

Write your name here

Surname

Other names

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

Centre Number

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Candidate Number

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Mathematics

Paper 2 (Calculator)

Foundation Tier

Thursday 7 June 2018 – Morning
Time: 1 hour 30 minutes

Paper Reference

1MA1/2F

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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6/7/7/7/8/7/1/c2/1/

.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 Write $\frac{4}{50}$ as a percentage.

To convert a fraction into a percentage it can be multiplied by 100

..... 8

%

(Total for Question 1 is 1 mark)

- 2 Write 1.59 correct to 1 decimal place.

The 5 is in the 1st decimal place. The 9 in the next place causes it to round up to a 6. All other figures after the 1st decimal place are then ignored

..... 1.6

(Total for Question 2 is 1 mark)

- 3 Work out the value of 3^5

Type it into the calculator

..... 243

(Total for Question 3 is 1 mark)

- 4 Write down a 6 digit number that has 4 as its thousands digit.
You can only use the digit 4 once.

It can be easier to start writing the digits from the right. The 4 needs to be in the 4th place from the right

..... 104000

(Total for Question 4 is 1 mark)

DO NOT WRITE IN THIS AREA

5 (a) Change 35 cm to mm.

1 cm = 10 mm. So multiplying the 35 cm by 10 converts it to 350 mm

..... 350 mm
(1)

(b) Change 7700 millilitres to litres.

1 litre = 1000 millilitres. So dividing the 7700 millilitres by 1000 converts it to 7.7 litres

..... 7.7 litres
(1)

(c) Change 0.32 kilograms to grams.

1 kilogram = 1000 grams. So multiplying the 0.32 kilograms by 1000 converts it to 320 grams

..... 320 grams
(1)

(Total for Question 5 is 3 marks)

6 Margaret is thinking of a number.
She says,

“My number is odd. It is a factor of 36 and a multiple of 3”

There are two possible numbers Margaret can be thinking of.

Write down these two numbers.

1, 36
2, 18
3, 12
4, 9
6

Listing out the factors of 36, starting with the smallest and largest and writing them in pairs. 36, 18, 3 and 9 are multiples of 3 but only 3 and 9 are also odd

..... 3 9

(Total for Question 6 is 3 marks)

- 7 Mohsin, Yusuf and Luke are going to play a game.
At the end of the game, one of them will be in First place, one of them will be in Second place and one of them will be in Third place.

Use the table below to list all the possible outcomes of the game.

First place	Second place	Third place
M	Y	L
M	L	Y
Y	M	L
Y	L	M
L	M	Y
L	Y	M

Using systematic listing

(Total for Question 7 is 2 marks)

DO NOT WRITE IN THIS AREA

8 Neil buys 30 pens, 30 pencils, 30 rulers and 30 pencil cases.

Price list	
pens	6 for 82p
pencils	15 for 45p
rulers	10 for £1.25
pencil cases	37p each

What is the total amount of money Neil spends?

$30 \div 6$ ← Dividing the 30 pens by the 6 pens in each lot works out that 5 lots of the 6 pens are needed
 $5 \times 0.82 = 4.10$ ← 82p is £0.82. 5 multiplied by the £0.82 works out that the cost for 5 lots of 6 pens (to get the 30 pens) is £4.10
 $30 \div 15$ ← Dividing the 30 pencils by the 15 pens in each lot works out that 2 lots of the 15 pencils are needed
 $2 \times 0.45 = 0.90$ ← 45p is £0.45. 2 multiplied by the £0.45 works out that the cost for 2 lots of 15 pencils (to get the 30 pencils) is £0.90
 $30 \div 10$ ← Dividing the 30 rulers by the 10 rulers in each lot works out that 3 lots of the 10 rulers are needed
 $3 \times 1.25 = 3.75$ ← 3 multiplied by the £1.25 works out that the cost for 3 lots of 10 rulers (to get the 30 rulers) is £3.75
 $30 \times 0.37 = 11.10$ ← 37p is £0.37. 30 multiplied by the £0.37 works out that the cost for 30 pencil cases is £11.10
 $4.10 + 0.90 + 3.75 + 11.10$ ← Adding the costs of the 30 pens, the 30 pencils, the 30 rulers and the 30 pencil cases works out that the total cost is £19.85

£.....19.85.....

