

**Thursday 4 November 2021 – Morning****GCSE (9–1) Mathematics****J560/02 Paper 2 (Foundation Tier)****Time allowed: 1 hour 30 minutes****You can use:**

- geometrical instruments
- tracing paper

**Do not use:**

- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s) \_\_\_\_\_

Last name \_\_\_\_\_

**INSTRUCTIONS**

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space, use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

**INFORMATION**

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [ ].
- This document has **20** pages.

**ADVICE**

- Read each question carefully before you start your answer.

Please note that these worked solutions have neither been provided nor approved by OCR and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

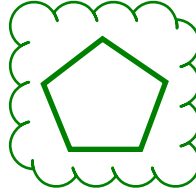
Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to [curtis@cgmaths.co.uk](mailto:curtis@cgmaths.co.uk)

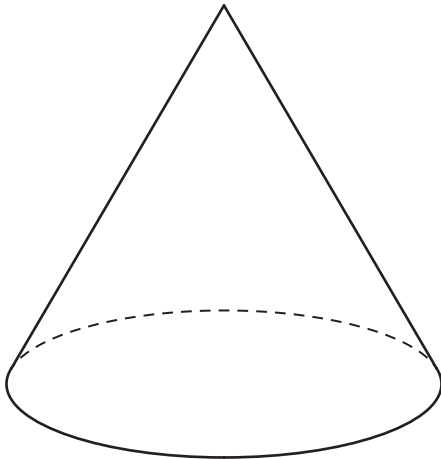
Answer **all** the questions.

- 1 (a) How many sides does a pentagon have?



(a) ..... [1]

- (b) Write down the mathematical name of this solid.



(b) ..... C... [1]

- (c) The angles in a triangle are  $40^\circ$ ,  $50^\circ$  and  $90^\circ$ .

Write down the mathematical name for this type of triangle.



(c) ..... [1]

- 2 Work out.

(a)  $-7 + 10$



(a) ..... [1]

(b)  $4 \times -2$



(b) ..... [1]

3 Work out.

(a)  $9.06 \div 3$

$$\begin{array}{r} 3. \\ 3 \overline{)9.06} \end{array}$$

Short division can be used

(a) ..... [1]

(b)  $15 \times 0.6$

$$\begin{array}{r} 15 \\ \times 0.6 \\ \hline \end{array}$$

Long multiplication can be used. As there is 1 decimal place in 0.6 there should be 1 decimal place in the answer

(b) ..... [2]

4 Use one of these symbols  $<$ ,  $>$  or  $=$  to make each statement true.

(a)  $\frac{1}{4}$  ..... 0.025

(b) 0.304 ..... 0.34

Inequality symbols point toward the smaller value. Convert  $\frac{1}{4}$  into a decimal

[1]

[1]

5 (a) Work out.

$$4 + 16 \div 2$$

The order of operations, BIDMAS, must be followed

(a) ..... [1]

(b) Insert one pair of brackets to make the calculation correct.

$$(5 \times 7 + 1 \div 9 = 4$$

[1]

6 In a quiz, Darcy answered 16 of the 20 questions correctly.

- (a) What fraction of the questions did Darcy answer correctly?  
Give your fraction in its lowest terms.

16 out of 20 is  $16/20$ . It can be simplified by dividing both the numerator and denominator by the same amount. Keep doing this until they cannot be divided any further without getting decimals

(a) ..... [2]

- (b) Write the fraction as a decimal.

Dividing the numerator by the denominator converts it into a fraction

(b) ..... [1]

- 7 (a) Write  $\frac{13}{3}$  as a mixed number.

Divide the numerator by the denominator to get the whole number and leave the remainder in a fraction

(a) ..... [1]

- (b) Work out.

(i)  $\frac{1}{3} + \frac{4}{9}$

Multiply both the numerator and denominator of  $1/3$  by something so that the denominators of both fractions are the same and they can be added

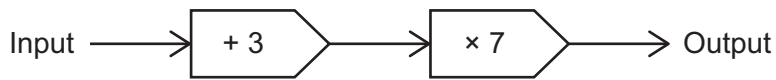
(b)(i) ..... [2]

(ii)  $3 \div \frac{1}{3}$

To divide by a fraction, keep the first number, change the division sign to a multiply and flip the second fraction

(ii) ..... [1]

8 Here is a function.



(a) Find the output when the input is 2.

