

Write your name here

Surname

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Pearson Edexcel
Level 1 / Level 2
GCSE (9–1)

Centre Number

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Candidate Number

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Mathematics

Paper 3 (Calculator)

Foundation Tier

Tuesday 13 June 2017 – Morning

Time: 1 hour 30 minutes

Paper Reference

1MA1/3F

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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.CG Maths.
Worked Solutions



Pearson

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

Any writing in blue should be written in the exam.

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

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows the lengths of five rivers.

River	Length (km)
Trent	297
Don	112
Severn	354
Thames	346
Mersey	113

(a) Write down the rivers in order of length.

Start with the shortest river.

Don, Mersey, Trent, Thames, Severn

(1)

Ami says,

“The River Thames is more than three times as long as the River Don.”

(b) Show that Ami is correct.

$$112 \times 3 = 336$$

This works out that three times as long as the River Don is 336 km. The River Thames is more than this

(1)

(Total for Question 1 is 2 marks)

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2 Cups are sold in packs and in boxes.

There are 12 cups in each pack.

There are 18 cups in each box.

Alison buys p packs of cups and b boxes of cups.

Write down an expression, in terms of p and b , for the total number of cups Alison buys.

p lots of 12 is the same as $12p$. b lots of 18 is the same as $18b$.
Adding these expressions together gives the total number of cups

$$12p + 18b$$

(Total for Question 2 is 2 marks)

3 Here are four digits.

5 6 1 9

(i) Write down the smallest possible two digit number that can be made with two of the digits.

1 is the smallest digit so this should be used first. The next smallest digit is 5 so this should be used next

$$15$$

(1)

(ii) Write down the three digit number closest to 200 that can be made with three of the digits.

The largest number less than 200 is 196, which is 4 away from 200. The smallest number greater than 200 is 516, which is 316 away from 200. So it must be 196

$$196$$

(1)

(Total for Question 3 is 2 marks)

4 $\frac{4}{5}$ of a number is 32

Find the number.

$$32 \div 4 \leftarrow \text{This works out that } 1/5 \text{ of the number is } 8$$

$$8 \times 5 \leftarrow \text{Multiplying by } 5 \text{ is the opposite of doing } 1/5 \text{ so finds the number}$$

40

(Total for Question 4 is 2 marks)

5 A path is made of white tiles and grey tiles.

$\frac{1}{4}$ of the tiles are white.

(a) Write down the ratio of white tiles to grey tiles.

If $1/4$ are white, $3/4$ must be grey. So the ratio could be written as $1/4 : 3/4$. Multiplying both sides by 4 eliminates the denominators

1 : 3

(1)

There is a total of 56 tiles.

(b) Work out the number of grey tiles.

$$\frac{1}{4} \times 56 \leftarrow \text{This works out that } 1/4 \text{ of the tiles is } 14 \text{ white tiles}$$

$$56 - 14 \leftarrow \text{Subtracting the } 14 \text{ white tiles from the } 56 \text{ tiles leaves } 42 \text{ grey tiles}$$

42

(2)

(Total for Question 5 is 3 marks)

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6 Here is a list of numbers.

12 15 14 17 22 19 13

Bridgit says,

“To work out the median you find the middle number, so the median of these numbers is 17”

Bridgit’s answer is **not** correct.

(a) What is wrong with Bridgit’s method?

They need to be put in order first From smallest to largest. Then find the middle number

(1)

(b) Work out the range of the numbers in the list.

22 - 12 ← Range = largest - smallest

10

(2)

(c) Work out the mean of the numbers in the list.

12 + 15 + 14 + 17 + 22 + 19 + 13 ← Adding all the numbers finds that the total is 112

112 ÷ 7 ← Dividing the total of the numbers by how many numbers there are gives the mean

16

(2)

(Total for Question 6 is 5 marks)

- 7 Priti is going to have a meal.
She can choose one starter and one main course from the menu.

Menu	
Starter	Main Course
Salad	Pasta
Fish	Rice
Melon	Burger

Write down all the possible combinations Priti can choose.

SP, SR, SB, FP, FR, FB, MP, MR, MB ← Using systematic listing

(Total for Question 7 is 2 marks)

- 8 Joanne wants to buy a dishwasher.

The dishwasher costs £372

Joanne will pay a deposit of £36

She will then pay the rest of the cost in 4 equal monthly payments.