(Total for Question 8 is 5 marks)

9 Emily drives 186 miles in 3 hours.

(a) What is her average speed?

$$186 \div 3 \leftarrow \text{Miles per hour means to divide the distance travelled in miles by the time taken in hours}$$

$$\dots\dots\dots 62 \dots\dots\dots \text{mph}$$

(2)

Sarah drives at an average speed of 58 mph for 4 hours.

(b) How many miles does Sarah drive?

$$s \begin{matrix} d \\ t \end{matrix} \leftarrow \text{Writing a formula triangle for distance, speed, time}$$

$$58 \times 4 \leftarrow \text{Covering } d \text{ in the formula triangle finds that distance} = \text{speed} \times \text{time}$$

$$\dots\dots\dots 232 \dots\dots\dots \text{miles}$$

(2)

(Total for Question 9 is 4 marks)

10 (a) Write down all the prime numbers between 20 and 30

Prime numbers are only divisible by themselves and 1. A number is prime if when it is put in the calculator and formatted as a product of prime factors it does not change

$$\dots\dots\dots 23, 29 \dots\dots\dots$$

(2)

Catherine says,

“2 is the only even prime number.”

(b) Is Catherine right?

You must give a reason for your answer.

Yes as all other even numbers are divisible by 2

2 is prime as is only divisible by itself and 1. All other even numbers are divisible by 2, meaning that they are divisible by another number other than themselves and 1, so they are not prime

(1)

(Total for Question 10 is 3 marks)

11 (a) Solve $x + x + x = 51$

$$3x = 51 \quad \leftarrow \boxed{x + x + x = 3x}$$

Dividing both sides by 3 eliminates the 3 on the left and gets x on its own

$$x = \dots\dots\dots 17 \quad (1)$$

(b) Solve $\frac{y}{4} = 3$

Multiplying both sides by 4 eliminates the 4 on the left and gets y on its own

$$y = \dots\dots\dots 12 \quad (1)$$

(c) Solve $2f + 7 = 18$

$$2f = 11 \quad \leftarrow \boxed{\text{Subtracting 7 from both sides eliminates the +7 on the left and gets the f term on its own}}$$

Dividing both sides by 2 eliminates the 2 on the left and gets f on its own

$$f = \dots\dots\dots \frac{11}{2} \quad (1)$$

(Total for Question 11 is 3 marks)

$11 + 17 + 8 = 36$ total fans, who are represented by 360° in the pie chart. So dividing the 360° by the 36 fans works out that 1 fan is represented by 10°

12 A group of football fans were asked what their half time snack was.

The table below gives information about their answers.

