

# Cambridge IGCSE™

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## MATHEMATICS

**0580/43**

## Paper 4 (Extended)

May/June 2020

**2 hours 30 minutes**

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  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Blank pages are indicated.

1 (a)

Campsite fees (per day)	
Tent .....	\$15.00
Caravan .....	\$25.00

The sign shows the fees charged at a campsite.  
Today there are 54 tents and 18 caravans on the site.

Calculate the fees charged today.

\$ ..... [2]

- (b) In September the total income at the campsite was \$37 054.  
This was a decrease of 4.5% on the total income in August.

Calculate the total income in August.

\$ ..... [2]

- (c) The visitors to the campsite today are in the ratio

$$\text{men} : \text{women} = 5 : 4 \quad \text{and} \quad \text{women} : \text{children} = 3 : 7.$$

- (i) Calculate the ratio men : women : children in its simplest form.

..... : ..... : ..... [2]

- (ii) Today there are 224 children at the campsite.

Calculate the total number of men and women.

..... [3]

- (d) The space allowed for each tent is a rectangle measuring 8 m by 6 m, each correct to the nearest metre.

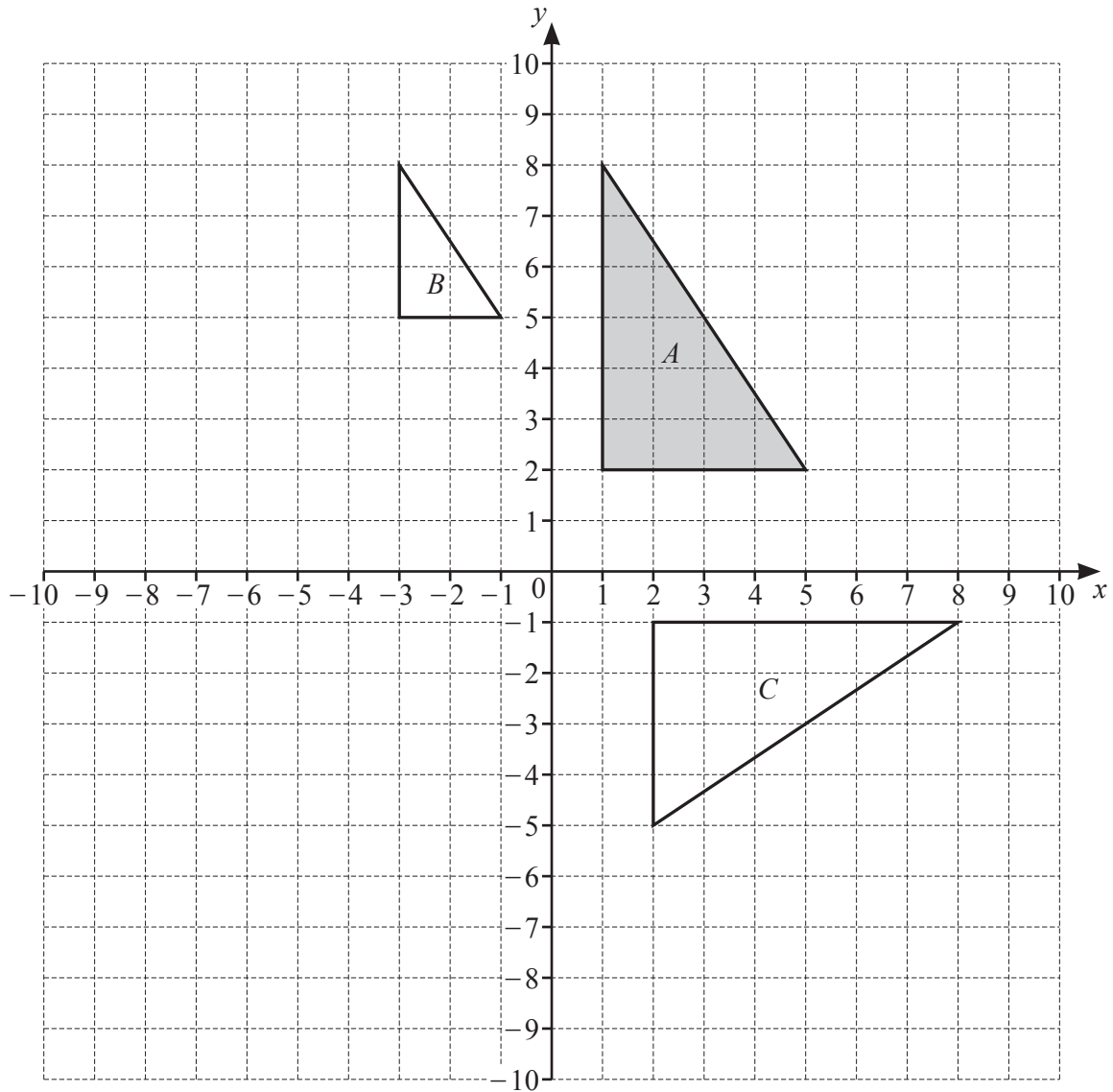
Calculate the upper bound for the area of the space allowed for each tent.

