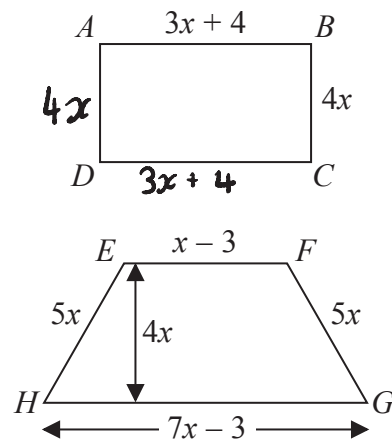


1. $ABCD$ is a rectangle.
 $EFGH$ is a trapezium.



All measurements are in centimetres.

The perimeters of these two shapes are the same.

Work out the area of the rectangle.

Perimeters

Trapezium: $x-3+5x+7x-3+5x = 18x-6$ ①

Rectangle: $3x+4+4x+3x+4+4x = 14x+8$ ①

two shapes have same perimeter

$$18x-6 = 14x+8 \quad \text{①}$$

$$18x = 14x + 14$$

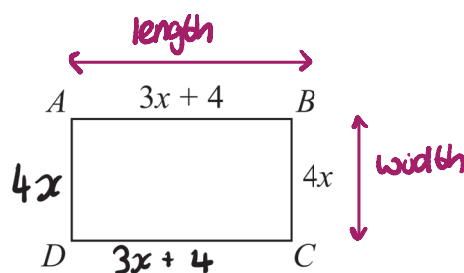
$$4x = 14$$

$$x = \frac{14}{4} = 3.5 \quad \text{①}$$

Area of rectangle

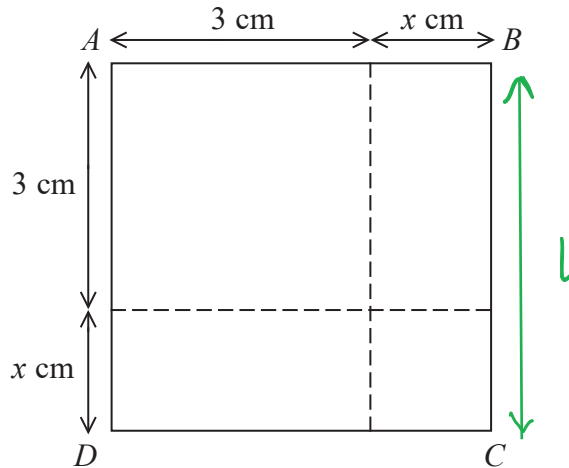
Area = length \times width

$$\begin{aligned} \text{Area} &= [3(3.5)+4] \times [4(3.5)] \\ &= [10.5+4] \times [14] \quad \text{①} \\ &= 14.5 \times 14 \\ &= 203 \text{ cm}^2 \end{aligned}$$



203 ① cm²
 5 marks

2.



The area of square $ABCD$ is 10 cm^2 .

Area of a square = l^2

Show that $x^2 + 6x = 1$

$$l = (x + 3). \quad A = (x + 3)^2 = 10 \quad \textcircled{1}$$

$$\begin{aligned} (x + 3)(x + 3) &= x^2 + 3x + 3x + 9 \\ &= x^2 + 6x + 9 = 10 \quad \textcircled{1} \end{aligned}$$

$$x^2 + 6x + \underline{9} = \underline{10}$$

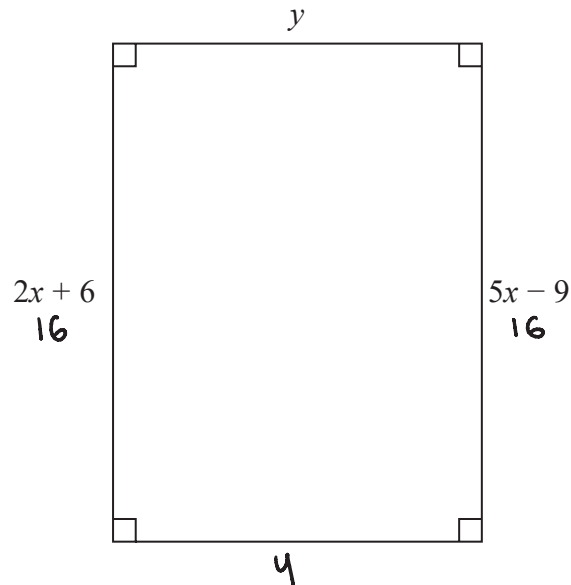
$\xrightarrow{-9}$

$$x^2 + 6x = 10 - 9$$

$$\underline{\underline{x^2 + 6x = 1}} \quad \textcircled{1}$$

(Total for Question is 3 marks)

3. Here is a rectangle.



All measurements are in centimetres.