Start with 2, add 3, then multiply the result by 7

(a) ..... [1]

(b) Find the input when the output is 63.

Do the opposite operations in the opposite order to go from the output to the input

(b) ..... [2]

9 A shopper buys 4 apples costing 60p each and 3 peaches. They pay with a £5 note and receive 44p in change. Each peach costs the same amount.

Work out the cost of one peach. You must show your working.

Multiplying the cost of each apple by the 4 apples works out the cost of the 4 apples. There are 100 pence in a pound so multiplying the £5 by 100 converts it into pence. Subtracting the 44p change leaves the cost of all the items. Subtracting the cost of the 4 apples from this leaves the total cost of the 3 peaches. Dividing the total cost of the 3 peaches by the 3 peaches works out the cost of one peach

..... p [5]

10 Ben and Sundip are making pancakes using the ingredients below.

<p>Ingredients to make 12 pancakes</p> <p>75ml water 200ml milk 100g flour 50g butter 2 eggs</p>
--

(a) The ratio of the amount of water to the amount of milk needed is 75 : 200.

Write this ratio in its simplest form.

To simplify a ratio, divide both sides by the same amount until they cannot be divided any further without getting decimals

(a) ..... : ..... [2]

(b) Ben makes 18 pancakes.

Work out how much flour he needs.

Dividing the 18 pancakes by the 12 in the recipe works out how many lots of the recipe is made. This can be expressed as a fraction and simplified. Then doing the simplified fraction of 100g by dividing the by the denominator and multiplying the result by the numerator

(b) ..... g [2]

(c) Sundip has 225g of butter and 10 eggs.  
She has plenty of the other ingredients.

Work out the maximum number of pancakes that she can make.

Dividing the 225g of butter by the 50g needed to make 12 pancakes works out how many lots of 12 pancakes can be made with the butter. Dividing the 10 eggs by the 2 needed to make 12 pancakes works out how many lots of 12 pancakes can be made with the eggs. One of the ingredients should be able to make less lots than the other and this is the limiting factor. Multiply 12 by the number of lots which can be made with the limiting factor to work out how many pancakes can be made

(c) ..... [4]

- 11 Ali (A), Blake (B), Rowan (R) and Sam (S) are in a relay team.  
Sam always runs fourth in the team.  
The order for the other three is chosen at random.

- (a) Complete this table to show all the possible orders for the team.  
The first row has been completed for you.  
You may not need to use all the rows.

First	Second	Third	Fourth
A	B	R	S

Use systematic listing

[2]

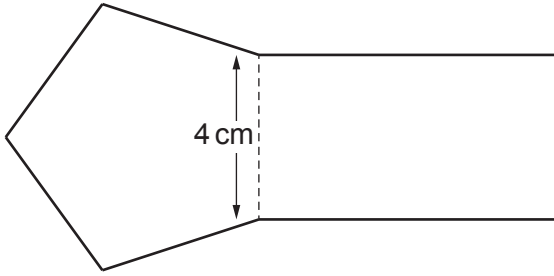
- (b) Find the probability that Ali will run first.

Express the fraction of the possible orders which have Ali going first

(b) ..... [2]



- 12 The shape below is formed by a rectangle of width 4 cm and a regular pentagon. For the rectangle, the ratio of the width to the length is 2 : 5.



Not to scale

Work out the perimeter of the shape.

Perimeter is the length of all of the outside edges added together. The pentagon is regular so all of its sides are the same length. Opposite sides on a rectangle are equal. The width of the rectangle is 4 cm and this is represented by 2 parts of the ratio. Dividing the 4 cm by 2 works out what 1 part of the ratio is worth. Multiplying this by 5 works out what the 5 parts of the ratio represent, which is the length of the rectangle

..... cm [4]

- 13 (a) Reece is given this question.

Write 20 as a product of prime factors.  
 Give your answer in index form.

This means that the answer should be given using indices if possible

Reece's answer is  $2 \times 2 \times 5$ .

Is Reece correct?

Explain your answer.

