Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

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CAMBRIDGE International Examinations

1 Mr Marr asks his mathematics class to complete a statistics project about books.

View solution

(a) Olga counts the number of letters in each of the last 50 words in the book she is reading.
She has only counted the letters in 43 words so far.
Her results for these 43 words are shown in the table below.

Number of letters in each word	Tally	Frequency
1	|||	
2	𝍸	
3	𝍸 𝍸 ||	
4	𝍸 |||	
5	𝍸 ||||	
6	|||	
7	||	
8		
9	|	

The last seven words in the book that Olga needs to add to the table are

..... and they all lived happily ever after.

(i) Complete the tally and frequency columns in the table. [2]

(ii) Find the range.

View solution

..... [1]

(iii) Find the median.

View solution

..... [1]

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(b) Billie asks 60 students in his school what their favourite type of book is.
He has started to draw a pictogram to show his results.

View solution

Type of book		Frequency
Comedy	⊞ ⊞ ⊞ ⊞	
Science fiction	⊞ ⊞ ⊟	10
Poetry	⊡	
Music	⊞ ⊞ □	
Romance		8
Detective		14

Key: ⊞ represents ..... books.

The science fiction row in the pictogram is complete.

(i) Complete the key. [1]

(ii) Complete the pictogram. [2]

(iii) Write down the mode.

..... [1]

(iv) Work out how many more students choose detective books than music books.

..... [1]

(v) Work out the fraction of students who did **not** choose romance books.

..... [2]

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2 **(a)** Write down

(i) the number twenty seven million, three hundred and sixty thousand and forty five in figures,

View solution

..... [1]

(ii) the six factors of 20,

View solution

....., ..., ..., ..., ..., ... [2]

(iii) a fraction that is equivalent to $\frac{7}{9}$,

View solution

..... [1]

(iv) a prime number between 30 and 40.

View solution

..... [1]

(b) For each statement, insert one pair of brackets to make it correct.

View solution

(i) $17 - 3 \times 5 - 3 = 11$ [1]

(ii) $3 + 2^2 - 4 = 21$ [1]

(c) Find $\sqrt[3]{4913}$.

View solution

..... [1]

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3 Three boys each have $600.

(a) Victor spends 40% of his $600.
He spends the money in the ratio clothes : books : music = 10 : 2 : 3.

View solution

(i) Work out how much he spends on music.

$ ..... [3]

(ii) Work out how much more he spends on clothes than books.

View solution

$ ..... [2]

(b) Walter invests his $600 for 3 years at a rate of 4.5% per year compound interest.

View solution

Calculate the interest Walter receives at the end of the 3 years.

$ ..... [3]

(c) Xavier goes on holiday to Europe and changes his $600 into euros (€).
He spends €325 whilst he is on holiday.
When he gets home he changes the euros he has left back into dollars.

View solution

The exchange rate is $1 = €0.864 .

Work out how many dollars he has left after his holiday.
Give your answer correct to the nearest cent.

$ ..... [3]