$$360 \div 36 = 10$$

Snack	Number of fans
burger	11
pie	17
hot dog	8

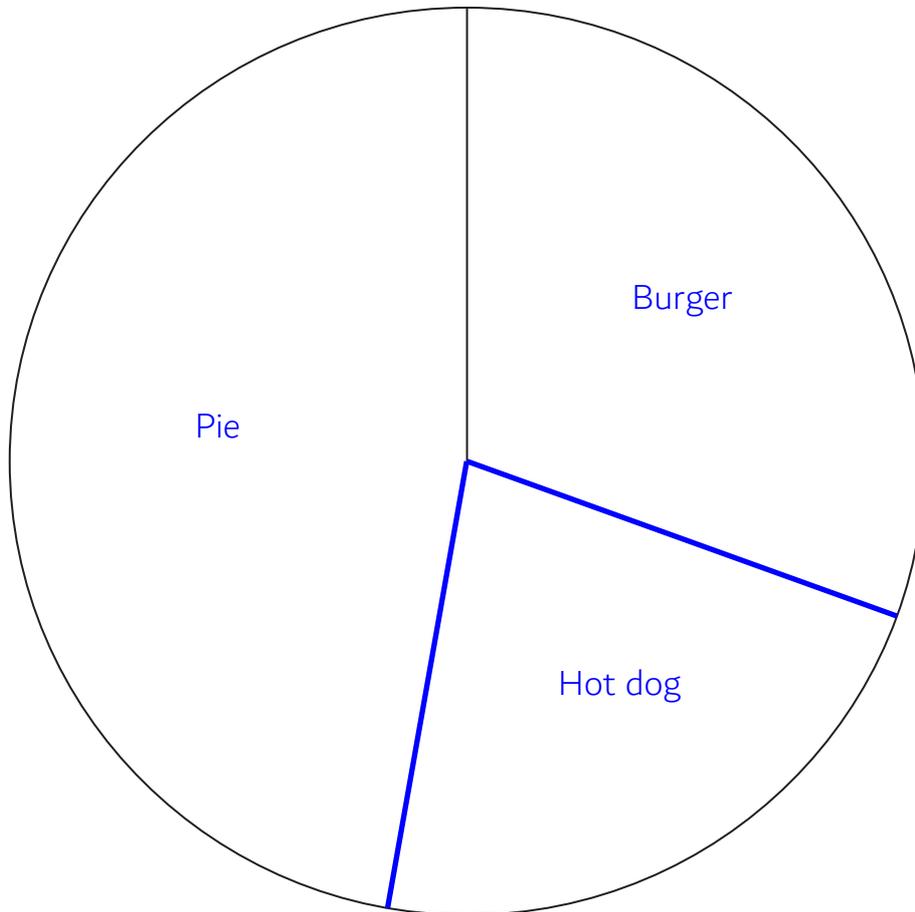
110

170

80

Draw an accurate pie chart for this information.

Multiplying the number of fans by the 10° which represent each fan works out how many degrees will represent each snack



Drawing the angles for burger and pie using a protractor. The remaining sector is for hot dog

(Total for Question 12 is 3 marks)

DO NOT WRITE IN THIS AREA

13 A scout group has a raffle to raise money for charity.
There is 1 prize to be won in the raffle.

Laura buys 12 raffle tickets.
A total of 350 raffle tickets are sold.

Find the probability that Laura does **not** win the prize.

$$350 - 12$$

Subtracting the 12 raffle tickets Laura buys from the 350 raffle tickets sold works out that there are 338 raffle tickets which Laura does not have

338 out of the 350 tickets would result in Laura not winning

$$\frac{338}{350}$$

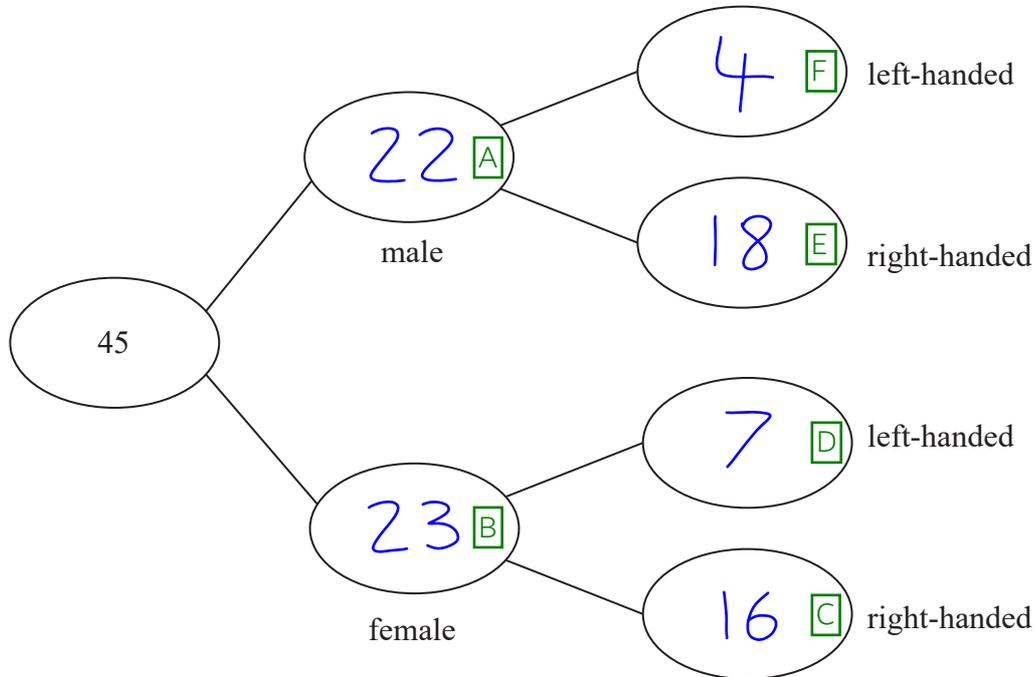
(Total for Question 13 is 2 marks)

14 Each worker in a factory is either left-handed or right-handed.

22 of the 45 workers are male.

16 of the 34 right-handed workers are female.