How much is each monthly payment?

$372 - 36$ ← Subtracting the deposit from the cost works out that the rest of the payment is £336

$336 \div 4$ ← Dividing the rest of the payment by the 4 equal monthly payments works out how much each monthly payment is

£..... 84

(Total for Question 8 is 2 marks)

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9 Davos is a cleaner.

The table shows information about the time it will take him to clean each of four rooms in a house.

Room	Time
Kitchen	2 hours
Sitting room	1 hour 40 minutes
Bedroom	$1\frac{1}{2}$ hours
Bathroom	45 minutes

Davos wants to clean all four rooms in one day.
He will have breaks for a total time of 75 minutes.

Davos is going to start cleaning at 9 am.

Will he finish cleaning by 4 pm?
You must show all your working.

$$2^{\circ} + 1^{\circ}40' + 1.5^{\circ} + 0^{\circ}45' + 0^{\circ}75'$$

Adding the 2 hours, the 1 hour 40 minutes, the $1\frac{1}{2}$ hours, the 45 minutes and the 75 minutes as sexagesimals on the calculator works out how long it will take. $7^{\circ}10'0''$ can be read as 7 hours 10 minutes

$$9^{\circ} + 7^{\circ}10'0'' = 16^{\circ}10'0''$$

Adding the time taken to 9 hours as sexagesimals on the calculator works out the time he will finish. $16^{\circ}10'0''$ can be read as 16 : 10 in 24 hour time, which is 4 : 10 pm in 12 hour time

No

4 : 10 pm is after 4 pm

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(Total for Question 9 is 3 marks)

10 ABC is a straight line.



The length AB is five times the length BC .

$AC = 90$ cm.

Work out the length AB .

$$90 \div 6$$

The ratio of $AB : BC$ is $5 : 1$. There are 6 parts in total in the ratio which represent the total length of AC . So dividing the total length of AC by 6 works out that 1 part of the ratio is worth 15 cm

$$15 \times 5$$

Multiplying the value of 1 part of the ratio by 5 works out that the 5 parts representing AB are worth 75 cm

..... 75 cm

(Total for Question 10 is 3 marks)

11 $T = 4v + 3$

(a) Work out the value of T when $v = 2$

$$4(2) + 3$$

Substituting 2 for v in the right side of the formula works out T

$T =$ 11
(2)

(b) Make v the subject of the formula $T = 4v + 3$

$$T - 3 = 4v$$

Subtracting 3 from both sides eliminates the +3 on the right and get the v term on its own

Dividing both sides by 4 gets v on its own

$$\rightarrow v = \frac{T - 3}{4}$$

.....
(2)

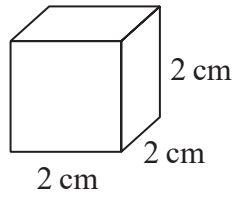
(Total for Question 11 is 4 marks)

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12 The diagram shows a cube of side length 2 cm.



Vera says,

“The volume of any solid made with 6 of these cubes is 48 cm^3 ”

(a) Is Vera correct?

You must show your working.

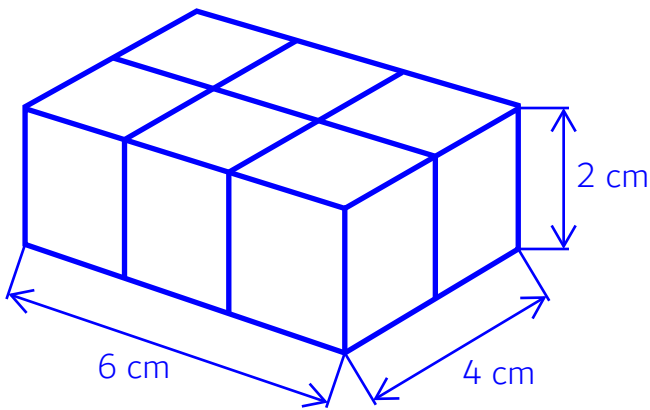
2^3 ← Volume of cube = length^3 . So the volume of 1 of these cubes is 8 cm^3

$8 \times 6 = 48$ ← Multiplying the volume of 1 of these cubes by 6 works out that the volume of 6 of these cubes is 48 cm^3

Yes

(2)

(b) (i) Draw a cuboid that can be made with 6 of these cubes. Write the dimensions of the cuboid on your diagram.



