



CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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## 0580/33

October/November 2020

**2 hours**

You must answer on the question paper.

You will need: Geometrical instruments

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For  $\pi$ , use either your calculator value or 3.142.

- The total mark for this paper is 104.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Blank pages are indicated.

- 1 (a) A cruise ship travels 2067 km.

(i) Write 2067 in words.

..... [1]

(ii) Write 2067 correct to the nearest hundred.

..... [1]

- (b) When full, the cruise ship carries 880 guests and 360 crew.

Write the ratio guests : crew in its simplest form.

..... : ..... [1]

- (c) There are 480 cabins on the ship.  
On one cruise, 456 of these cabins were used.

Find the percentage of cabins that were used.

..... % [1]

- (d) Last year the cost of a cruise was \$4600.  
This year the cost of the same cruise is \$4784.

Work out the percentage increase in the cost.

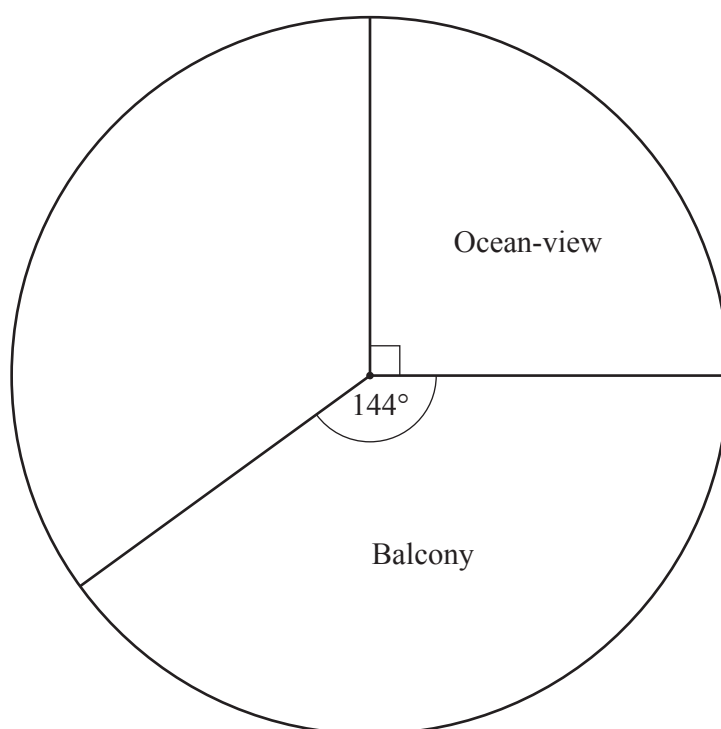
..... % [2]

- (e) The cost of building the ship was \$153 000 000.

Write 153 000 000 in standard form.

..... [1]

- (f) There are 480 cabins on the ship.  
There are four types of cabin: Ocean-view, Balcony, Interior and Suite.  
Hannah starts to draw a pie chart to show the numbers of each type of cabin.



- (i) Show that there are 120 Ocean-view cabins on the ship.

[1]

- (ii) The table shows information about each type of cabin.

Type of cabin	Number of cabins	Sector angle in a pie chart
Ocean-view	120	$90^\circ$
Balcony	192	$144^\circ$
Interior	68	
Suite	100	

- (a) Complete the table.

[2]

- (b) Complete the pie chart.

[1]

2 (a) Using numbers from 55 to 85, write down

(i) a multiple of 23,

..... [1]

(ii) a factor of 120,

..... [1]

(iii) a common multiple of 8 and 12,

..... [1]

(iv) a number that is **both** square **and** odd,

..... [1]

(v) a number that has exactly 2 factors.

..... [1]

(b) Write 220 as the product of its prime factors.

