

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Pages	Mark
3	
4 – 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22	
TOTAL	



General Certificate of Secondary Education
Higher Tier

Mathematics (Linear) B

4365/1H

Paper 1 Non-calculator

H

Practice Paper 2012 Specification (Set 3)

<p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments. <p>You must not use a calculator.</p>	
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Time allowed

- 1 hour 30 minutes

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

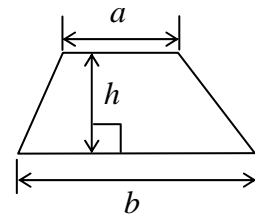
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 3 and 11.
These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer booklet.

Advice

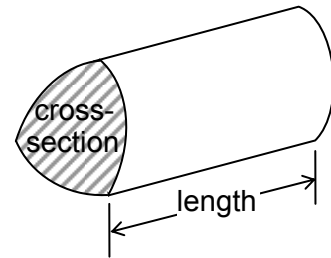
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a + b)h$

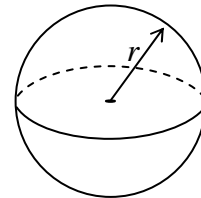


Volume of prism = area of cross-section \times length



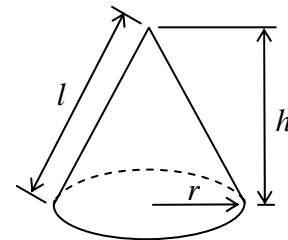
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

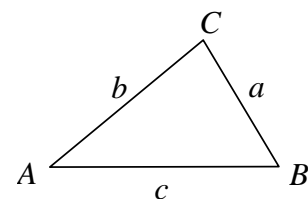
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab \sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer **all** questions in the spaces provided.

- 1 This table shows the driving distances, in kilometres, between five towns.
For example, it is 250 kilometres from Cardiff to London.

	Aberdeen			
750	Cardiff			
180	580	Edinburgh		
760	250	640	London	
480	280	330	310	Manchester



- 1 (a) Trevor makes this journey.

Edinburgh → Manchester → Cardiff → London → Edinburgh

How far does he drive?

Answer km (2 marks)

- 1 (b) John drives from Aberdeen to Edinburgh. His average speed is 60 kilometres per hour.

How long does his journey take?

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Answer hours (2 marks)

2

Andy sees two offers on potatoes.



Which is the best buy?

You **must** show your working.

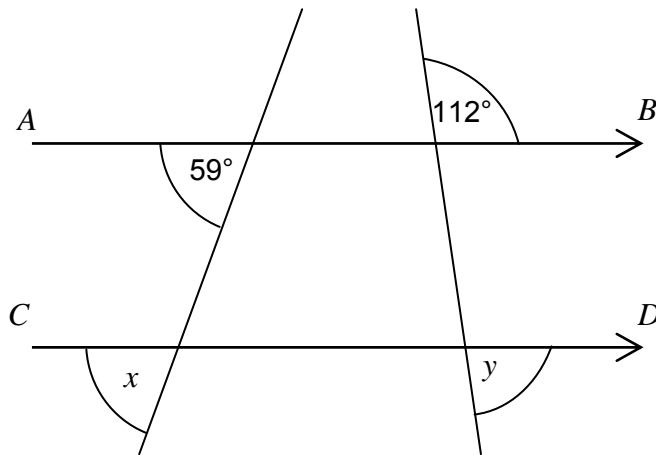
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Answer (4 marks)

***3**Not drawn
accurately*AB* and *CD* are parallel lines.

- 3 (a)** Write down the value of angle x .
Give a reason for your answer.

Answerdegrees

Reason (2 marks)

- 3 (b)** Work out the value of angle y .

Answerdegrees (2 marks)

- 4 k , q and r are three prime numbers between 10 and 25.

$$k + q = 2r$$

Work out the values of k , q and r .

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$$k = \dots\dots\dots q = \dots\dots\dots r = \dots\dots\dots \text{ (3 marks)}$$

- 5 Roxy is doing a survey to find out if boys or girls send more texts.

Design an observation sheet to collect her results.

(2 marks)

- 6 Work out the circumference of a circle, radius 8cm.
Give your answer in terms of π .

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Answer cm (2 marks)

- 7 a and b are odd numbers.