(1)

(ii) Work out the surface area of your cuboid.

2^2 ← This works out that the area of one square face of a cube is 4 cm^2

4×22 ← There are 22 squares on the surface of the cuboid. So multiplying the area of one of the squares by 22 works out the surface area

.....88..... cm^2

(2)

(Total for Question 12 is 5 marks)

13 The size of the largest angle in a triangle is 4 times the size of the smallest angle.
The other angle is 27° less than the largest angle.

Work out, in degrees, the size of each angle in the triangle.
You must show your working.

$A + 4A + 4A - 27$	←	Let A be the smallest angle. The largest angle is 4 times the size of the smallest angle so must be 4A. The other angle is 27° less than the largest angle so must be $4A - 27$. Adding these angles together expresses the total of the angles in the triangle
$9A - 27 = 180$	←	Simplifying the expression by collecting like terms. It must be equal to 180 as there are this many degrees in total in a triangle
$9A = 207$	←	Adding 27 to both sides to get the A term on its own
$A = 23$	←	Dividing both sides by 9 to get A on its own. So the smallest angle is 23°
23×4	←	The largest angle is 4 times the size of the smallest angle so must be 92°
$92 - 27$	←	The other angle is 27° less than the largest angle so must be 65°

..... 23 $^\circ$, 92 $^\circ$, 65 $^\circ$

(Total for Question 13 is 5 marks)

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14 Andy went on holiday to Canada.
His flights cost a total of £1500

Andy stayed for 14 nights.
His hotel room cost \$196 per night.

Andy used wifi for 12 days.
Wifi cost \$5 per day.

The exchange rate was \$1.90 to £1

- (a) Work out the total cost of the flights, the hotel room and wifi.
Give your answer in pounds.

$196 \times 14 = 2744$ ← Multiplying the cost of the hotel room per night by the 14 nights works out that the total cost of the hotel room was \$2744

$5 \times 12 = 60$ ← Multiplying the cost of the wifi per day by the 12 days works out that the total cost of the wifi was \$60

$2744 + 60$ ← Adding the costs of the hotel room and the wifi in dollars works out that their total cost was \$2804

$2804 \div 1.90$ ← Dividing the total cost of the hotel room and wifi in dollars by \$1.90 works out that the total cost of the hotel room and wifi in pounds is £1475.79, to the nearest penny

$1475.79 + 1500$ ← Adding the cost of the flights to the total cost of the hotel room and wifi in pounds works out the total cost of the flights, hotel room and wifi in pounds

£ 2975.79
(5)

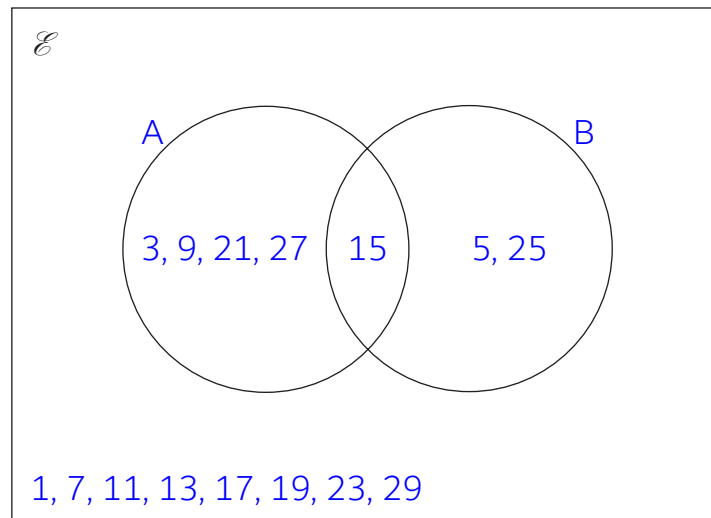
- (b) If there were fewer dollars to £1, what effect would this have on the total cost, in pounds, of Andy's holiday?

It would be more ← As the costs in dollars were divided by the number of dollars to £1 to convert them into pounds and dividing by less will make it more
(1)

(Total for Question 14 is 6 marks)

- 15 $\mathcal{E} = \{\text{odd numbers less than } 30\}$
 $A = \{3, 9, 15, 21, 27\}$
 $B = \{5, 15, 25\}$

(a) Complete the Venn diagram to represent this information.



(4)

A number is chosen at random from the universal set, \mathcal{E} .