.....  
 Product means the result of multiplying numbers together. Prime means numbers which only have two factors: themselves and 1. Factors means whole numbers a certain value can be divided by without resulting in a decimal or fraction  
 .. [1]

- (b) Complete the power of 2.

$2^3 = 2 \times 2 \times 2 = 8$ . A negative power means '1 over'

$$\frac{1}{8} = 2^{\square} \quad [1]$$

- (c) Work out.

$$\sqrt{81} \times 2^3$$

The square root of 81 means to find the numbers which will give 81 when squared. Squared means multiplied by itself.  $2^3 = 2 \times 2 \times 2 = \dots$

(c) ..... [3]

- 14 A car mechanic has a tin containing 5 litres of engine oil.  
Each week they use 450 millilitres of this oil for their vehicles.

The car mechanic says

After 9 weeks I will have used over 80% of the oil in this tin.

Are they correct?

Show how you decide.

Multiplying the 450 millilitres used each week by the 9 weeks works out how many millilitres are used after 9 weeks. There are 1000 millilitres in 1 litre. Use this conversion to convert the 5 litres into millilitres. Work out 10% of this amount of millilitres then multiply the result by 8 to work out 80% of the tin. If the number of millilitres used is more than the number of millilitres in 80% of the tin, they are correct

.....  
..... [5]

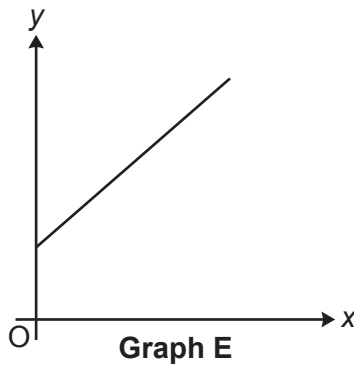
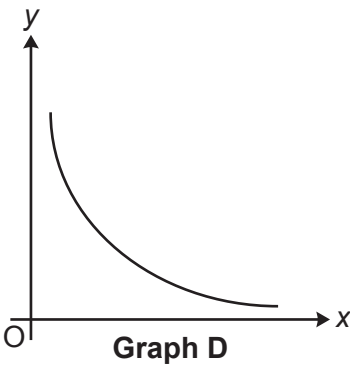
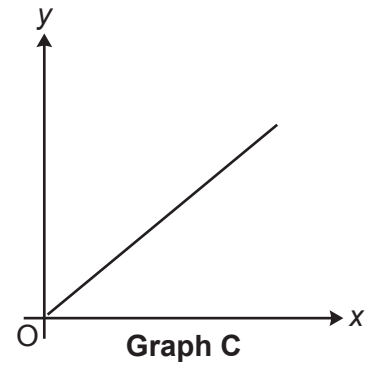
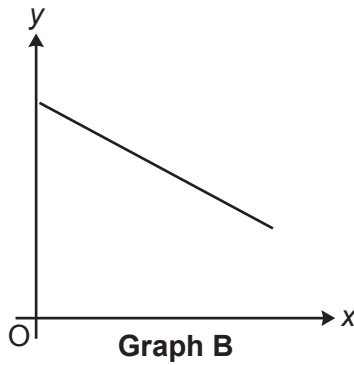
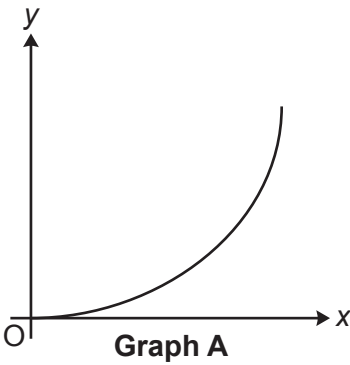
15 Solve the inequality.

$$2(x + 5) < 16$$

Dividing both sides by 2 eliminates the 2 on the left. Then subtracting 5 from both sides eliminates the 5 on the left and gets x on its own

..... [3]

16 Here are sketches of five graphs.



Write the letter of the graph that represents the following relationships.