- 7 (a) Is $a + b$ odd, even or could it be either?

Tick a box.

odd even either

(1 mark)

- 7 (b) Is ab odd, even or could it be either?

Tick a box.

odd even either

(1 mark)

8 A test is taken by 20 students.

Mark, m	Frequency	Midpoint	
$0 \leq m \leq 4$	0	2	
$5 \leq m \leq 9$	4	7	
$10 \leq m \leq 14$	10	12	
$15 \leq m \leq 19$	4	17	
$20 \leq m \leq 24$	2	22	
	20		

Work out an estimate of the mean mark.

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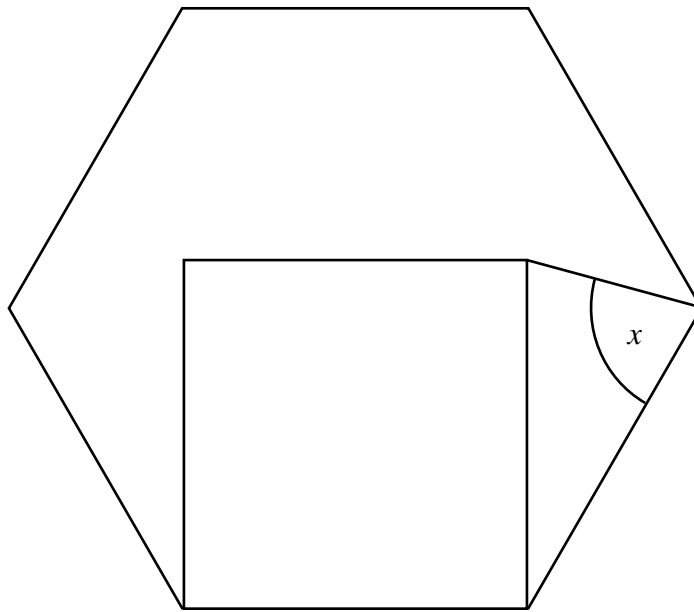
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Answer (3 marks)

- 9 A square is drawn on one side of a regular hexagon, as shown.



Not drawn
accurately

Work out the size of angle x .

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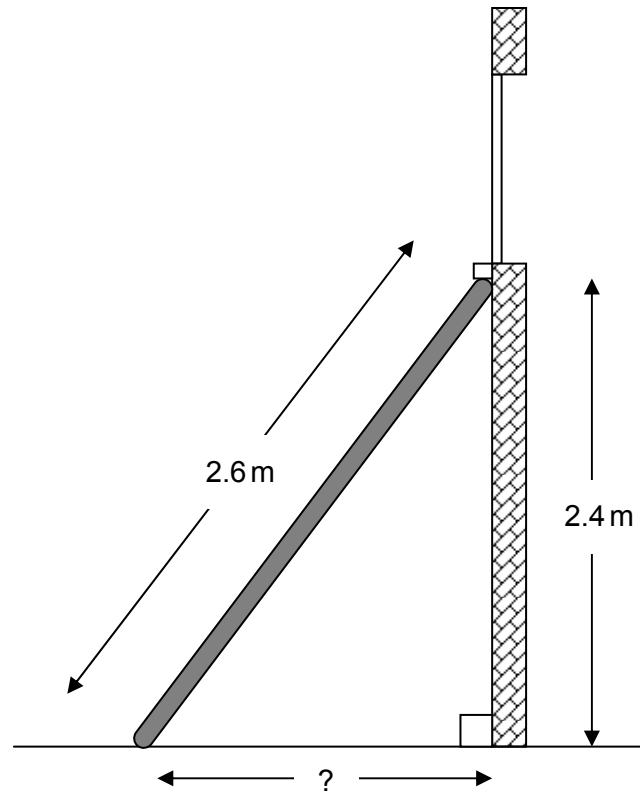
$x =$ degrees (4 marks)

Turn over for the next question

10

A ladder is 2.6 m long.

It is placed so that it just reaches a window ledge 2.4 m above the ground.



How far from the base of the wall is the foot of the ladder?

You will need the following information.

$$2.4^2 = 5.76, 2.6^2 = 6.76$$

You **must** show your working.