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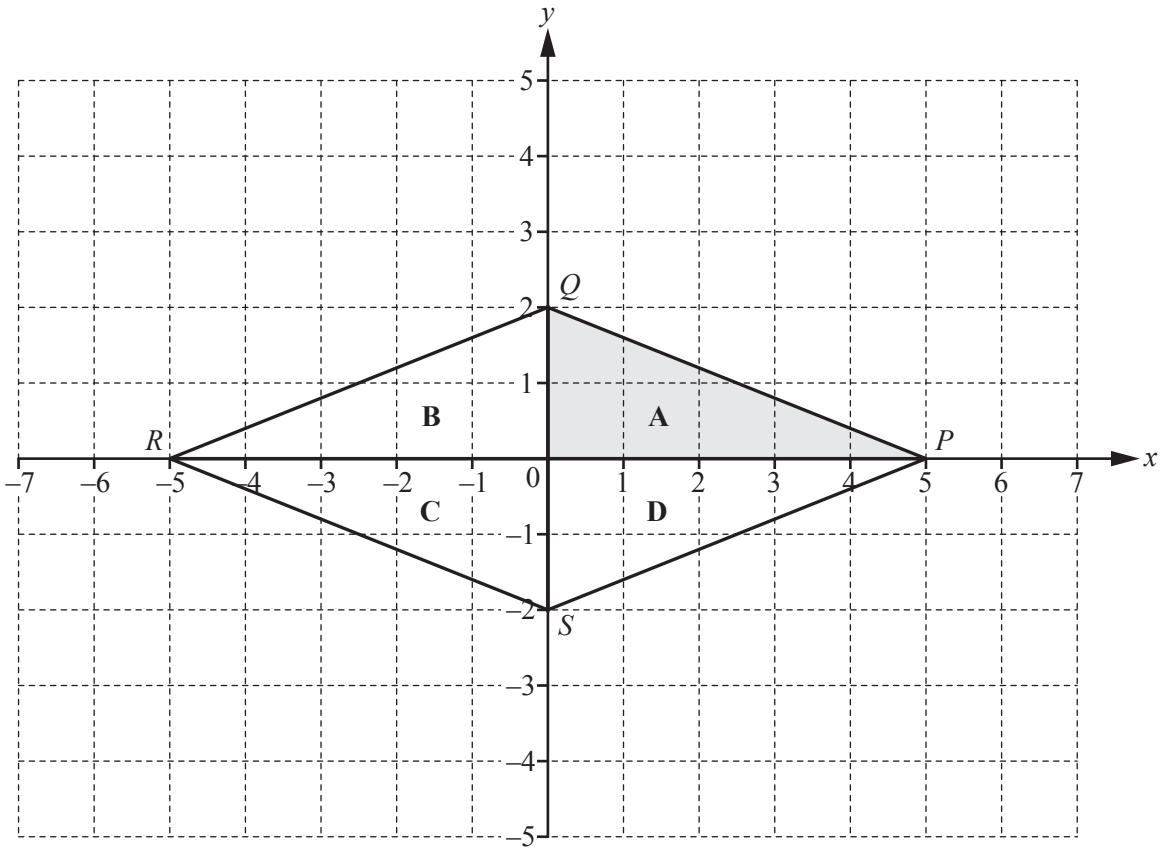
4



The diagram shows a quadrilateral *PQRS* which is made from four congruent triangles **A**, **B**, **C** and **D**.

(a) Write down the mathematical name for the quadrilateral *PQRS*.

View solution

..... [1]

(b) **(i)** Write down the co-ordinates of *S*.

View solution

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

(ii) Measure the obtuse angle *PSR*.

View solution

..... [1]

(c) **(i)** Measure the length of the line *PQ*.

View solution

..... cm [1]

(ii) Work out the perimeter of the quadrilateral *PQRS*.

View solution

..... cm [1]

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(d) Describe fully the **single** transformation that maps

View solution

(i) triangle **A** onto triangle **B**,

.....

..... [2]

View solution

(ii) triangle **A** onto triangle **C**.

.....

..... [3]

