4} = \frac{9}{5}$$

(1)

- (b) Solve the equation you circled to work out the value of x .

(4)

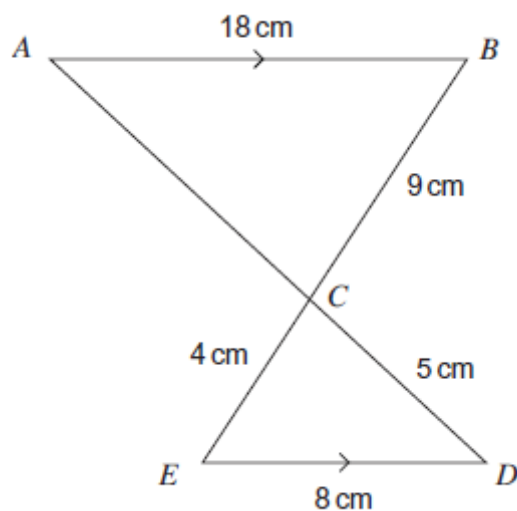
(Total 5 marks)

Q18.(H)

ACD and BCE are straight lines.

Triangle ABC is similar to triangle DEC .

AB is parallel to ED .



Not drawn accurately

Work out the area of triangle ABC .

(Total 6 marks)