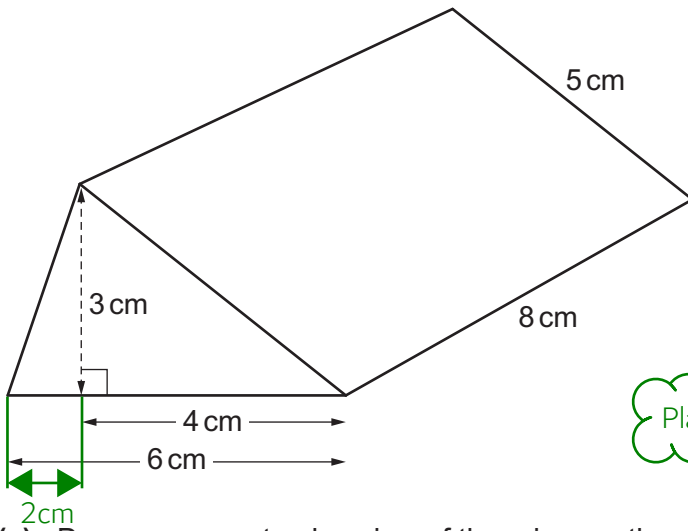
(a) y is directly proportional to x.

Doubling x doubles y → (a) ..... [1]

(b) y is inversely proportional to x.

Doubling x halves y → (b) ..... [1]

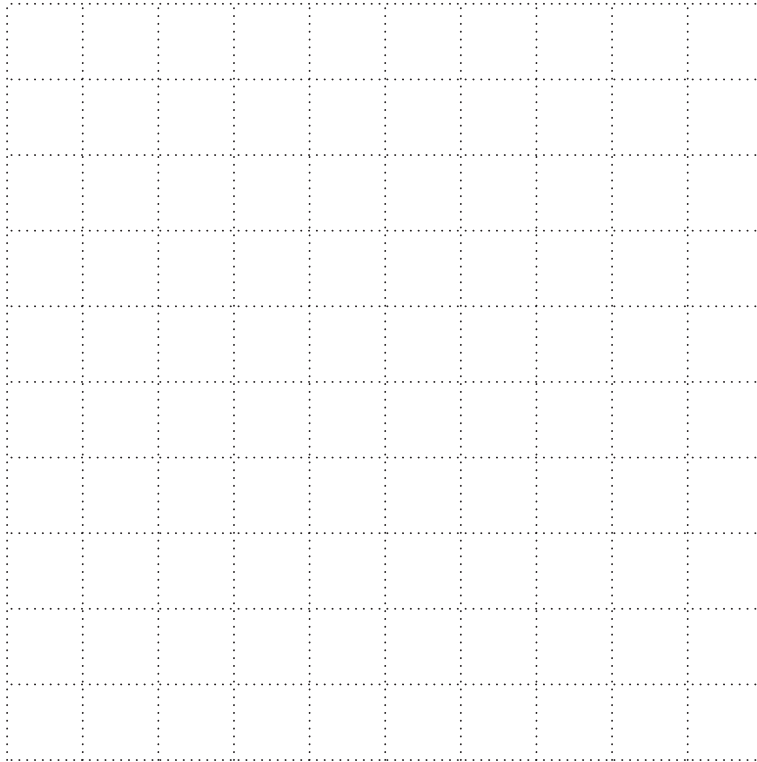
17 The diagram shows a prism.



Not to scale

Plan means the view from directly above

(a) Draw an accurate plan view of the prism on the one-centimetre square grid below.



[3]

(b) Show that the volume of the prism is  $72 \text{ cm}^3$ .

[2]

Volume of prism = cross sectional area  $\times$  length. The length of the prism is 8cm.  
 The cross section is the triangle at the front. Area of triangle =  $\frac{1}{2} \times$  base  $\times$  height.  
 The base is 6cm and the height is 3cm

(c) A cuboid with a square base also has a volume of  $72 \text{ cm}^3$ .  
 The height of the cuboid is 2 cm.

Work out the length of one side of the square base.