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Answerm (3 marks)

***11** Solve $2(3x - 1) = 3x + 13$

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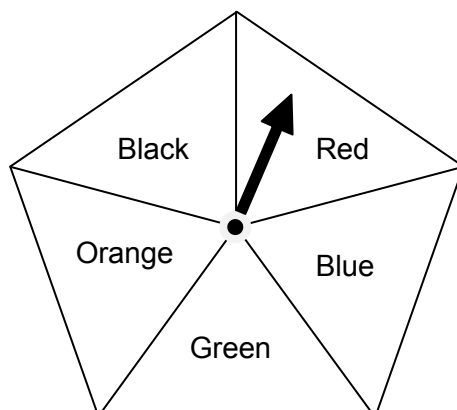
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$x =$ (4 marks)

Turn over for the next question

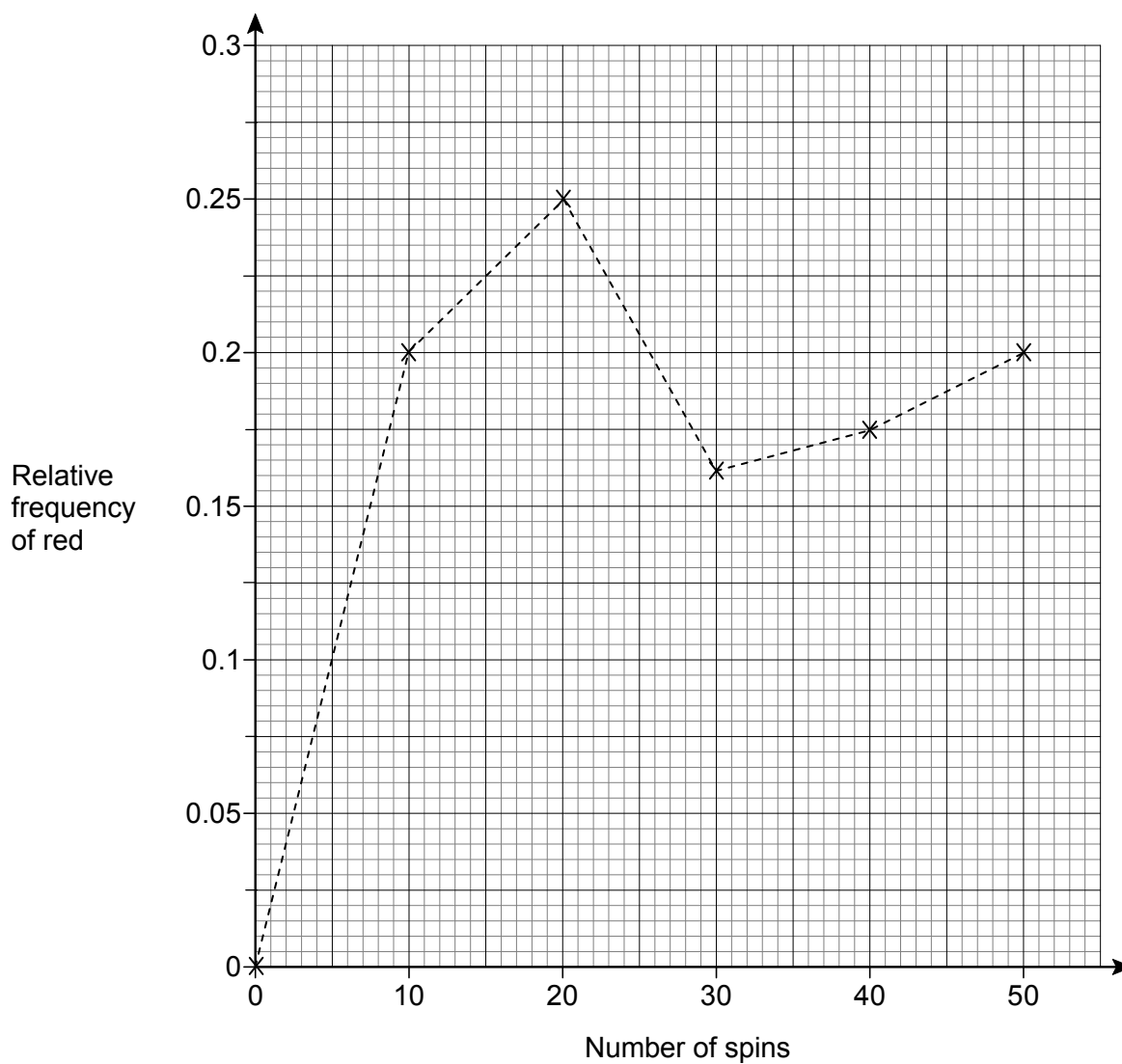
12 Here is a spinner with five equal sides.