(b) What is the probability that the number is in the set $A \cup B$?

7 out of the 15 numbers are in the union of A and B (A or B or both) $\rightarrow \frac{7}{15}$

(2)

(Total for Question 15 is 6 marks)

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16 Solve the simultaneous equations

$$3x + y = -4 \leftarrow \text{1st equation}$$
$$3x - 4y = 6 \leftarrow \text{2nd equation}$$

$$5y = -10 \leftarrow \text{Subtracting the 2nd equation from the 1st equation cancels out the x term. } 3x - 3x = 0 \text{ and } y - -4y = 5y \text{ and } -4 - 6 = -10. \text{ Then dividing both sides by 5 finds that } y = -2$$

$$3x - 2 = -4 \leftarrow \text{Substituting } -2 \text{ for } y \text{ in the 1st equation}$$

$$3x = -2 \leftarrow \text{Adding 2 to both sides gets the x term on its own}$$

Dividing both sides by 3 gets x on its own

$$x = \dots\dots\dots -\frac{2}{3}$$

$$y = \dots\dots\dots -2$$

(Total for Question 16 is 3 marks)

17 The table shows some information about the dress sizes of 25 women.

Dress size	Number of women
8	2
10	9
12	8
14	6

(a) Find the median dress size.

$$\frac{25 + 1}{2}$$

Using the formula $(n + 1)/2$, where n is the number of women, works out that the 13th woman is in the middle

$$13 - 2$$

Counting the first 2 women with a dress size of 8 finds that another 11 needs to be counted to get to the 13th

$$11 - 9$$

Counting the next 9 women with a dress size of 10 finds that another 2 needs to be counted to get to the 13th

The 8 women with dress size 12 is more than the 2 which still needs to be counted to get to the 13th. So the median must be in this category, which is dress size 12

12

(1)

3 of the 25 women have a shoe size of 7

Zoe says that if you choose at random one of the 25 women, the probability that she has either a shoe size of 7 or a dress size of 14 is $\frac{9}{25}$ because

$$\frac{3}{25} + \frac{6}{25} = \frac{9}{25}$$

(b) Is Zoe correct?

You must give a reason for your answer.

No, as some women may have both shoe size of 7 and a dress size of 14

The number of women who have both shoe size of 7 and a dress size of 14 would subtract from the 9 when working out the number of women with either a shoe size of 7 or a dress size of 14

(1)

(Total for Question 17 is 2 marks)

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18 Daniel bakes 420 cakes.
 He bakes only vanilla cakes, banana cakes, lemon cakes and chocolate cakes.

$\frac{2}{7}$ of the cakes are vanilla cakes.

35% of the cakes are banana cakes.

The ratio of the number of lemon cakes to the number of chocolate cakes is 4:5

Work out the number of lemon cakes Daniel bakes.

$\frac{2}{7} \times 420 = 120$ ← This works out that $\frac{2}{7}$ of the 420 cakes is 120 vanilla cakes

$\frac{35}{100} \times 420 = 147$ ← This works out that 35% of the 420 cakes is 147 banana cakes. Putting the 35% over 100 converts it into a fraction

$420 - 120 - 147$ ← Subtracting the 120 vanilla cakes and the 147 banana cakes from the 420 cakes works out that there are 153 lemon and chocolate cakes in total

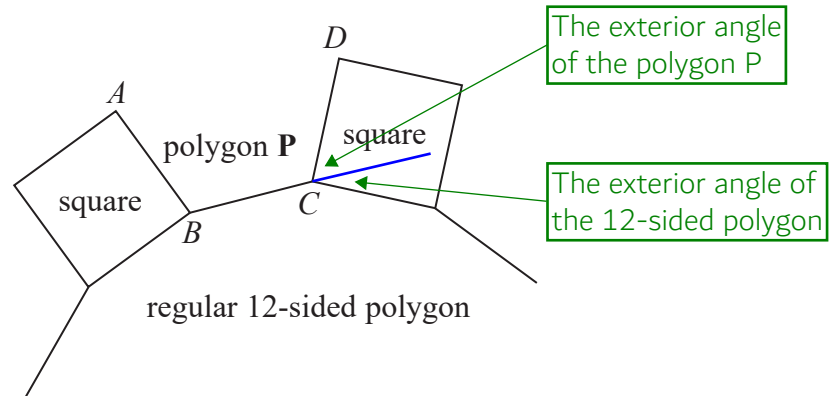
$153 \div 9$ ← $4 + 5 = 9$ parts in total in the ratio which represent the 153 lemon and chocolate cakes. Dividing the 153 total by 9 works out that 1 part of the ratio is worth 17 cakes

17×4 ← Multiplying the value of 1 part of the ratio by the 4 parts which represent the lemon cakes works out that there are 68 lemon cakes

.....68

(Total for Question 18 is 5 marks)

19 In the diagram, AB , BC and CD are three sides of a regular polygon P .



Show that polygon P is a hexagon.