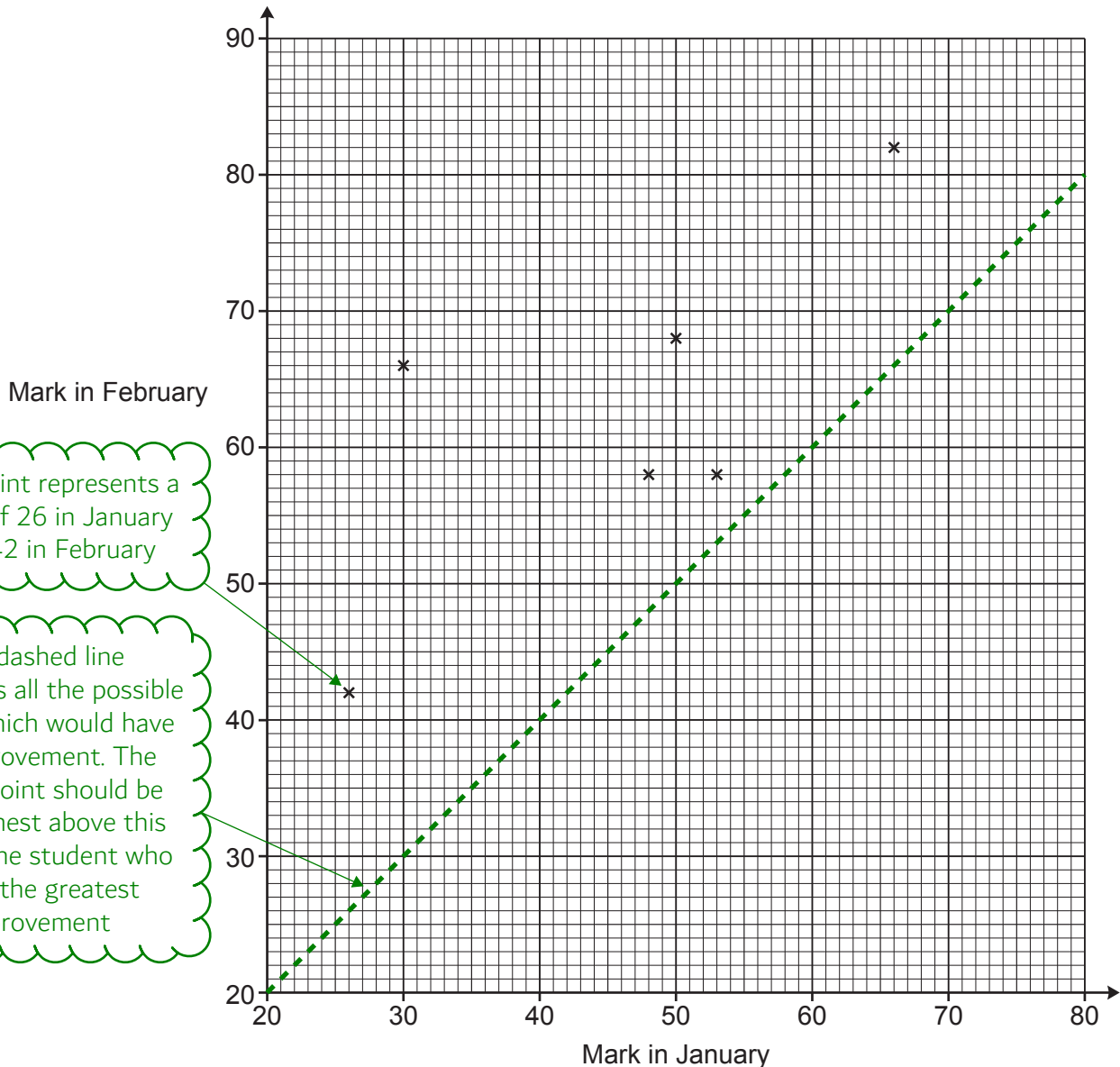
Volume of cuboid = length  $\times$  width  $\times$  height. Let  $x$  be the length of the square base of the cuboid. As all the sides of a square are the same, the width is also  $x$ . The height is 2. Form an expression of the volume of the cuboid and set it equal to the actual volume of 72. Solve the equation to find  $x$ , the length of one side of the square base

(c) ..... cm [3]

- 18 The table shows the marks obtained by 10 students in spelling tests in January and February.

<b>Mark in January</b>	26	53	50	48	30	66	70	44	37	38
<b>Mark in February</b>	42	58	68	58	66	82	86	60	48	50

The marks for the first six students are plotted on the scatter diagram.



- (a) Plot the marks for the remaining four students. [2]
- (b) Describe the type of correlation shown in the completed scatter diagram.