The arrow is spun 50 times.



The number of times the arrow lands on red is recorded.

The relative frequency of red is plotted after every 10 spins on the grid.



12 (a) Show that the arrow landed on red 5 times in the first 20 spins.

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(1 mark)

12 (b) Is the spinner biased towards red?

Tick a box.

Yes No

Give a reason for your answer.

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(2 marks)

Turn over for the next question

13 Solve the simultaneous equations

$$y = 3x - 1$$

$$5x - 2y = 4$$

Do **not** use trial and improvement.

You **must** show your working.

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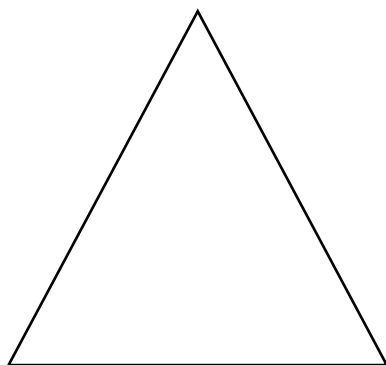
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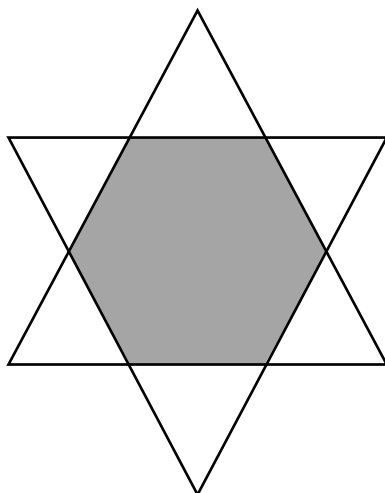
$x = \dots\dots\dots y = \dots\dots\dots$ (4 marks)

- 14 An equilateral triangle has an area of 36 cm^2 .



Not drawn
accurately

Two of these triangles overlap to form a **regular** hexagon as shown.



Not drawn
accurately

Work out the area of the hexagon.

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Answer cm^2 (3 marks)

7

15 Simplify $\frac{2x + 6}{(x + 3)^2}$

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Answer (2 marks)

16 Solve $\frac{x + 3}{2} - \frac{2x - 1}{3} = 1$

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$x =$ (4 marks)

17 (a) Simplify $(2x^4y)^3$

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Answer (2 marks)

17 (b) Factorise fully $2x^2 - 32y^2$

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Answer (2 marks)