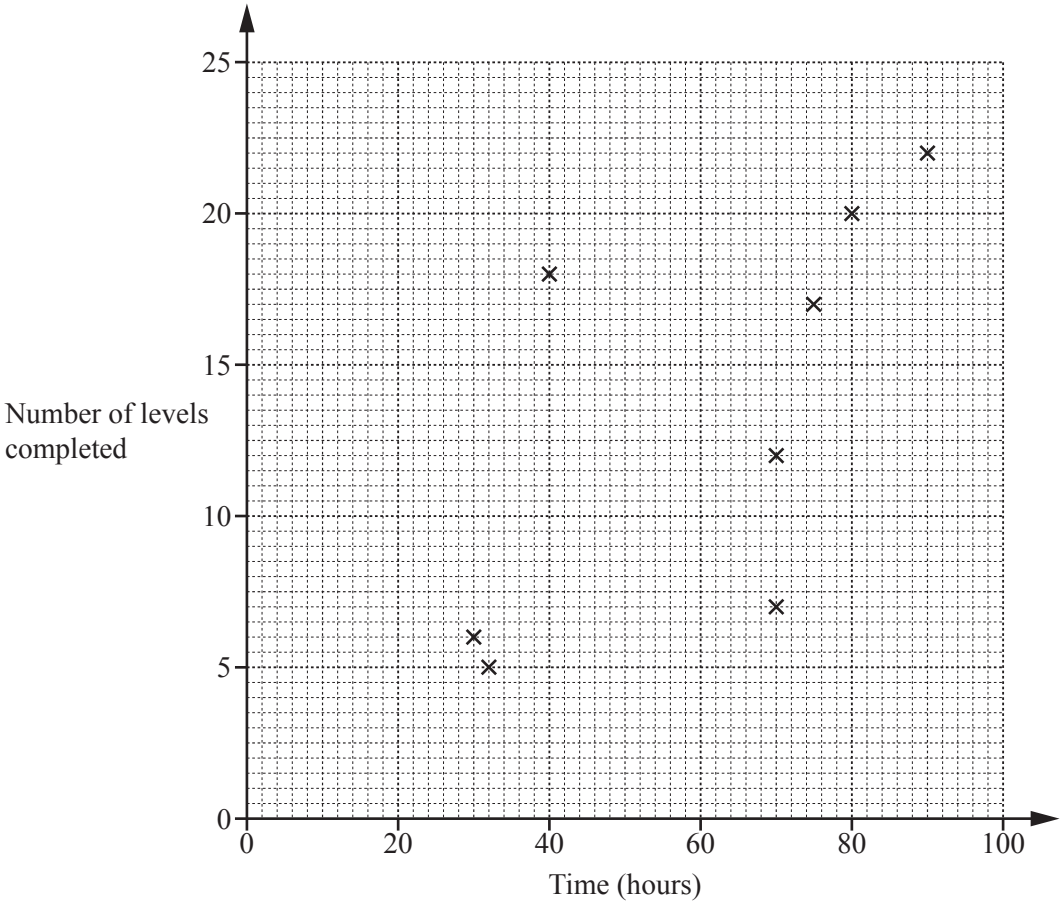
(e) On the grid, draw the image of triangle **D** after a translation by the vector $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$. [2]

View solution

5 Lucy asked 12 people how many hours they each spent playing a computer game and the number of levels they each completed in one month.

The results are shown in the table.

Time spent playing (hours)	90	32	70	75	30	70	40	80	40	65	50	32
Number of levels completed	22	5	12	17	6	7	18	20	8	15	11	9



View solution

(a) Complete the scatter diagram.
The first eight points have been plotted for you. [2]

(b) One person completes more levels per hour than any of the others.

View solution

On the scatter diagram, put a ring around the point for this person. [1]

(c) What type of correlation does this scatter diagram show?

..... [1]

View solution

(d) On the scatter diagram, draw a line of best fit. [1]

(e) Another person, Monika, completed 19 levels but forgot to record the time spent playing.

View solution

Use your line of best fit to estimate the number of hours that Monika spent playing.

..... hours [1]

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6 Georgiana is travelling by train from Redtown to Teignley.

(a) The price of a ticket is \$13.50 .
Georgiana's ticket price is reduced by one-third because she is a student.

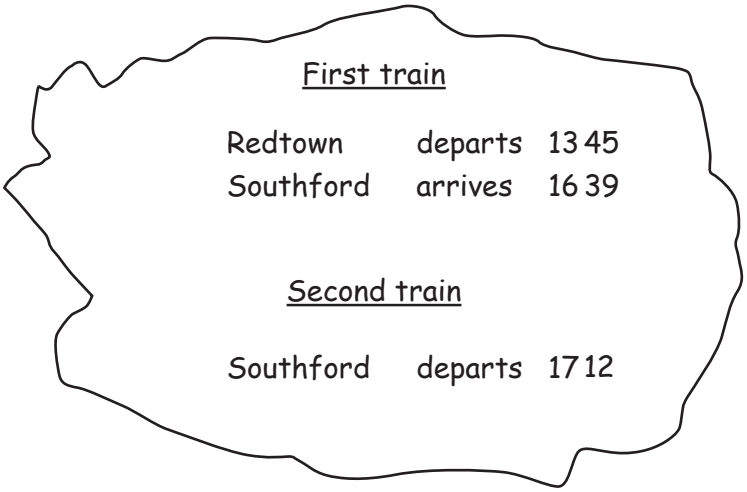
View solution

Work out how much she pays for her ticket.