..... Positive: both variables increase together. Negative: one variable increases as the other decreases. None: there is no link between the variables ..... [1]

- (c) (i) On the scatter diagram, **circle** the student that made the greatest improvement in their marks from January to February. [1]
- (ii) Work out the percentage change in this student's marks from January to February.

Percentage change = (new - original)/original x 100. The new is the mark in February. The original is the mark in January

(c)(ii) ..... % [3]

- (d) Another student, Kai, scored 79 marks in the test in January but was absent for the test in February.

Kai says

I could use a line of best fit on the scatter diagram to estimate the marks I may have achieved in the test in February.

Is Kai's method reliable?  
Give a reason for your answer.

No,  
.....  
..... [1]



- 19 A worker received a 10% pay increase in 2017 and a further 10% pay increase in 2018. The worker says

Over these two years, my pay increased by  $10\% + 10\% = 20\%$ .

The worker is incorrect.

Work out the correct percentage increase.

You must show your working.

100% + 10% increases to 110%. Dividing this by 100 converts it into a decimal multiplier. Multiplying the decimal multiplier by itself represents an increase of 10% then another increase of 10%. Convert the resulting decimal into a percentage by multiplying it by 100 then work out the percentage increase by considering how much it has increased from 100%

..... [5]

- 20 Force is measured in newtons (N).  
A force of 198.5 N is applied to a rectangular surface of length 4.9 cm and width 4.1 cm.

Work out an **estimate** of the pressure, in  $\text{N}/\text{cm}^2$ , applied to this rectangular surface.

[The formula for pressure is:  $\text{Pressure} = \frac{\text{Force}}{\text{Area}}$ ]

Round all values to 1 significant figure. Area of rectangle = length x width.  
Substitute the force and area into the formula to find pressure

.....  $\text{N}/\text{cm}^2$  [4]

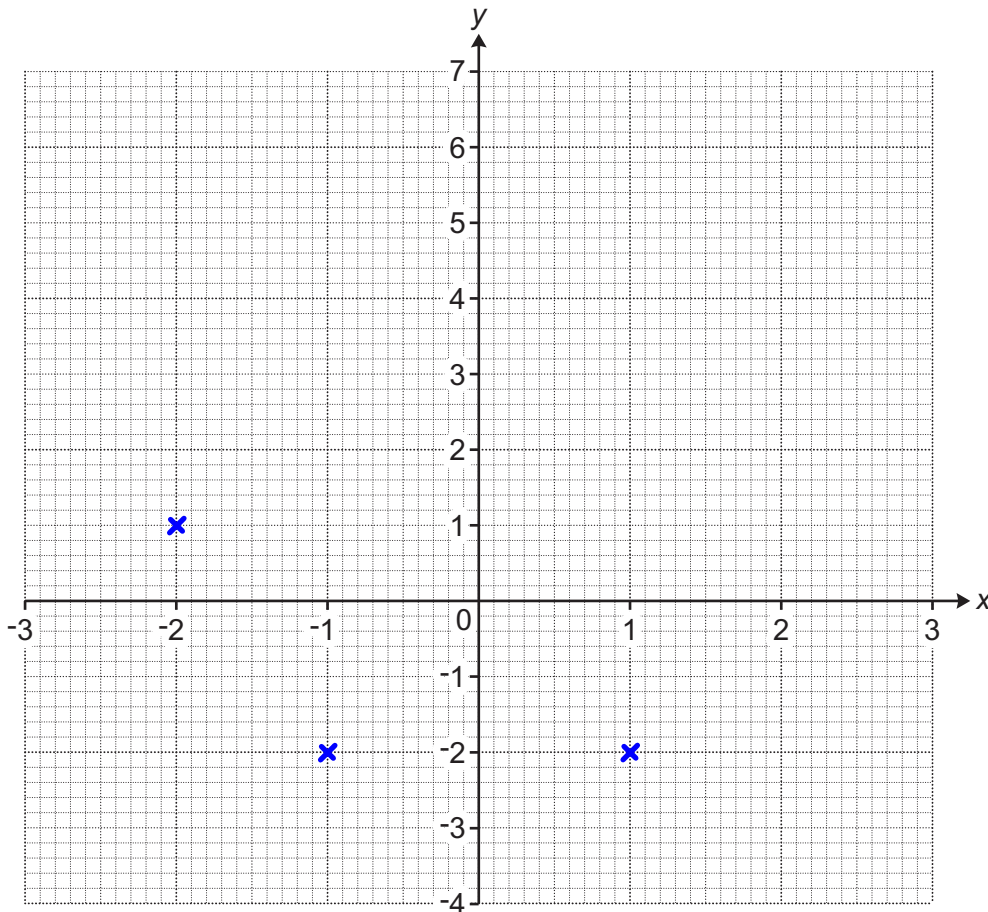
Substitute -3 into the equation to find y.  
Then substitute 0 into the equation to find y.  
Squaring a negative gives a positive