Turn over for the next question

18 Match each of the sketch graphs to one of these equations.

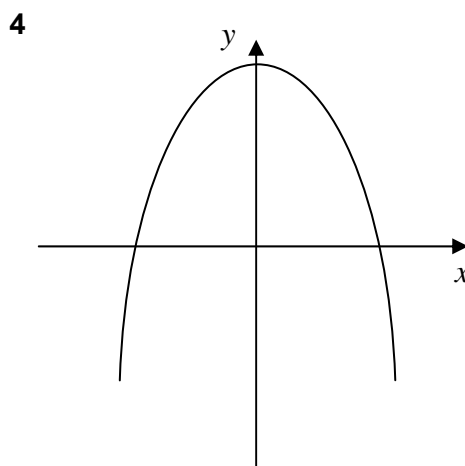
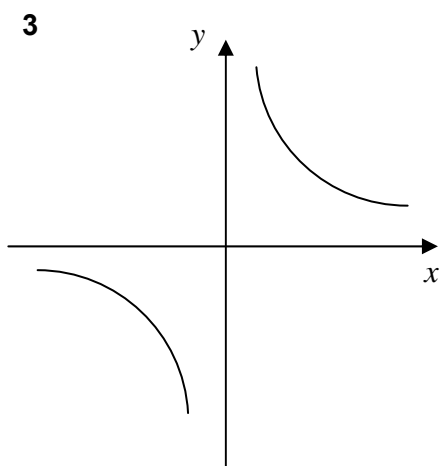
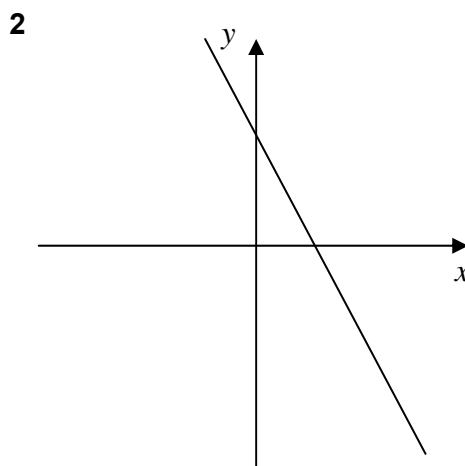
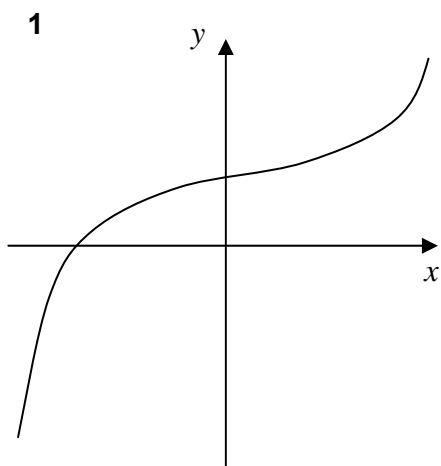
A $y = 2 - 2x$

B $y = 2x + 2$

C $y = 3 - x^2$

D $y = x^3 + 4$

E $y = \frac{2}{x}$



Graph 1 represents equation

Graph 2 represents equation

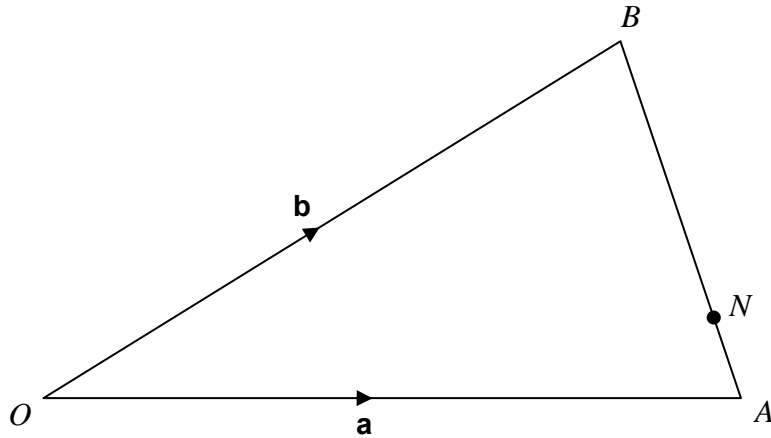
Graph 3 represents equation

Graph 4 represents equation (4 marks)

19 In triangle OAB ,

$$\vec{OA} = \mathbf{a}$$

$$\vec{OB} = \mathbf{b}$$



Not drawn
accurately

$$\vec{AN} = \frac{1}{3} \vec{AB}$$

Work out \vec{ON} in terms of \mathbf{a} and \mathbf{b} .

Simplify your answer.