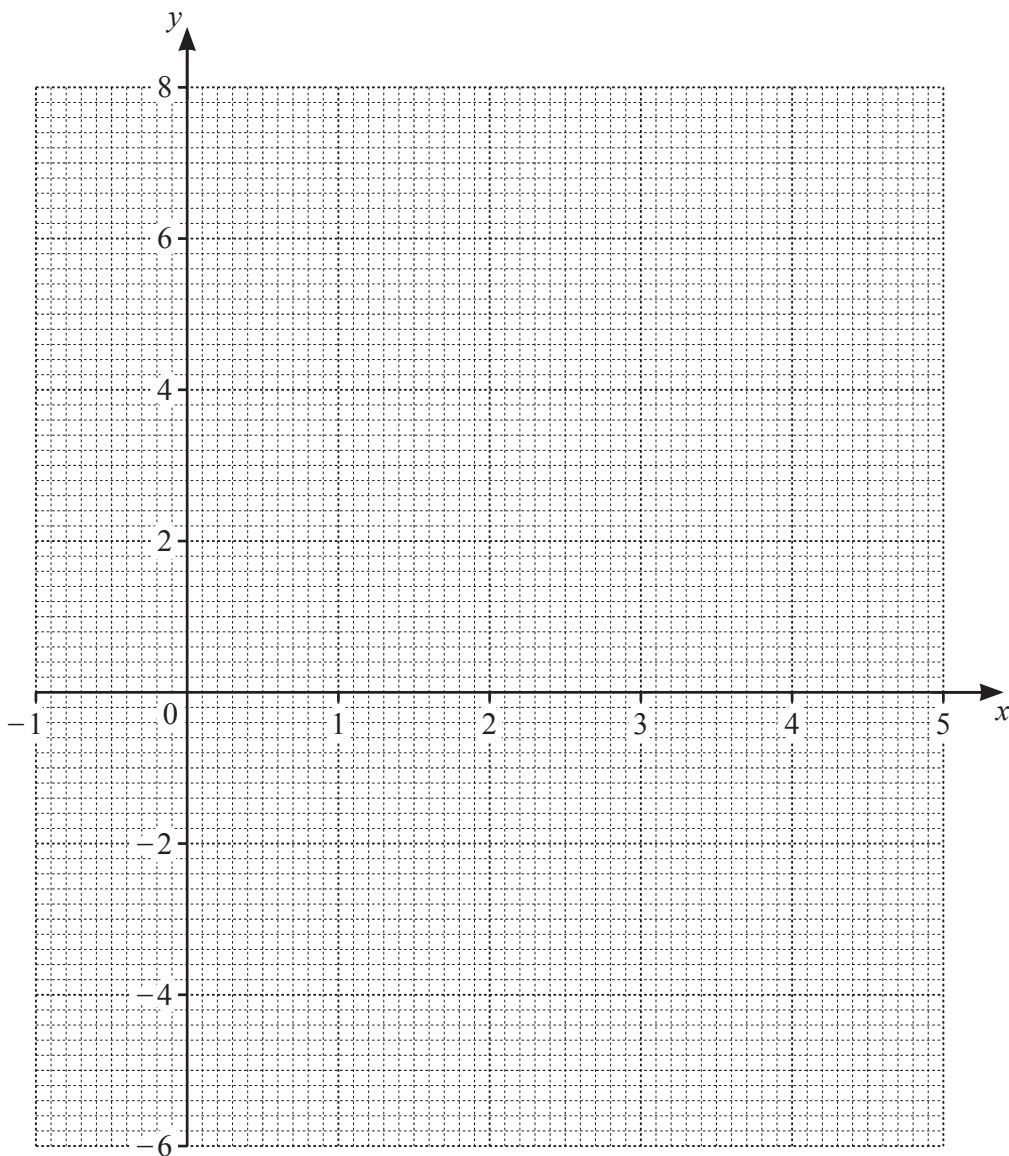
..... [2]

- 3 (a) Complete the table of values for  $y = 1 + 5x - x^2$ .