The area of the rectangle is 48 cm^2 .

Show that $y = 3$

$$2x + 6 = 5x - 9 \quad \checkmark$$

$$\begin{array}{r} -2x \quad -2x \\ 6 = 3x - 9 \end{array}$$

$$\begin{array}{r} +9 \quad +9 \\ 15 = 3x \end{array}$$

$$15 = 3x$$

$$\div 3 \quad \div 3$$

$$5 = x \quad \checkmark$$

$$2x + 6$$

$$= 2(5) + 6$$

$$= 10 + 6$$

$$= 16$$

$$5x - 9$$

$$= 5(5) - 9$$

$$= 25 - 9$$

$$= 16 \quad \checkmark$$

Area of rectangle = $b \times h$

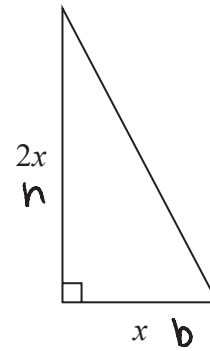
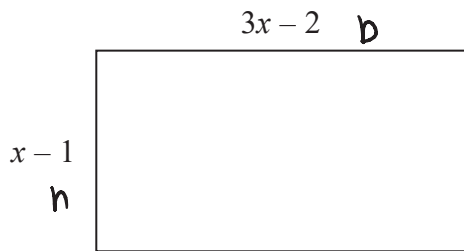
$$48 = y \times 16$$

$$\div 16 \quad \div 16$$

$$3 = y \quad \checkmark$$

(Total for Question is 4 marks)

4. Here is a rectangle and a right-angled triangle.



All measurements are in centimetres.

The area of the rectangle is **greater than** the area of the triangle.

Find the set of possible values of x .

$$\text{Area of rectangle} = b \times h$$

$$\text{Area of triangle} = \frac{1}{2} \times b \times h$$

$$\begin{aligned} \text{Area of rectangle} \\ (3x-2)(x-1) \end{aligned}$$

$$\begin{aligned} \text{Area of triangle} \\ \frac{1}{2} \times x \times 2x \\ \frac{1}{2} \times 2x^2 \\ x^2 \quad \checkmark \end{aligned}$$