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

- (e) The value of the campsite has increased exponentially by 1.5% every year since it opened 30 years ago.

Calculate the value of the campsite now as a percentage of its value 30 years ago.

..... % [2]



(a) (i) Draw the image of triangle  $A$  after a reflection in the line  $y = -x$ . [2]

(ii) Draw the image of triangle  $A$  after a translation by the vector  $\begin{pmatrix} -2 \\ -9 \end{pmatrix}$ . [2]

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

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

..... [3]  
.....

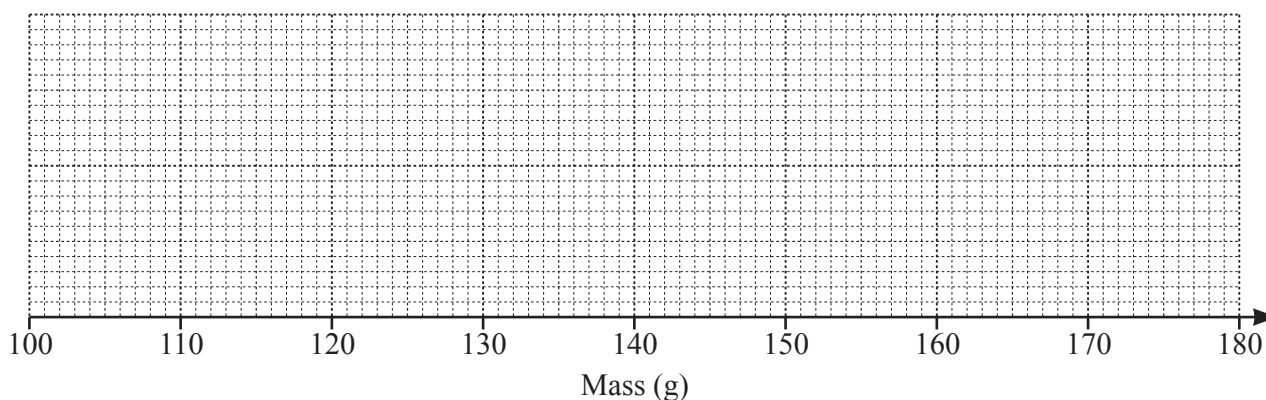
(ii) triangle  $A$  onto triangle  $C$ .

..... [3]  
.....

3 (a) Here is some information about the masses of potatoes in a sack:

- The largest potato has a mass of 174 g.
- The range is 69 g.
- The median is 148 g.
- The lower quartile is 121 g.
- The interquartile range is 38 g.

On the grid below, draw a box-and-whisker plot to show this information.



[4]

(b) The table shows the marks scored by some students in a test.

Mark	5	6	7	8	9	10
Frequency	8	2	12	2	0	1

Calculate the mean mark.

..... [3]

- 4 (a) Solve the inequality.

$$3m + 12 \leq 8m - 5$$

..... [2]

- (b) Solve the equation.

$$\frac{2x+5}{3-x} = \frac{14}{15}$$

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

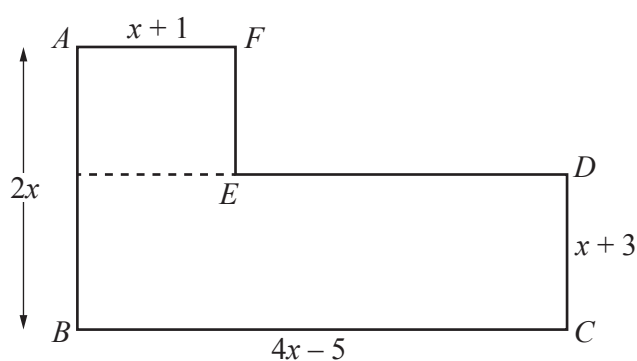
- (c) Solve the simultaneous equations.  
You must show all your working.

$$\begin{aligned}y &= 4 - x \\ x^2 + 2y^2 &= 67\end{aligned}$$

$$x = \dots\dots\dots, y = \dots\dots\dots$$

$$x = \dots\dots\dots, y = \dots\dots\dots [6]$$

- 5 All the lengths in this question are in centimetres.