You must show your working.

$$360 \div 12$$

The exterior angles of any polygon add up to 360° . So dividing 360° by the 12 exterior angles of the 12-sided polygon works out that each exterior angle is 30°

$$90 - 30$$

The interior angle of a square is 90° . Subtracting the exterior angle of the 12-sided polygon from this 90° works out that each exterior angle of the polygon P is 60°

$$360 \div 60 = 6$$

The exterior angles of any polygon add up to 360° . So dividing 360° by the size of each exterior angle of the polygon P works out that there must be 6 of them, which means it is a 6-sided polygon, which is a hexagon

(Total for Question 19 is 4 marks)

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20 The density of apple juice is 1.05 grams per cm³.

The density of fruit syrup is 1.4 grams per cm³.

The density of carbonated water is 0.99 grams per cm³.

25 cm³ of apple juice are mixed with 15 cm³ of fruit syrup and 280 cm³ of carbonated water to make a drink with a volume of 320 cm³.

Work out the density of the drink.

Give your answer correct to 2 decimal places.

$d \frac{m}{v}$

Writing the formula triangle for density, mass, volume. Covering m in the formula triangle finds that mass = density × volume

$1.05 \times 25 = 26.25$

Multiplying the density of the apple juice by the volume of the apple juice works out that the mass of the apple juice is 26.25 grams

$1.4 \times 15 = 21$

Multiplying the density of the fruit syrup by the volume of the fruit syrup works out that the mass of the fruit syrup is 21 grams

$0.99 \times 280 = 277.2$

Multiplying the density of the carbonated water by the volume of the carbonated water works out that the mass of the carbonated water is 277.2 grams

$26.25 + 21 + 277.2$

Adding the masses of the apple juice, the fruit syrup and the carbonated water works out that the mass of the drink is 324.45 grams

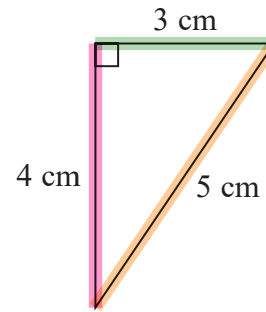
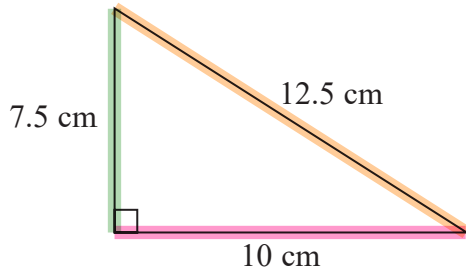
$324.45 \div 320$

Covering d in the formula triangle finds that density = mass ÷ volume

$1.013\dots$ is rounded to 2 decimal places $\rightarrow 1.01\dots$ g/cm³

(Total for Question 20 is 4 marks)

21



Show that these two triangles are mathematically similar.

$$12.5 \div 5 = 2.5$$

$$10 \div 4 = 2.5$$

$$7.5 \div 3 = 2.5$$

Dividing each side of the larger triangle by the same side of the smaller triangle gives the same scale factor. So the two triangles are mathematically similar (same shape but different size)

(Total for Question 21 is 2 marks)