$x$	-1	0	1	2	3	4	5
$y$		1	5		7		1

[2]

- (b) On the grid, draw the graph of  $y = 1 + 5x - x^2$  for  $-1 \leq x \leq 5$ .



[4]

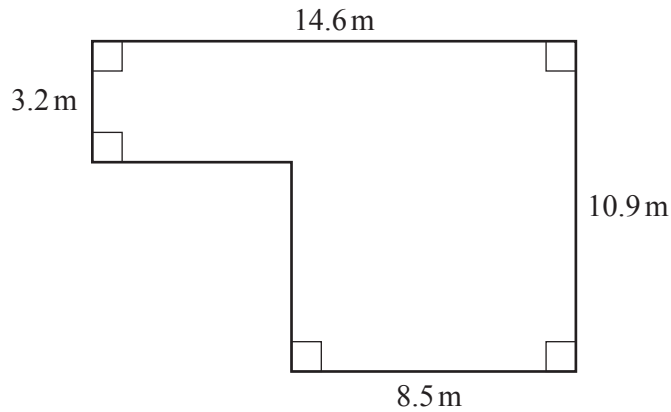
- (c) (i) On the grid, draw the line  $y = 3$ .

[1]

- (ii) Use your line to solve the equation  $1 + 5x - x^2 = 3$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [2]

- 4 (a) The diagram shows the plan of part of Rachel's garden.



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Calculate the area.

.....  $\text{m}^2$  [3]

- (b) Rachel has a pond in her garden in the shape of a circle.  
The circumference of the pond is 4.25 m.

Calculate the diameter of the pond.  
Give your answer in centimetres.

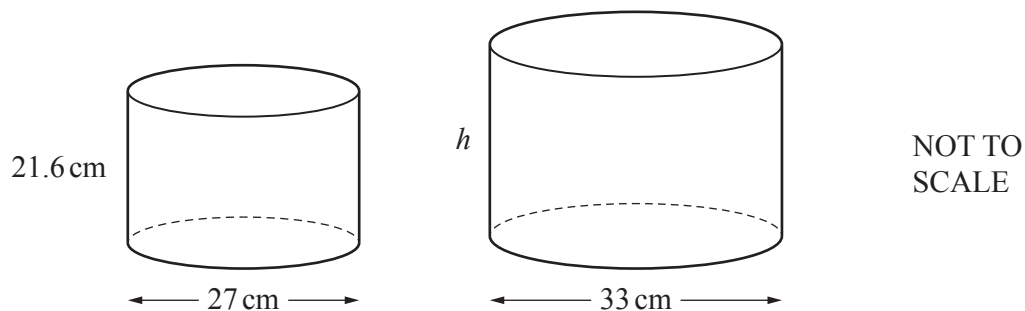
..... cm [3]

- (c) A plant pot is a cylinder with radius 15 cm and height 24 cm.

Calculate the volume of the pot.

.....  $\text{cm}^3$  [2]

- (d) The diagram shows two mathematically similar plant pots.



The smaller pot has height 21.6 cm and diameter 27 cm.  
The larger pot has diameter 33 cm.

Find the height,  $h$ , of the larger pot.

$$h = \dots\dots\dots \text{ cm [2]}$$

- (e) A shop sells bags of compost in three different sizes.

Small
30 litres
\$5.82

Medium
50 litres
\$9.45

Large
75 litres
\$14.50

Work out which size of bag gives the best value.  
Show how you decide.

..... [3]

- 5 The table shows the maximum power, kW, and the time taken, in seconds, to accelerate from 0 to 100 km/h for each of 10 cars.