NOT TO  
SCALE

The diagram shows a shape  $ABCDEF$  made from two rectangles.  
The total area of the shape is  $342 \text{ cm}^2$ .

- (a) Show that  $x^2 + x - 72 = 0$ .

[5]

- (b) Solve by factorisation.

$$x^2 + x - 72 = 0$$

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



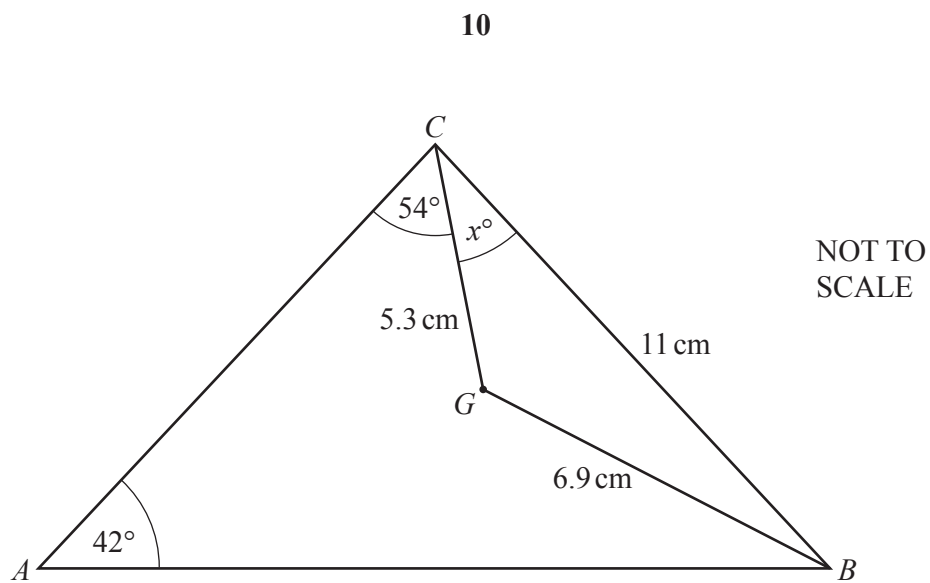
- (c) Work out the perimeter of the shape  $ABCDEF$ .

..... cm [2]

- (d) Calculate angle  $DBC$ .

Angle  $DBC =$  ..... [2]

6 (a)



The diagram shows triangle  $ABC$  with point  $G$  inside.  
 $CB = 11$  cm,  $CG = 5.3$  cm and  $BG = 6.9$  cm.  
 Angle  $CAB = 42^\circ$  and angle  $ACG = 54^\circ$ .

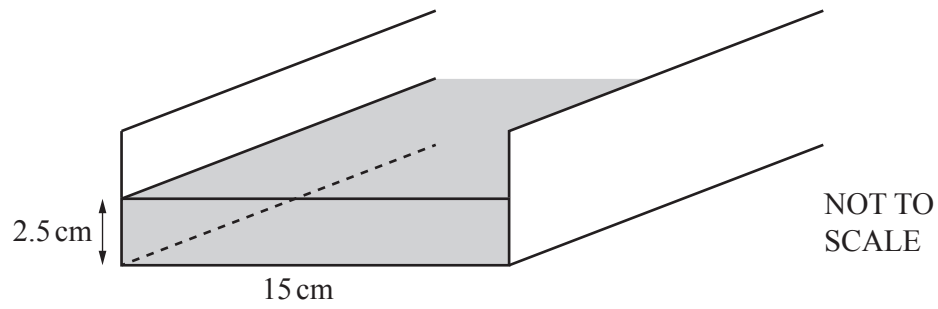
(i) Calculate the value of  $x$ .

$x = \dots\dots\dots$  [4]

(ii) Calculate  $AC$ .

$AC = \dots\dots\dots$  cm [4]

(b)



Water flows at a speed of 20 cm/s along a rectangular channel into a lake.  
The width of the channel is 15 cm.  
The depth of the water is 2.5 cm.

Calculate the amount of water that flows from the channel into the lake in 1 hour.  
Give your answer in litres.

..... litres [4]

- (a) (i)** Complete the tree diagram.



- ..... [2]

- ..... [3]

- (b) Calculate the probability that Bob plays football for 2 of the next 3 Saturdays.