$$(3x-2)(x-1) > x^2$$

$$3x^2 - 3x - 2x + 2 > x^2$$

$$3x^2 - 5x + 2 > x^2$$

$$2x^2 - 5x + 2 > 0 \quad \checkmark$$

$$2x^2 - 4x - x + 2 > 0 \quad \begin{matrix} \times 4 \\ + -5 \end{matrix}$$

$$2x(x-2) - 1(x-2) > 0$$

$$(2x-1)(x-2) > 0 \quad \checkmark$$

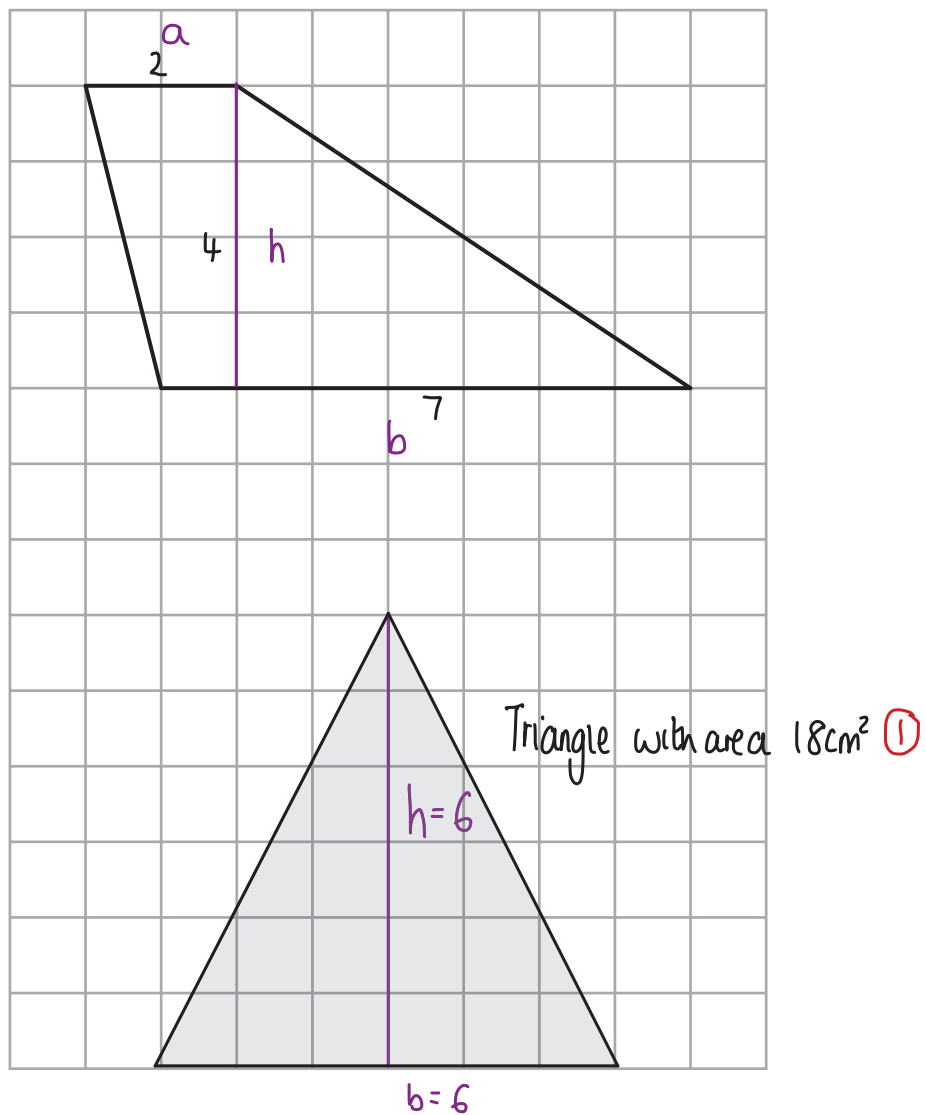
$$x = \frac{1}{2} \quad \checkmark \quad x > \frac{1}{2}$$

$$x = 2 \quad \checkmark \quad x > 2$$

$$x > 2 \quad \checkmark$$

(Total for Question is 5 marks)

5. Here is a **trapezium** drawn on a centimetre grid.



On the grid, draw a **triangle equal in area to this trapezium**.

$$\begin{aligned}
 \text{Area of Trapezium} &= \frac{1}{2} (a+b) \times h \quad \leftarrow \begin{array}{l} \text{sum of parallel sides} \\ \text{height between them} \end{array} \\
 &= \frac{1}{2} (2+7) \times 4 \\
 &= 18 \text{ cm}^2 \quad \text{①}
 \end{aligned}$$

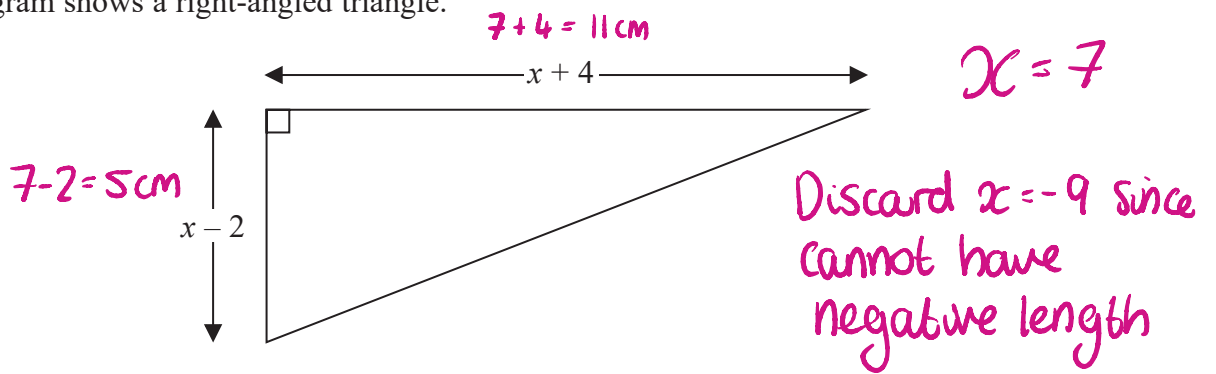
$$\begin{aligned}
 \text{Area of Triangle} &= 18 = \frac{1}{2} bh \\
 bh &= 36
 \end{aligned}$$

The base and height must multiply to get 36
= a factor pair of 36

9 and 4
or 6 and 6 If $b=6$ and $h=6$

(Total for Question is 2 marks)

6. The diagram shows a right-angled triangle.



All the measurements are in centimetres.