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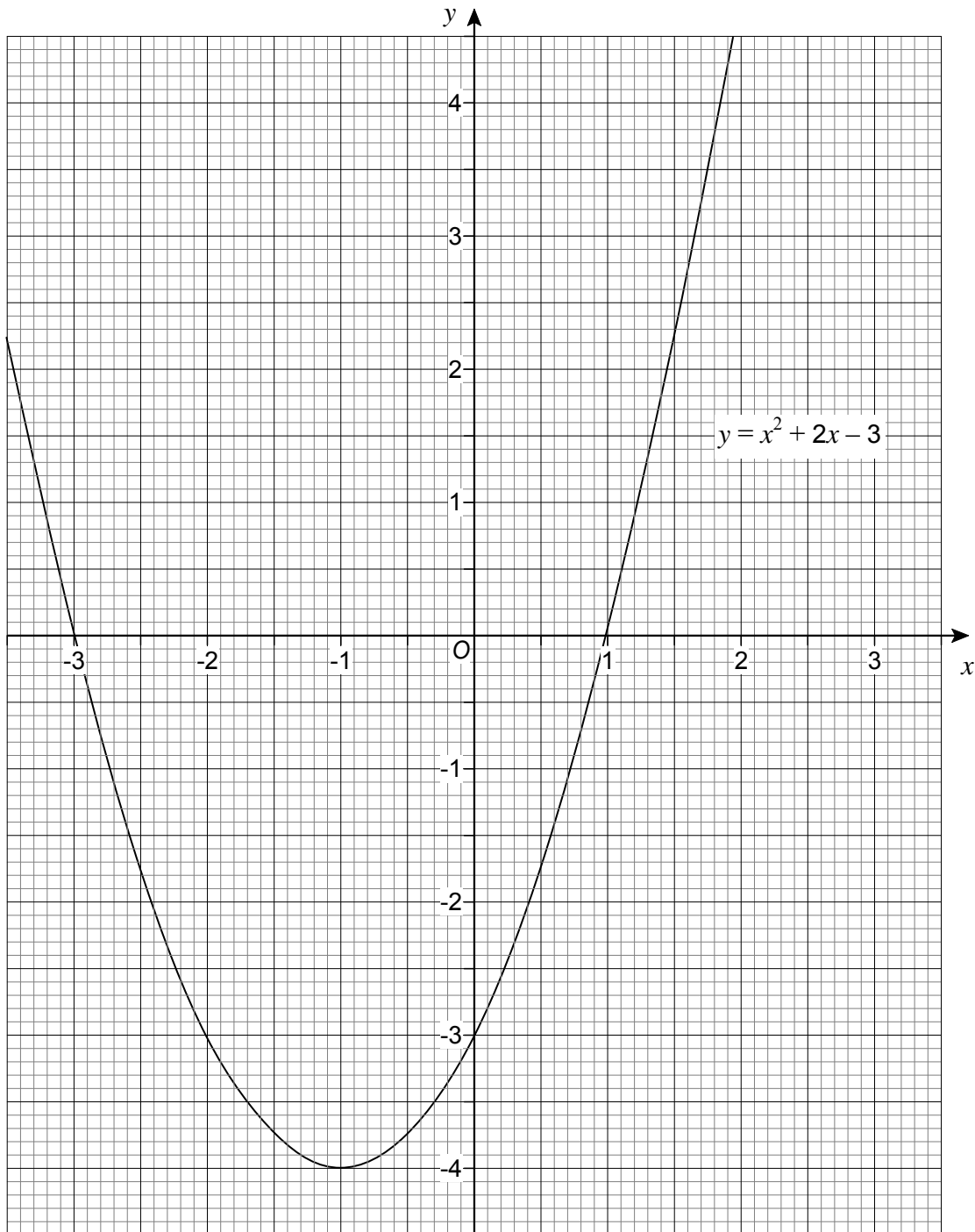
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Answer (4 marks)

20 The graph of $y = x^2 + 2x - 3$ is shown on the grid.



By drawing an appropriate straight line, find the approximate solutions of

$$x^2 + x - 5 = 0$$

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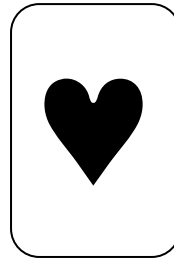
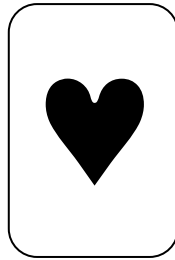
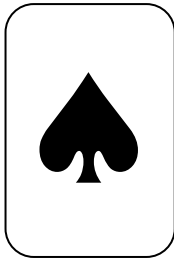
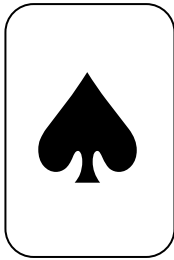
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$x =$ and (3 marks)

Turn over for the next question

- 21** Wendy makes up a game to raise money for charity.
These four cards are shuffled and placed face down.



Players pay £1 to play the game.
The player turns over two cards.
If the cards are the same, the player gets £2.

Wendy wants to raise at least £50.

Will she do this if 180 people play the game?

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(4 marks)

END OF QUESTIONS