..... [3]

- (c) When Arun plays football, the probability that he scores the winning goal is  $\frac{1}{7}$ .

Calculate the probability that Arun scores the winning goal one Saturday.

..... [2]

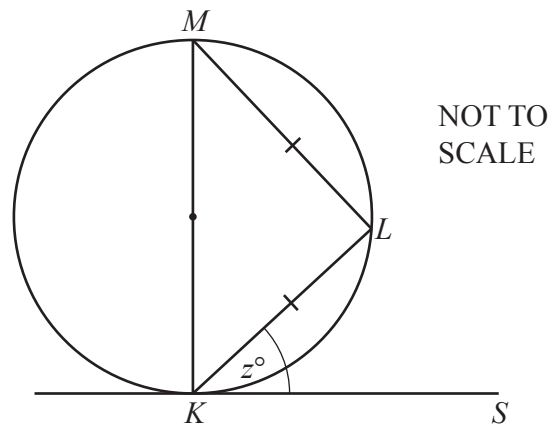
- 8 (a) The interior angle of a regular polygon with  $n$  sides is  $150^\circ$ .

Calculate the value of  $n$ .

$n = \dots\dots\dots$  [2]

- (b) (i)  $K, L$  and  $M$  are points on the circle.  
 $KS$  is a tangent to the circle at  $K$ .  
 $KM$  is a diameter and triangle  $KLM$  is isosceles.

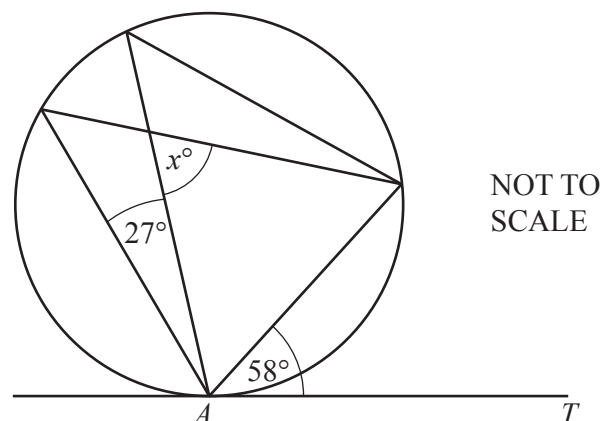
Find the value of  $z$ .



$z = \dots\dots\dots$  [2]

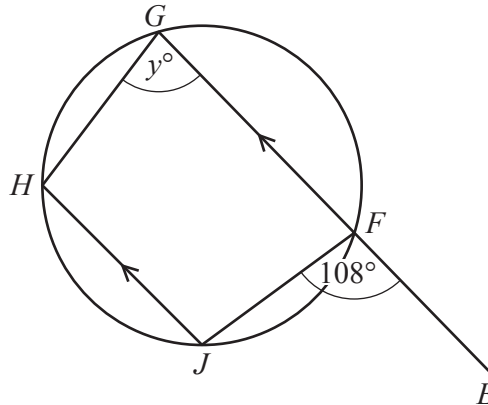
- (ii)  $AT$  is a tangent to the circle at  $A$ .

Find the value of  $x$ .



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

(iii)



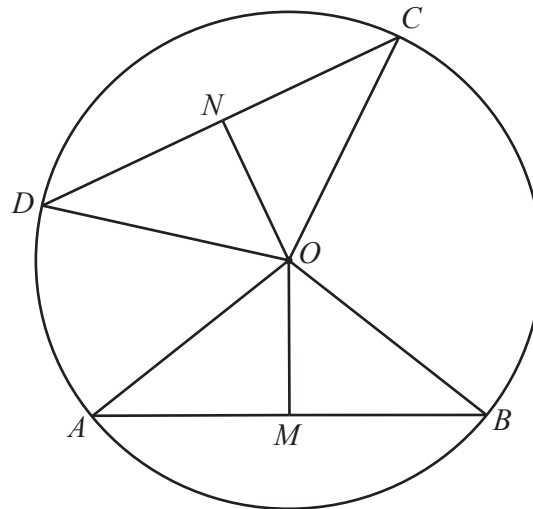
NOT TO  
SCALE

$F$ ,  $G$ ,  $H$  and  $J$  are points on the circle.  
 $EFG$  is a straight line parallel to  $JH$ .

Find the value of  $y$ .