Complete the frequency tree for this information.



(Total for Question 14 is 3 marks)

A: 22 are male.

B: The rest of the 45 must be female. $45 - 22 = 23$.

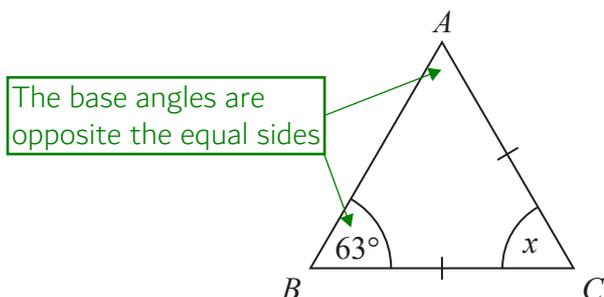
C: 16 right-handed workers are female.

D: The rest of the 23 females must be left-handed. $23 - 16 = 7$.

E: Subtracting the 16 right-handed females from the 34 right-handed gives 18 right-handed males.

F: The rest of the 22 males must be left-handed. $22 - 18 = 4$

15 Mary needs to work out the size of angle x in this diagram.



She writes

$$x = 63^\circ \text{ because base angles of an isosceles triangle are equal.}$$

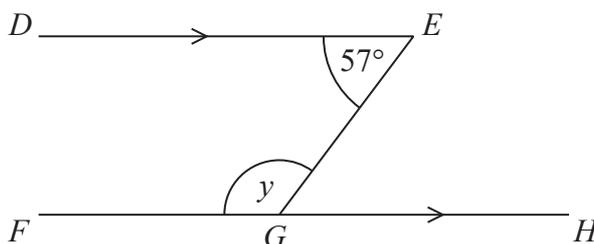
Mary is wrong.

(a) Explain why.

x is not a base angle

(1)

William needs to work out the size of angle y in this diagram.



William writes

Working	Reason
angle $EGH = 57^\circ$	because corresponding angles are equal
$y = 180^\circ - 57^\circ$ $y = 123^\circ$	because angles on a straight line add up to 180°

This reason is wrong

One of William's reasons is wrong.

(b) Write down the correct reason.

Alternate angles are equal

(1)

(Total for Question 15 is 2 marks)

16 Marla buys some bags of buttons.

There are 19 buttons or 20 buttons or 21 buttons or 22 buttons in each bag.

The table gives some information about the number of buttons in each bag.

Number of buttons	Frequency		
19 5		
20	×	7	= 140
21	×	3	= 63
22	×	1	= 22

The total number of buttons is 320

Multiplying the number of buttons in each bag by the frequencies works out the total number of buttons for each category

Complete the table.

$$140 + 63 + 22$$

Adding the totals of the number of buttons for each category works out that there are 225 buttons which are in bags of 20, 21 or 22

$$320 - 225$$

Subtracting the 225 buttons which are in bags of 20, 21 or 22 works out that there is 95 buttons in bags of 19

$$95 \div 19$$

Dividing the 95 buttons by the 19 in each bag works out that there are 5 bags with 19 buttons in each bag

(Total for Question 16 is 3 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

17 Here is the list of ingredients for making 30 biscuits.

Ingredients for 30 biscuits
225 g butter
110 g caster sugar
275 g plain flour
75 g chocolate chips

Lucas has the following ingredients.

- 900 g butter
- 1000 g caster sugar
- 1000 g plain flour
- 225 g chocolate chips

What is the greatest number of biscuits Lucas can make?

You must show your working.

$$900 \div 225 = 4$$

Dividing the 900 g butter by the 225 g butter needed for 30 biscuits works out that there is enough butter for 4 lots of the 30 biscuits

$$1000 \div 110 = 9.09$$

Dividing the 1000 g caster sugar by the 110 g caster sugar needed for 30 biscuits works out that there is enough caster sugar for 9.0... lots of the 30 biscuits

$$1000 \div 275 = 3.63$$

Dividing the 1000 g plain flour by the 275 g plain flour needed for 30 biscuits works out that there is enough plain flour for 3.6... lots of the 30 biscuits