Maximum power (kW)	77	52	103	55	44	51	85	135	90	110
Time (seconds)	12.5	14.9	9.0	12.1	14.4	12.9	10.0	7.1	11.0	9.4

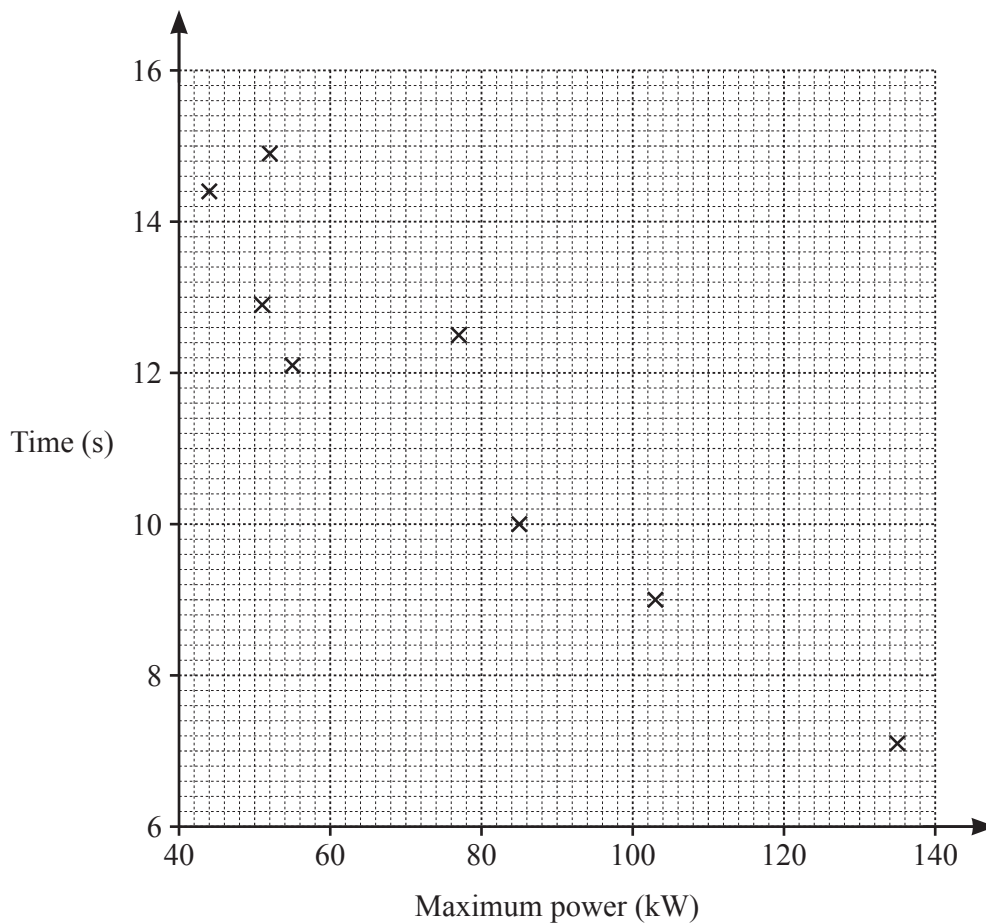
- (a) (i) Find the range of the times.

..... s [1]

- (ii) Find the median maximum power.

..... kW [2]

- (b) (i) Complete the scatter diagram.  
The first eight points have been plotted for you.



[1]



- (ii) What type of correlation is shown on the scatter diagram?

..... [1]

- (iii) Describe the relationship between the maximum power of a car and the time taken to accelerate from 0 to 100 km/h.

.....

..... [1]

- (iv) Draw a line of best fit on the scatter diagram.

[1]

- (v) Another car has a maximum power of 63 kW.

Use your line of best fit to estimate the time taken for this car to accelerate from 0 to 100 km/h.

..... s [1]

- (c) Robert buys a car for \$18 160.

He pays a deposit of \$6460.

He pays the rest of the money in 24 equal monthly payments.

Work out the amount of each monthly payment.

\$ ..... [3]

- (d) A fuel tank holds 52 litres when full.