21 (a) Complete this table for  $y = x^2 - 3$ .

x	-3	-2	-1	0	1	2	3
y		1	-2		-2	1	6

[2]

(b) Draw the graph of  $y = x^2 - 3$  for values of x from -3 to 3.



[3]

(c) Use your graph to solve  $x^2 - 3 = 2$ .

It is basically asking what x is when y = 2. Reading across from 2 to the line and down to the x-axis works out estimates for the solutions to the equation

(c)  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [2]

- 22 A journalist is going to do a survey to find out whether people aged 15 or less spend more time playing computer games than people aged more than 15.

The journalist says their sample will be the first 20 people leaving a particular shop after 9 am next Monday.

- (a) Give **one** reason why the journalist's sample is unlikely to give reliable information.

.....  .....

..... [1]

- (b) Make **three** suggestions to help the journalist obtain a sample that may give more reliable information.

1 .....

.....

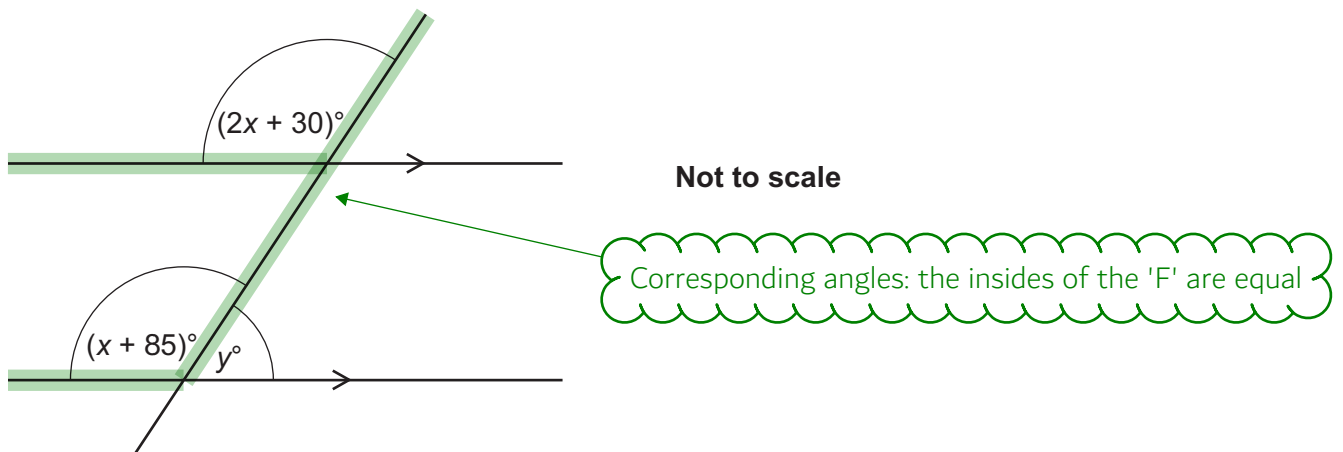
2 .....  .....

.....

3 .....  .....

..... [3]

- 23 The diagram shows a straight line crossing two parallel lines.



Find the value of  $y$ .  
You must show your working.

Set the two corresponding angles equal to each other to form an equation in terms of  $x$  which can be solved to find  $x$  by rearranging. Then work out the  $(x + 85)$  angle. There are  $180^\circ$  around a point on a straight line. This fact can then be used to find  $y$ .

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

END OF QUESTION PAPER