\$ ..... [2]

(b) Georgiana travels on two trains.
The first train goes from Redtown to Southford.
The second train goes from Southford to Teignley.
She has written down some information about the times of her trains.

View solution



(i) Write 13 45 using the 12-hour clock.

..... [1]

(ii) Work out how long the first train should take to travel from Redtown to Southford.
Give your answer in hours and minutes.

View solution

..... h ..... min [1]

(iii) The first train arrives at Southford 46 minutes late.

View solution

By how many minutes has Georgiana missed her second train?

..... min [2]

(c) While Georgiana waits for the next train, she buys a cup of hot chocolate.

View solution



NOT TO SCALE

Work out which cup of hot chocolate is the best value.
Show all your working.

..... [3]

(d) The next train from Southford to Teignley is at 18 12.
The journey is 76 km and the train travels at an average speed of 48 km/h.

View solution

Work out the time that the train arrives in Teignley.

..... [3]

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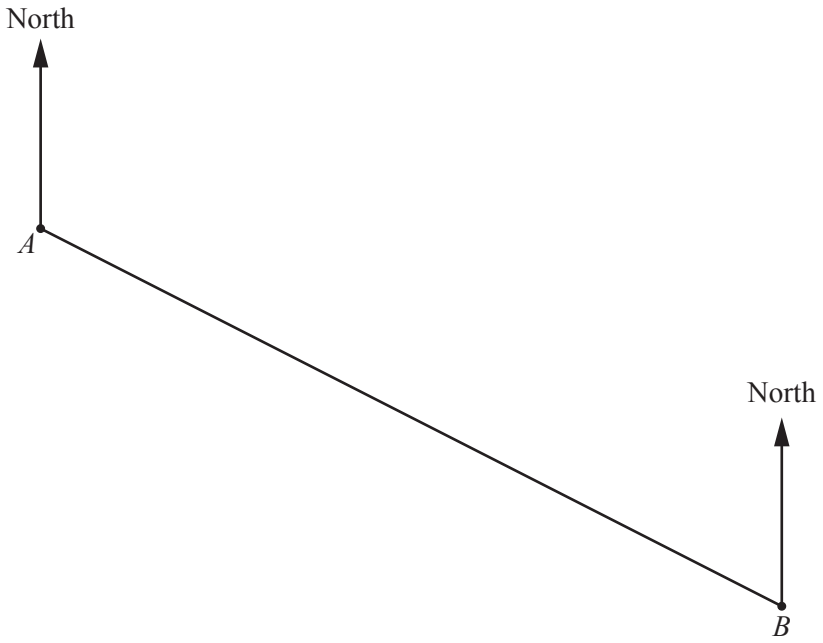
7 The scale drawing shows the positions of Annika's house, A, and Bernhard's house, B, on a map.
The scale is 1 centimetre represents 300 metres.



Scale: 1 cm to 300 m

(a) Work out the actual distance, in metres, between Annika's house and Bernhard's house.

View solution

..... m [2]

(b) Measure the bearing of Bernhard's house from Annika's house.

View solution

..... [1]

(c) **(i)** **Using a straight edge and compasses only**, construct the perpendicular bisector of AB.
Show all your construction arcs. [2]

(ii) Cordelia's house is

View solution

- the same distance from Annika's house and Bernhard's house

and

- due south of Annika's house.

Mark on the map the position of Cordelia's house.
Label this point C. [2]

(d) Dougie's house is

View solution

- on a bearing of 320° from Bernhard's house

and

- 1650 m from Annika's house.