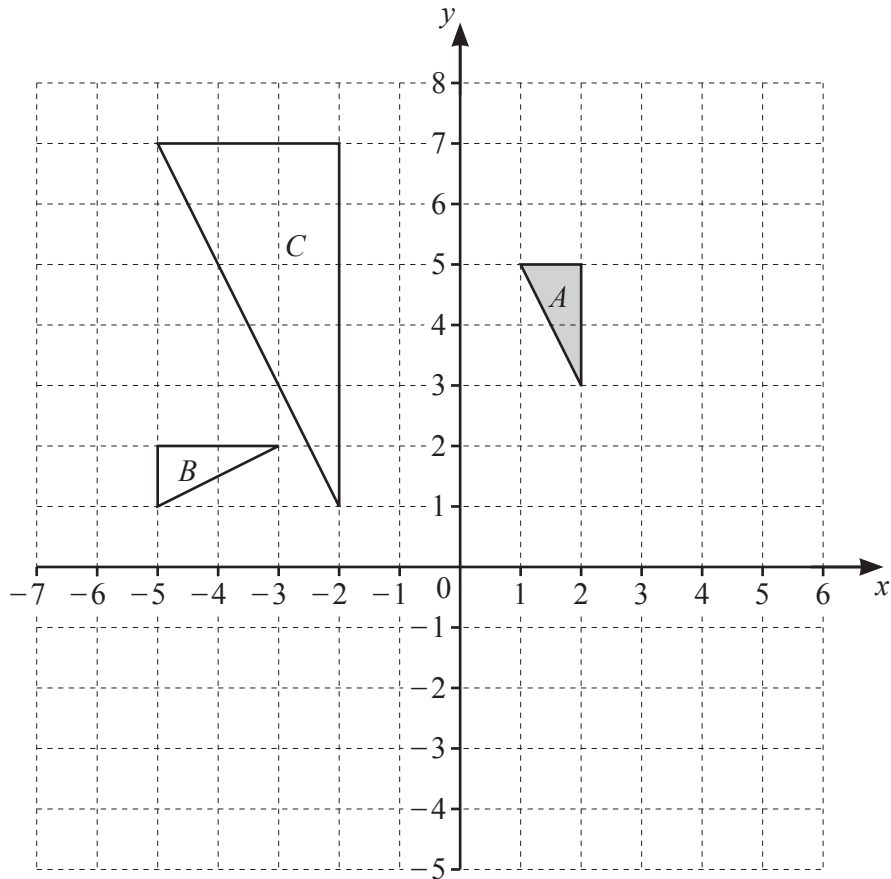
The tank is a quarter full.

Jim fills the tank with fuel that costs \$2.18 per litre.

Work out how much Jim pays.

\$ ..... [3]

6 (a)



(i) On the grid, draw the image of

(a) triangle  $A$  after a translation by the vector  $\begin{pmatrix} 3 \\ -7 \end{pmatrix}$ , [2]

(b) triangle  $A$  after a reflection in the line  $x = 3$ . [2]

(ii) Describe fully the **single** transformation that maps triangle  $A$  onto triangle  $B$ .

..... [3]

(iii) Describe fully the **single** transformation that maps triangle  $A$  onto triangle  $C$ .

..... [3]

(b)  $\mathbf{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$      $\mathbf{b} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$      $\mathbf{c} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

Work out.

(i)  $\mathbf{a} + \mathbf{b}$

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [1]$$

(ii)  $\mathbf{b} - 2\mathbf{c}$

$$\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [2]$$

(c) Point  $P$  has coordinates  $(6, -2)$  and  $\overrightarrow{PQ} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$ .

Find the coordinates of point  $Q$ .

$$(\dots\dots\dots, \dots\dots\dots) \quad [1]$$

7 (a)  $W = 3a + 5c$

Find the value of  $W$  when  $a = 6$  and  $c = 2$ .