$$225 \div 75 = 3$$

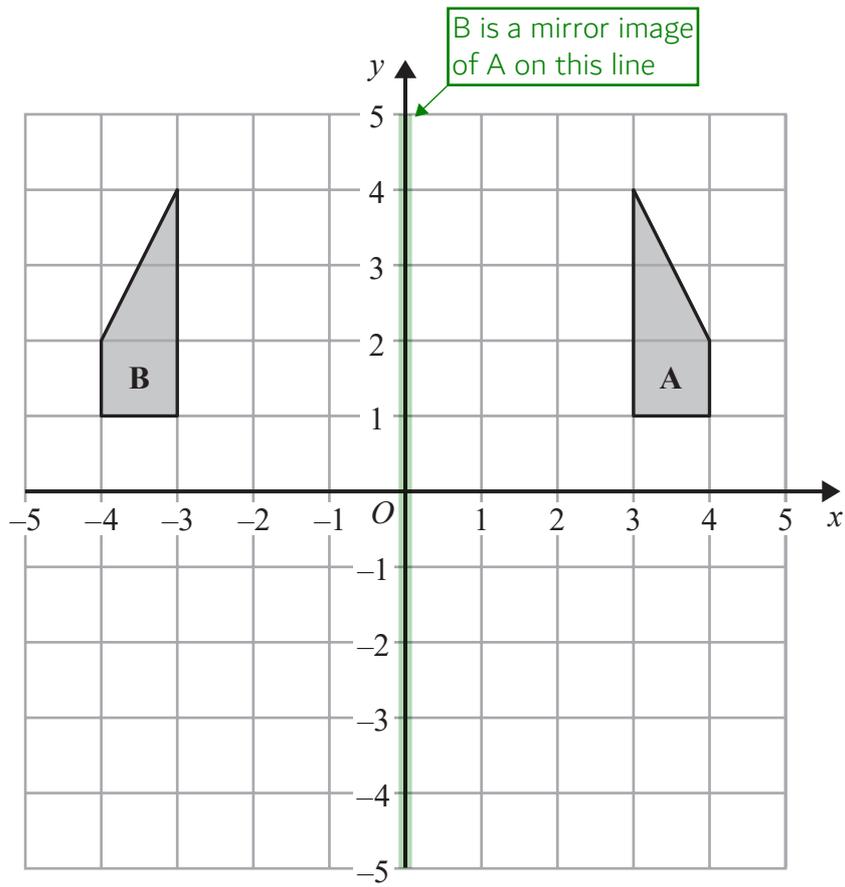
Dividing the 225 g chocolate chips by the 75 g chocolate chips needed for 30 biscuits works out that there are enough chocolate chips for 3... lots of the 30 biscuits

$$30 \times 3$$

3 is the smallest number of lots of the 30 biscuits so this is the most number of lots which can be made. There cannot be more than 3 lots as there will not be enough chocolate chips. Multiplying the 30 biscuits by this 3 works out that the greatest number of biscuits which can be made is 90

90

(Total for Question 17 is 3 marks)



Describe fully the single transformation that maps shape A onto shape B.

Reflection in the y axis

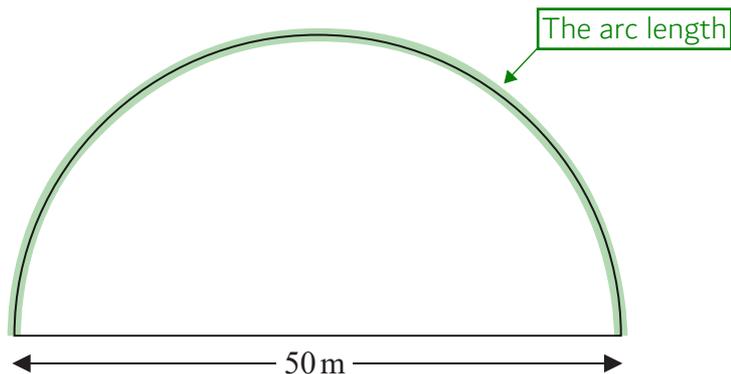
(Total for Question 18 is 2 marks)

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DO NOT WRITE IN THIS AREA

19 A farmer has a field in the shape of a semicircle of diameter 50 m.



The farmer asks Jim to build a fence around the edge of the field. Jim tells him how much it will cost.

Total cost = £29.86 per metre of fence plus £180 for each day's work

Jim takes three days to build the fence.