Mark on the map the two possible positions of Dougie's house.
Label each of these points D. [4]

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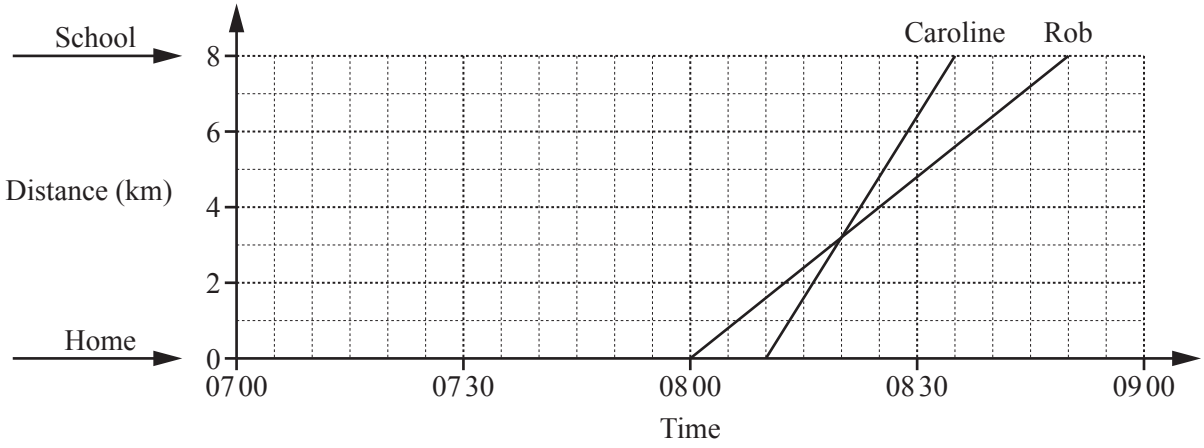
8 Three children from the same family travel from their home to the same school.
Caroline cycles to school.
Rob runs to school.
William walks to school.



The travel graph shows the journeys to school for Caroline and Rob.
Rob leaves home before Caroline.

(a) Explain what is happening when the two lines intersect on the travel graph.

View solution

.....

..... [1]

(b) Work out Rob's speed in km/h.

View solution

..... km/h [2]

(c) William leaves home at 0725.
He walks to school at a constant speed of 6 km/h.

View solution

On the grid, draw William's journey. [1]

(d) At what time is the distance between Rob and William greatest?

View solution

..... [1]

(e) Complete this list of names in the order they arrive at school.

View solution

First .....

Second .....

Third ..... [1]

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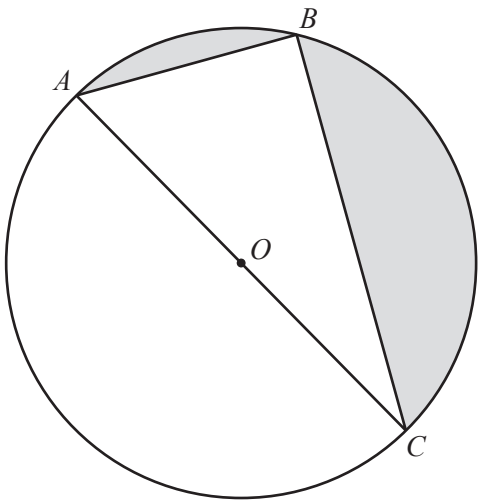
9



NOT TO SCALE

A, B and C are points on the circumference of a circle, centre O.

(a) Write down the mathematical name for

View solution

(i) the straight line AC,

..... [1]

(ii) the straight line AB.

View solution

..... [1]

(b) Give a geometrical reason why angle $ABC = 90°$.

..... [1]

View solution

(c) $AB = 20\,\text{cm}$ and $AC = 52\,\text{cm}$.

View solution

(i) Use trigonometry to calculate angle BAC.

Angle $BAC =$ ..... [2]

View solution

(ii) Show that $BC = 48\,\text{cm}$.

[2]

View solution

(iii) Work out the area of triangle ABC.

..... cm^2 [2]

View solution

(iv) Work out the total shaded area.

..... cm^2 [3]

10 (a) (i) Write down the gradient of the line $y = -4x + 7$.

..... [1]

(ii) Write down the equation of a line parallel to $y = 2x + 3$.

$y =$ ..... [1]

(iii) Write down the co-ordinates of the point where the graph of $y = 6x - 5$ crosses the y-axis.

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

(iv) The point $(k, 7)$ lies on the line $y = 4x - 3$.

View solution

Find the value of k.

$k =$ ..... [2]

(b) (i) Complete the table of values for $y = x^2 - x - 5$.