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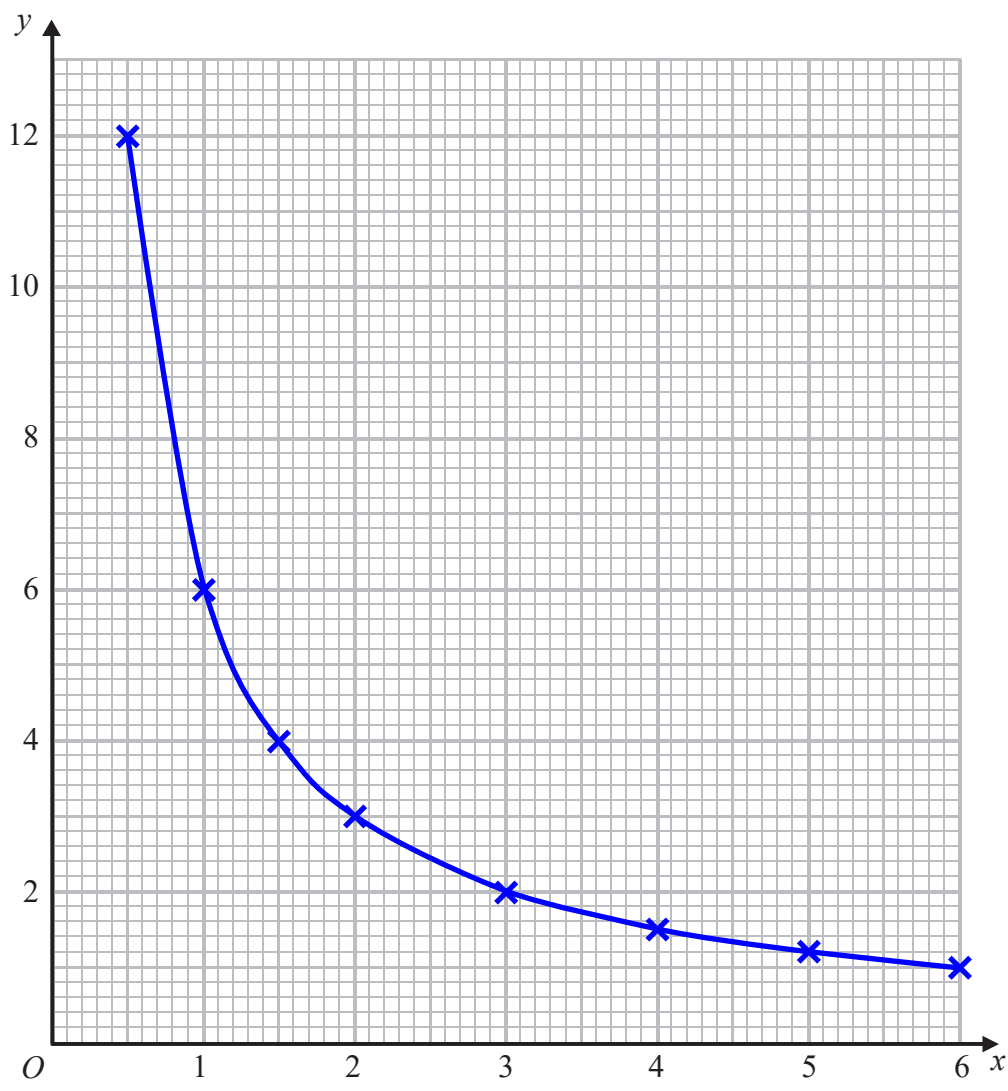
22 (a) Complete the table of values for $y = \frac{6}{x}$

Using table mode on the calculator, set $f(x) = 6/x$, start: 0.5, end: 6, step: 0.5.
This gives all of the values needed and the ones not needed can be ignored

x	0.5	1	1.5	2	3	4	5	6
y	12	6	4	3	2	1.5	1.2	1

(2)

(b) On the grid below, draw the graph of $y = \frac{6}{x}$ for values of x from 0.5 to 6



Plotted all the points then joined them up with a curve

(2)

(Total for Question 22 is 4 marks)

23 Harley's house has a value of £160 000 correct to 2 significant figures.

(a) (i) Write down the least possible value of the house.

This is the least possible value which rounds to £160000 correct to 2 significant figures

£ 155000

(1)

(ii) Write down the greatest possible value of the house.

This is the greatest possible value which rounds to £160000 correct to 2 significant figures

£ 164999.99

(1)

The value of Rita's house increased by 5%.

Her house then had a value of £210 000

(b) Work out the value of Rita's house before the increase.

$100 + 5$ ← Adding 5% to 100% works out that it had increased to 105% of the original value

$210000 \div 105$ ← Dividing the £210000 by 105 works out that 1% of the original value is £2000

2000×100 ← Multiplying the value of 1% by 100 works out that 100% of the original value is £200000

£ 200000

(2)

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS