Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2020**

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- 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 π, use either your calculator value or 3.142.

INFORMATION

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

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

View solution

(i) Write 2067 in words.

..... [1]

View solution

(ii) Write 2067 correct to the nearest hundred.

..... [1]

View solution

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

Write the ratio guests : crew in its simplest form.

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

View solution

(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]

View solution

(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]

View solution

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

Write 153 000 000 in standard form.

..... [1]

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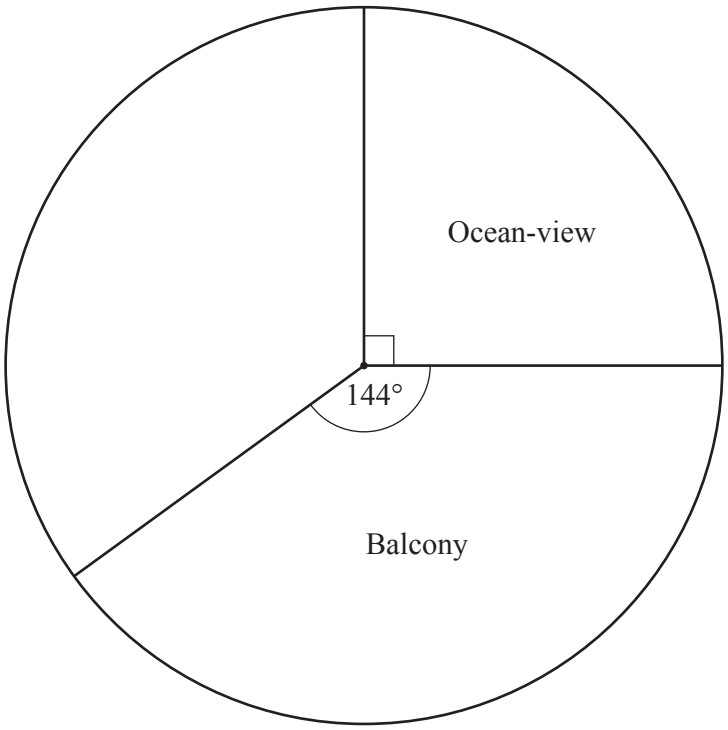
(f) There are 480 cabins on the ship.
There are four types of cabin: Ocean-view, Balcony, Interior and Suite.
Hannah starts to draw a pie chart to show the numbers of each type of cabin.

View solution



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

[1]

View solution

(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°
Balcony	192	144°
Interior	68	
Suite	100	

(a) Complete the table.

[2]

(b) Complete the pie chart. [1]

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

(i) a multiple of 23,

View solution

..... [1]

(ii) a factor of 120,

View solution

..... [1]

(iii) a common multiple of 8 and 12,

View solution

..... [1]

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

View solution

..... [1]

(v) a number that has exactly 2 factors.

View solution

..... [1]

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

View solution

..... [2]

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

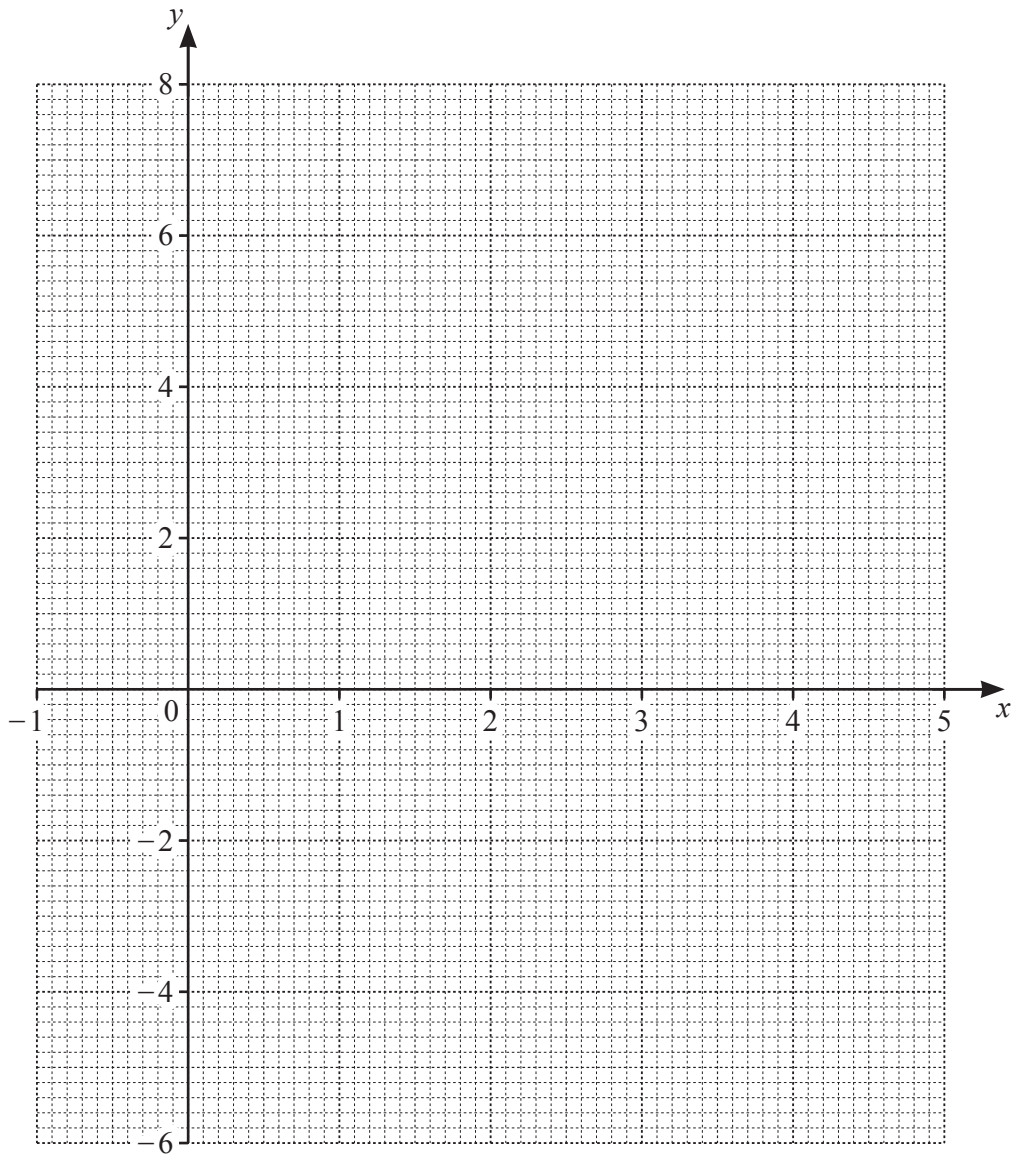
View solution

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 $-1 \leqslant x \leqslant 5$.

View solution



[4]

(c) **(i)** On the grid, draw the line $y = 3$. [1]

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

View solution

$x =$ ..... or $x =$ ..... [2]

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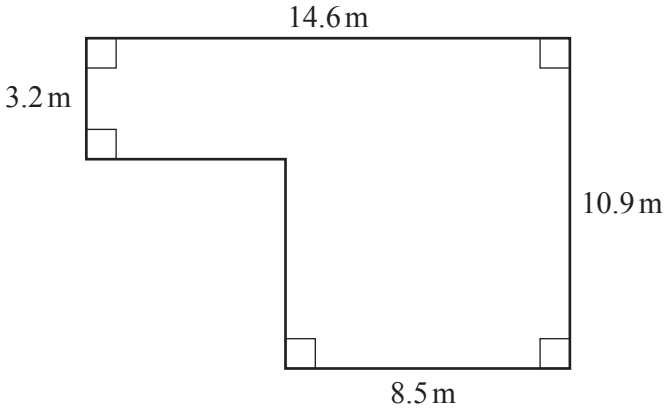
4 **(a)** The diagram shows the plan of part of Rachel's garden.

View solution



NOT TO SCALE

Calculate the area.

..... 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.

View solution

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.

View solution

Calculate the volume of the pot.

..... cm^3 [2]

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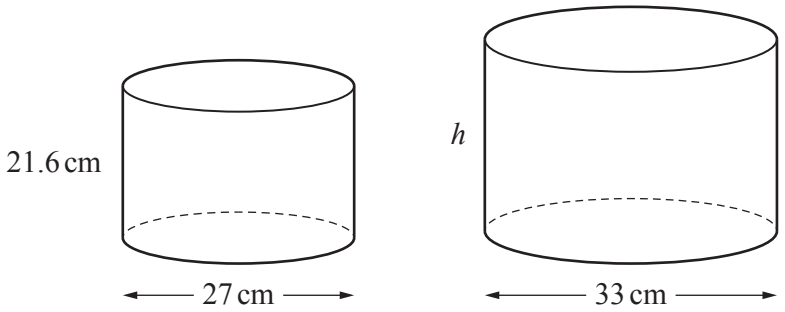
(d) The diagram shows two mathematically similar plant pots.

View solution



NOT TO SCALE

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.

$h =$ ..... cm [2]

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

View solution

Small	Medium	Large
30 litres $5.82	50 litres $9.45	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.

View solution

..... s [1]

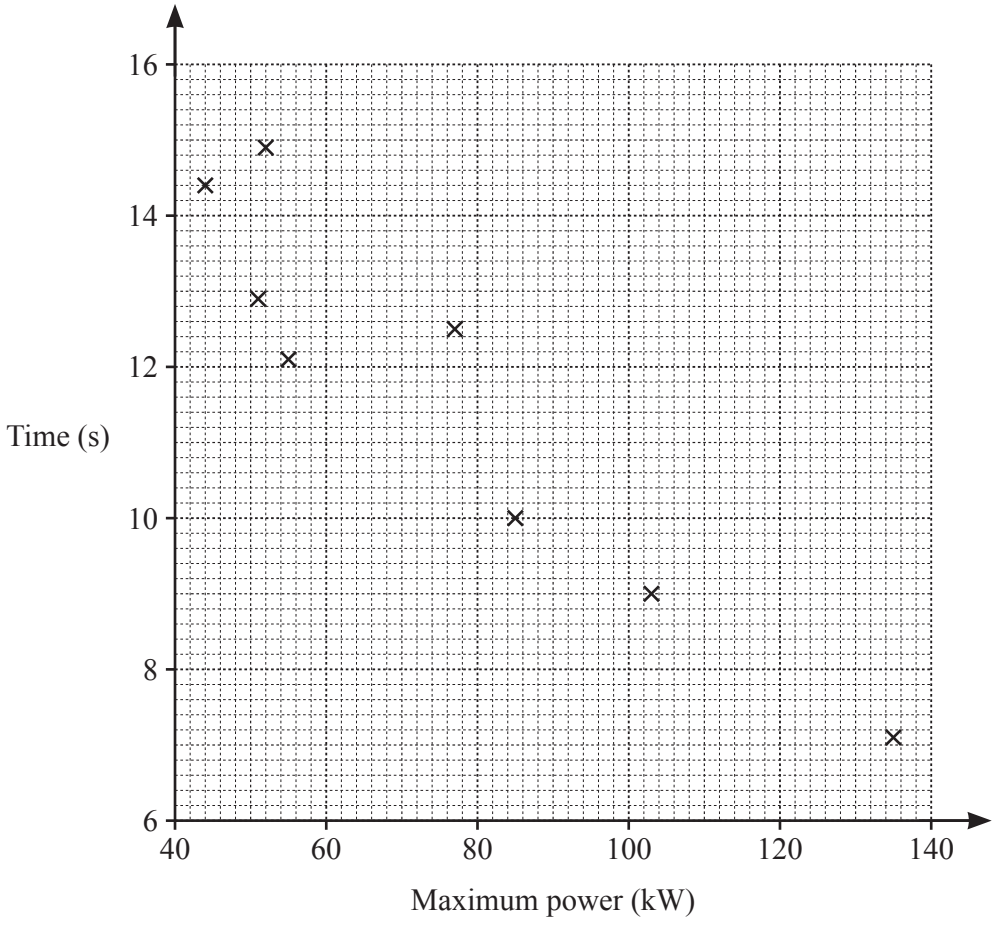
(ii) Find the median maximum power.

View solution

..... kW [2]

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

View solution



[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.

View solution

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.

View solution

Work out how much Jim pays.

$ ..... [3]

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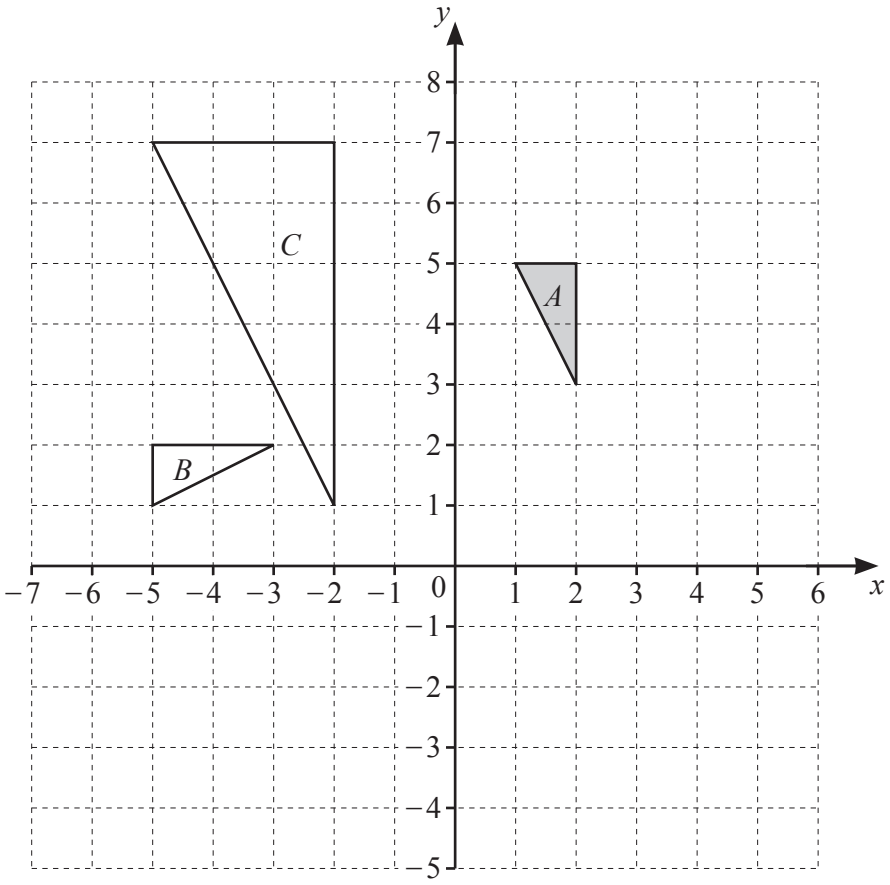
6 (a)

View solution



(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.

View solution

.....

..... [3]

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

View solution

.....

..... [3]

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

View solution

Work out.

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

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

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

View solution

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

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

View solution

Find the coordinates of point Q.

(..... , ...) [1]

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

View solution

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

$W =$ ..... [2]

(b) Factorise completely.

$12b + 8b^2$

View solution

..... [2]

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

View solution

$m =$ ..... [2]

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

View solution

$x =$ ..... [1]

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(e) Find the value of

(i) 3^0,

View solution

..... [1]

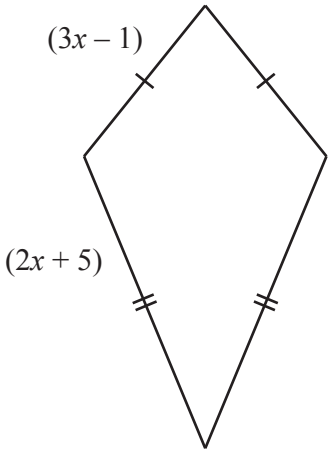
(ii) 5^{-2}.

View solution

..... [1]