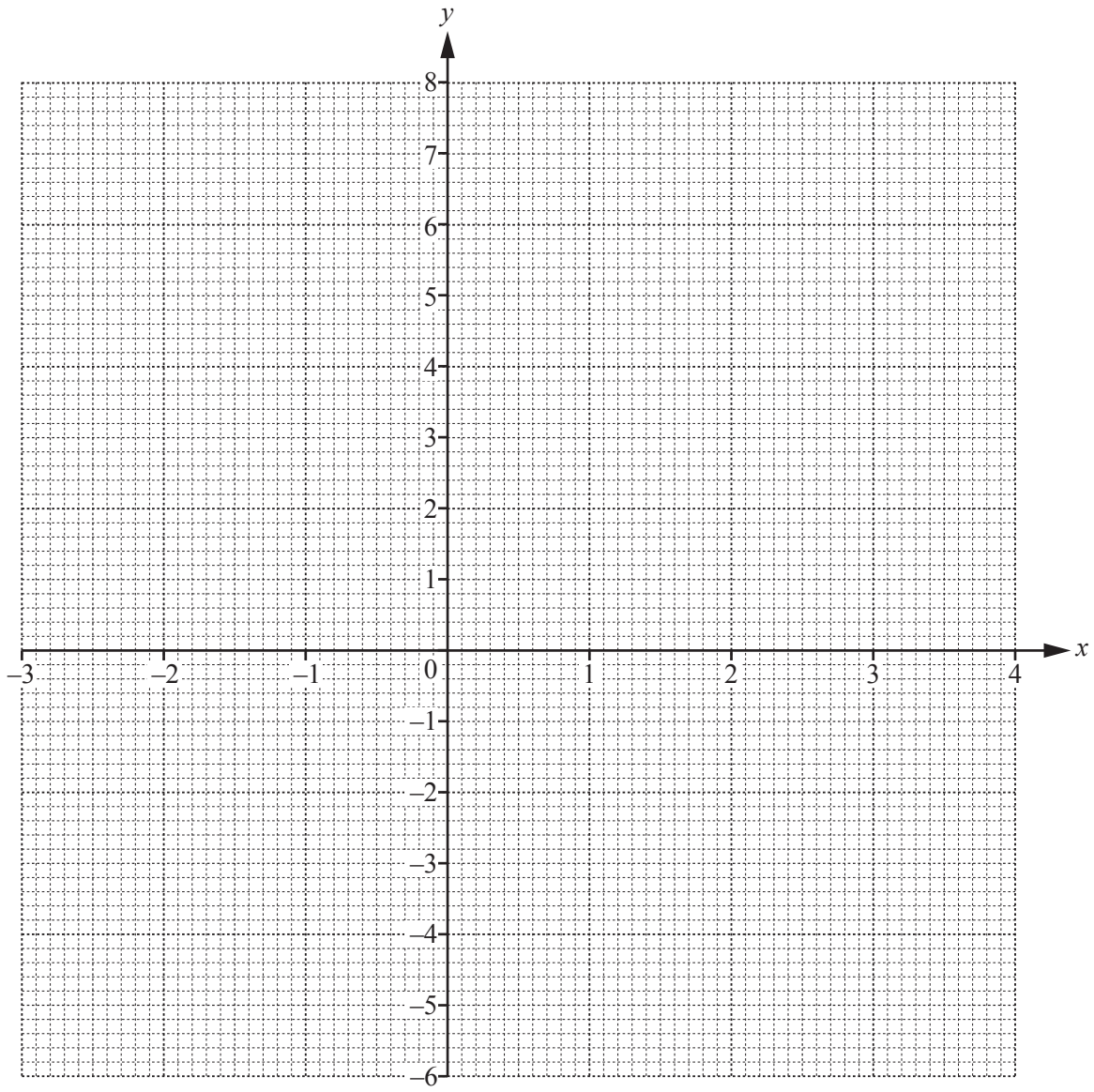
View solution

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

[3]

(ii) On the grid, draw the graph of $y = x^2 - x - 5$ for $-3 \leqslant x \leqslant 4$.

View solution



[4]

(iii) Write down the co-ordinates of the lowest point on the graph.

View solution

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

(iv) **(a)** On the grid, draw the line of symmetry of the graph. [1]

(b) Write down the equation of this line.

..... [1]

View solution

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