The area of the triangle is 27.5cm^2

Work out the length of the shortest side of the triangle.
 You must show all your working.

Area of Triangle = $\frac{\text{Base} \times \text{Height}}{2}$

Area = $\frac{1}{2} \times (x-2) \times (x+4)$ ①

$\frac{1}{2} \times (x-2)(x+4) = 27.5 \times 2$

$(x-2)(x+4) = 55$

$x^2 + 4x - 2x - 8 = 55$

$x^2 + 2x - 8 = 55$

$x^2 + 2x - 63 = 0$ ①

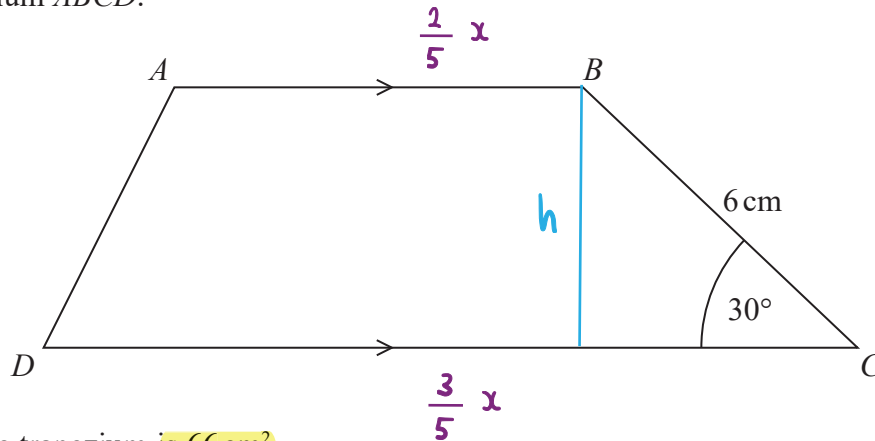
$-7 \times 9 = -63$
 $-7 + 9 = 2$

$(x-7)(x+9) = 0$

$x-7=0$ $x+9=0$ ①
 $x=7$ or $x=-9$

① 5 cm

7. Here is trapezium $ABCD$.



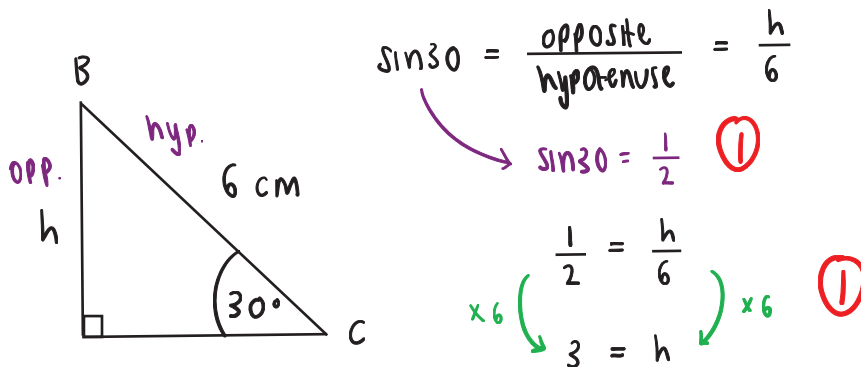
The area of the trapezium is 66 cm^2

the length of AB : the length of $CD = 2:3$

Find the length of AB .

$AB : CD$ 5 parts in total.
 = 2 : 3 AB has 2 of these 5 parts.
 CD has 3 of these 5 parts.

Find height of trapezium:



Area of trapezium:

$$A = \left(\frac{a+b}{2} \right) h. \quad 66 = \left(\frac{\frac{2}{5}x + \frac{3}{5}x}{2} \right) (3)$$

Find length AB :

$$\left. \begin{array}{l} 66 = \left(\frac{x}{2} \right) (3) \\ \div 3 \left(\begin{array}{l} 22 = \frac{x}{2} \\ \times 2 \left(\begin{array}{l} 44 = x \end{array} \right) \end{array} \right. \end{array} \right\} \begin{array}{l} AB = \frac{2}{5}x \\ = \frac{2}{5}(44) \\ = \underline{\underline{17.6 \text{ cm}}} \end{array}$$

(Total for Question is 5 marks)

17.6 cm