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

View solution



NOT TO SCALE

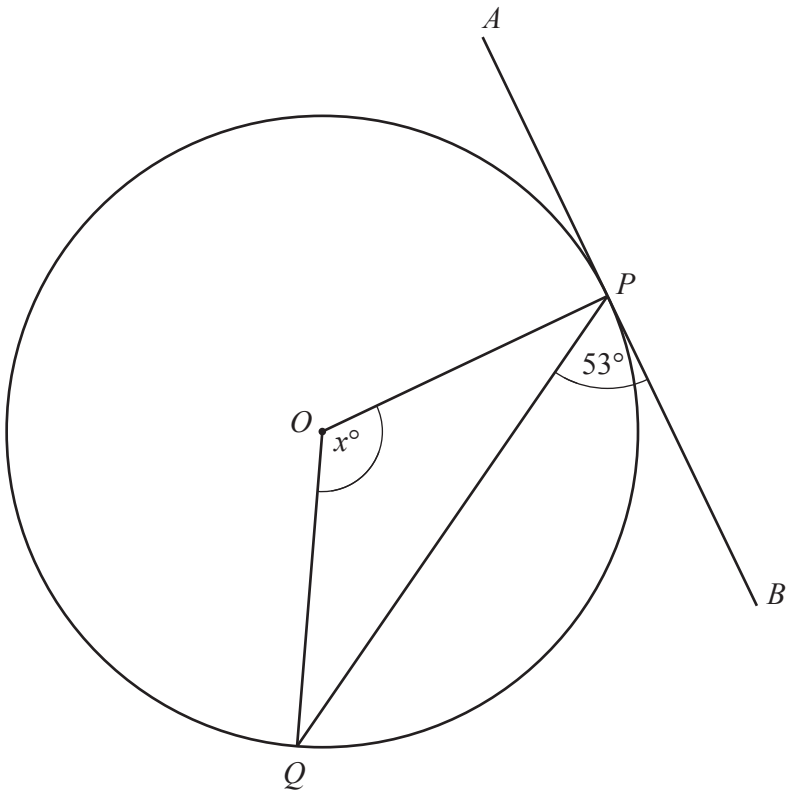
The diagram shows a kite with sides $(2x+5)$ and $(3x-1)$.
The perimeter of the kite is 33 cm.

Work out the length of a shorter side.

..... cm [5]

8 (a)

View solution



NOT TO SCALE

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°.

View solution

..... [1]

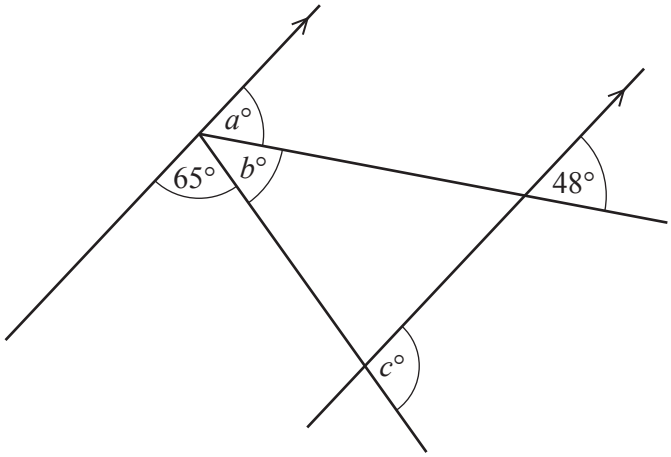
(iii) Find the value of x.

View solution

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

(b)

View solution



NOT TO SCALE

The diagram shows two parallel lines and two straight lines.

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

$a =$ ..... because ..... [2]

View solution

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

$b =$ ..... because ..... [2]

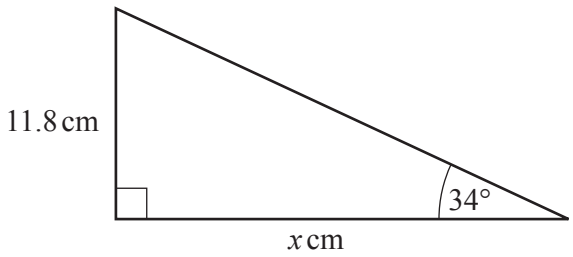
View solution

(iii) Find the value of c.

$c =$ ..... [2]

View solution

(c)



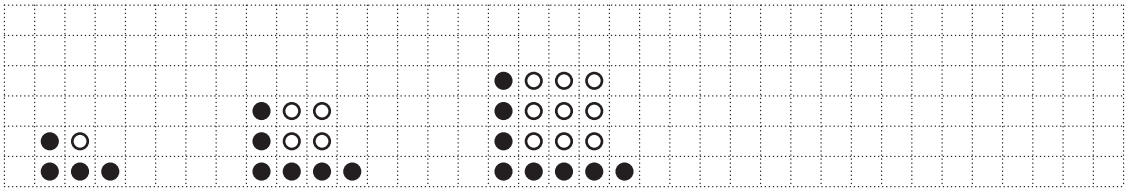
NOT TO SCALE

Calculate the value of x.

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

Question 9 is printed on the next page.

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



Pattern 1 Pattern 2 Pattern 3 Pattern 4

View solution

(a) Draw Pattern 4. [1]

(b) Complete the table.

View solution

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

View solution

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

..... [2]

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

View solution

..... [1]

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

View solution

Can she make Pattern 12 using her counters?
Explain your answer.

..... because .....

..... [2]

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