$W = \dots\dots\dots$  [2]

(b) Factorise completely.

$$12b + 8b^2$$

$\dots\dots\dots$  [2]

(c) Make  $m$  the subject of the formula  $y = 4m - p$ .

$m = \dots\dots\dots$  [2]

(d) Find the value of  $x$  when  $5^x \times 5^3 = 5^{12}$ .

$x = \dots\dots\dots$  [1]

(e) Find the value of

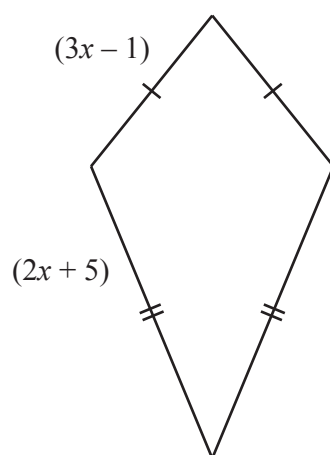
(i)  $3^0$ ,

..... [1]

(ii)  $5^{-2}$ .

..... [1]

(f) In this part, all measurements are in centimetres.



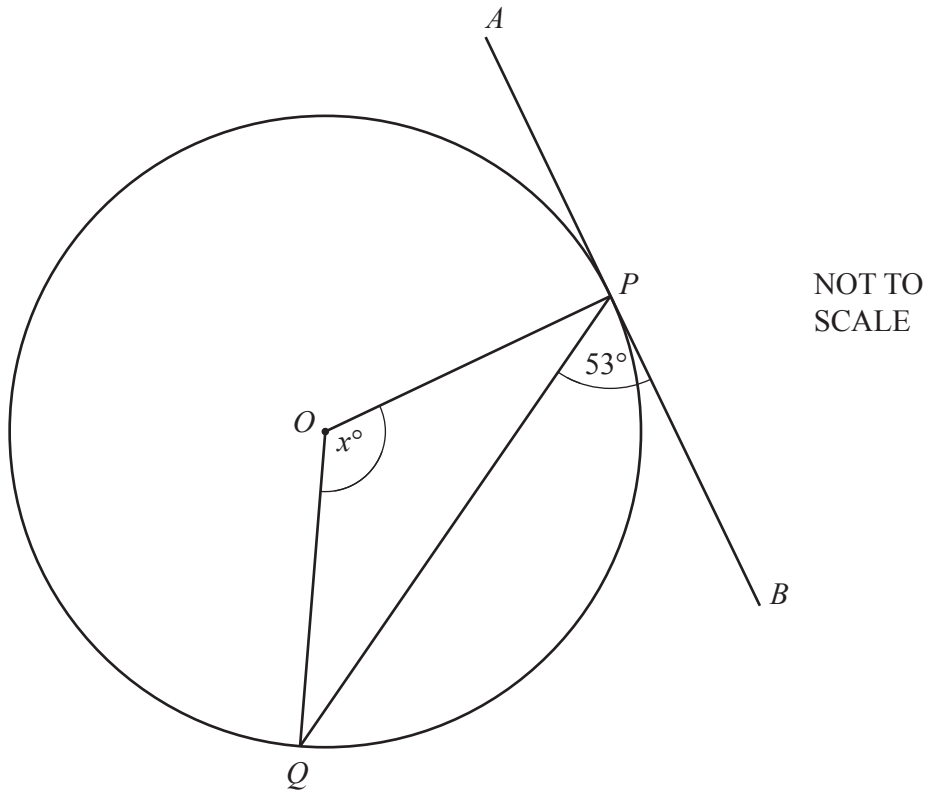
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The diagram shows a kite with sides  $(2x + 5)$  and  $(3x - 1)$ .  
The perimeter of the kite is 33 cm.

Work out the length of a shorter side.

..... cm [5]

8 (a)



$P$  and  $Q$  are points on the circle, centre  $O$ .  
 $APB$  is a tangent to the circle at  $P$ .

- (i) Write down the mathematical name for the line  $PQ$ .