$y = \dots\dots\dots$  [2]

(c)



NOT TO  
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$A$ ,  $B$ ,  $C$  and  $D$  are points on the circle, centre  $O$ .  
 $M$  is the midpoint of  $AB$  and  $N$  is the midpoint of  $CD$ .  
 $OM = ON$

Explain, giving reasons, why triangle  $OAB$  is congruent to triangle  $OCD$ .

.....

.....

.....

.....

[3]

9 (a) The equation of line  $L$  is  $3x - 8y + 20 = 0$ .

(i) Find the gradient of line  $L$ .

..... [2]

(ii) Find the coordinates of the point where line  $L$  cuts the  $y$ -axis.

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



(b) The coordinates of  $P$  are  $(-3, 8)$  and the coordinates of  $Q$  are  $(9, -2)$ .

(i) Calculate the length  $PQ$ .

..... [3]

(ii) Find the equation of the line parallel to  $PQ$  that passes through the point  $(6, -1)$ .

..... [3]

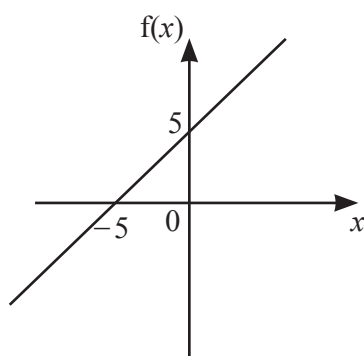
(iii) Find the equation of the perpendicular bisector of  $PQ$ .

..... [4]

- 10 (a) The diagrams show the graphs of two functions.

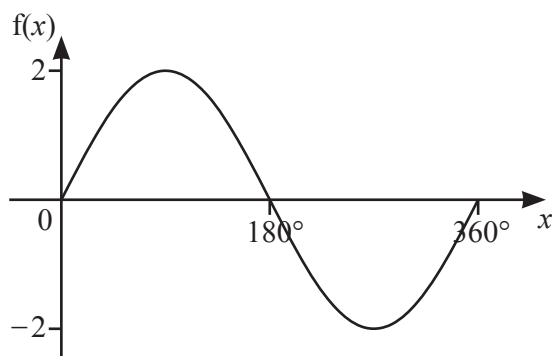
Write down each function.

(i)



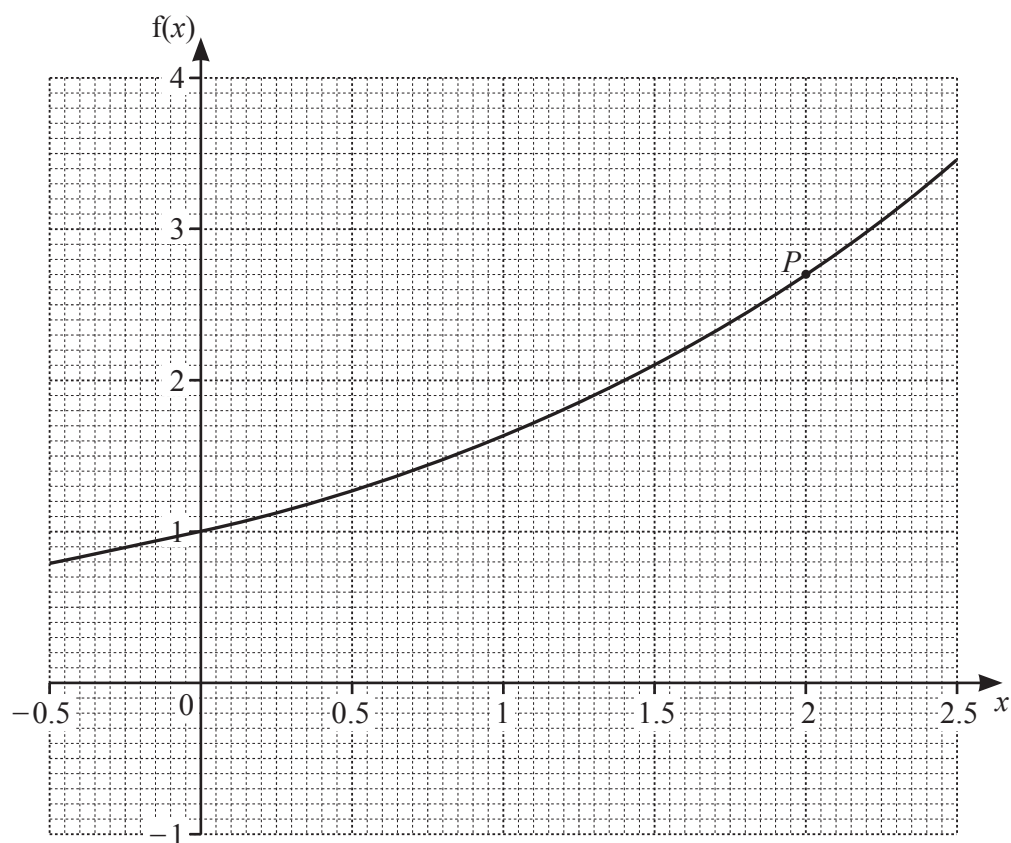
$f(x) = \dots\dots\dots$  [2]