..... [1]

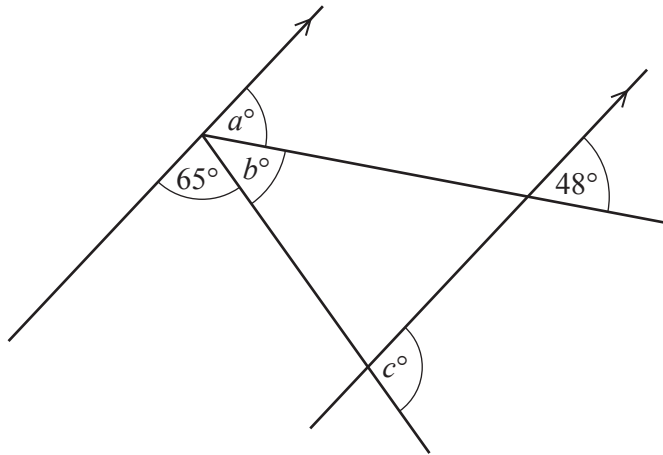
- (ii) Explain why angle  $OPB$  is  $90^\circ$ .

..... [1]

- (iii) Find the value of  $x$ .

$x =$  ..... [3]

(b)



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The diagram shows two parallel lines and two straight lines.

- (i) Find the value of  $a$ .  
Give a reason for your answer.

$a = \dots\dots\dots$  because  $\dots\dots\dots$  [2]

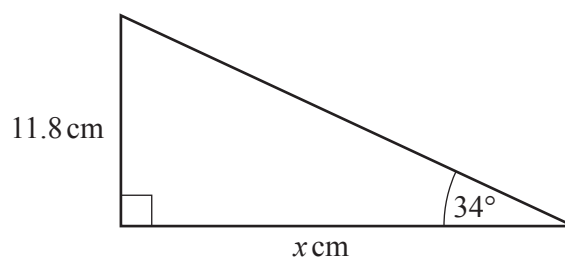
- (ii) Find the value of  $b$ .  
Give a reason for your answer.

$b = \dots\dots\dots$  because  $\dots\dots\dots$  [2]

- (iii) Find the value of  $c$ .

$c = \dots\dots\dots$  [2]

(c)



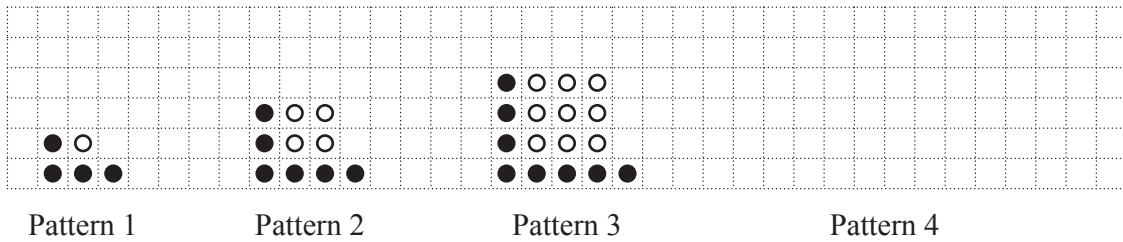
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Calculate the value of  $x$ .

$x = \dots\dots\dots$  [3]

Question 9 is printed on the next page.

- 9 A sequence of patterns is made using black counters and white counters.



- (a) Draw Pattern 4. [1]

- (b) Complete the table.

Pattern	1	2	3	4	5
Number of black counters	4	6	8		
Number of white counters	1	4	9		

[2]

- (c) Write an expression, in terms of  $n$ , for

- (i) the number of black counters in Pattern  $n$ ,

..... [2]

- (ii) the number of white counters in Pattern  $n$ .

..... [1]

- (d) Elena has 30 black counters and 140 white counters.

Can she make Pattern 12 using her counters?

Explain your answer.

..... because .....

..... [2]

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