(ii)



$f(x) = \dots\dots\dots$  [2]

(b)



The diagram shows the graph of another function.

By drawing a suitable tangent, find an estimate for the gradient of the function at the point  $P$ .

..... [3]

11

$$f(x) = 7x - 4$$

$$g(x) = \frac{2x}{x-3}, x \neq 3$$

$$h(x) = x^2$$

(a) Find  $g(6)$ .

..... [1]

(b) Find  $fg(4)$ .

..... [2]

(c) Find  $fh(x)$ .

..... [1]

(d) Find  $\frac{f(x)}{2} + g(x)$ .Give your answer as a single fraction, in terms of  $x$ , in its simplest form.

..... [3]

- (e) Find the value of  $x$  when  $f(x+2) = -11$ .

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

- (f) Find the values of  $p$  that satisfy  $h(p) = p$ .

..... [2]

12 (a) A curve has equation  $y = 4x^3 - 3x + 3$ .

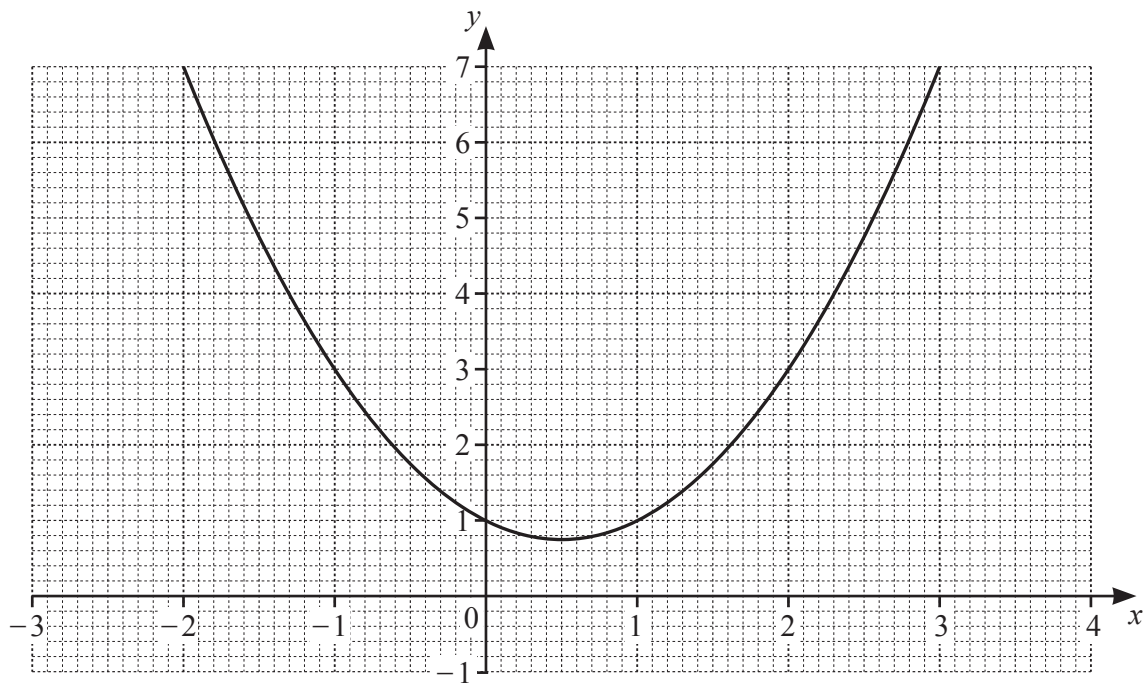
(i) Find the coordinates of the two stationary points.

( ..... , ..... ) and ( ..... , ..... ) [5]

(ii) Determine whether each of the stationary points is a maximum or a minimum.  
Give reasons for your answers.

[3]

(b) The graph of  $y = x^2 - x + 1$  is shown on the grid.



By drawing a suitable line on the grid, solve the equation  $x^2 - 2x - 2 = 0$ .

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

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