Work out the total cost.

$$180 \times 3 = 540$$

← Multiplying the £180 for each day's work by the 3 days of work finds that it costs £540 for the work

$$\pi \times 50$$

← The distance around the outside of a circle is the circumference. Circumference = $\pi \times$ diameter. So the circumference of the whole circle is 50π m

$$50\pi \div 2$$

← Dividing the circumference by 2 works out that the arc length is 25π m as the semicircle is half of the whole circle

$$25\pi + 50$$

← Adding the 50 m straight length to the arc length works out that the total length of the fence is 128.5... m

$$128.5... \times 29.86$$

← Multiplying the total length of the fence by the £29.86 per metre works out that the fence costs £3838.20 to the nearest penny

$$3838.20 + 540$$

← Adding the £3838.20 for the fence and the £540 for the work finds that the total cost to build the fence is £4378.20

£ 4378.20

(Total for Question 19 is 5 marks)

20 (a) Simplify $m^3 \times m^4$

$a^x \times a^y = a^{x+y}$, so the indices should be added

$$m^7$$

(1)

(b) Simplify $(5np^3)^3$

Everything in the bracket is raised to the power of 3. $(a^x)^y = a^{xy}$, so the indices should be multiplied.

$$125n^3p^9$$

(2)

(c) Simplify $\frac{32q^9r^4}{4q^3r}$

$32/4 = 8$. $a^x/a^y = a^{x-y}$, so the indices should be subtracted. $r = r^1$

$$8q^6r^3$$

(2)

(Total for Question 20 is 5 marks)

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DO NOT WRITE IN THIS AREA

21 (a) Find the lowest common multiple (LCM) of 40 and 56

40, 80, 120, 160, 200, 240, 280
56, 112, 168, 224, 280

Using table mode on the calculator. Define $f(x) = 40x$ and define $g(x) = 56x$. Start: 1. End: 30. Step: 1. This lists out the first 30 multiples of 40 and 56. Looking through both lists until the lowest number in both lists is found, which is 280

Newer Casio calculators can work out the LCM without having to do this method

280

(2)

$$A = 2^3 \times 3 \times 5$$

$$B = 2^2 \times 3 \times 5^2$$

(b) Write down the highest common factor (HCF) of A and B .

$$2^2 \times 3 \times 5$$

The HCF is the lowest power of each prime number in both of the product of prime factors multiplied together. 2^2 is lower than 2^3 , 3 is the same in both and 5 is lower than 5^2

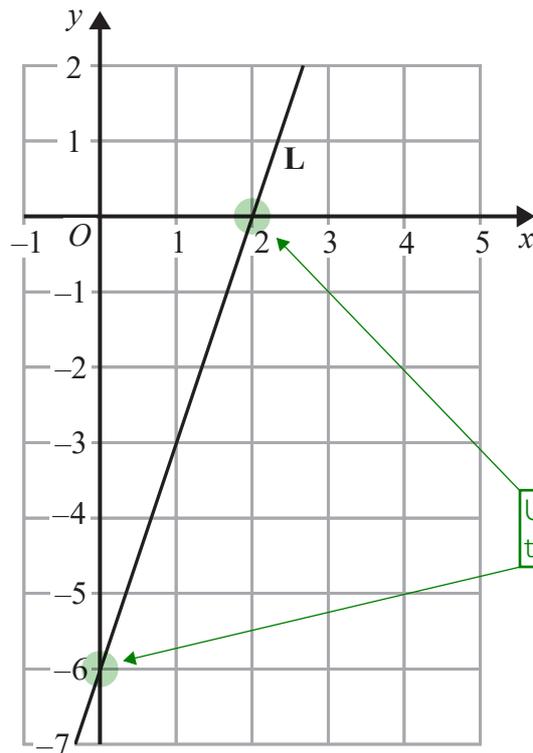
Newer Casio calculators can work out the HCF without having to do this method

60

(1)

(Total for Question 21 is 3 marks)

22 The line **L** is shown on the grid.



Find an equation for **L**.

$$\frac{6}{2}$$

Gradient = (change in y)/(change in x). The change in y from -6 to 0 is 6 and the change in x from 0 to 2 is 2. So the gradient is 3

$y = mx + c$ is the general equation of a straight line, where m is the gradient and c is the y -intercept. The y -intercept is -6 as this is the y -coordinate where the line crosses the y -axis

$$y = 3x - 6$$

(Total for Question 22 is 3 marks)

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DO NOT WRITE IN THIS AREA

23 Raya buys a van for £8500 plus VAT at 20%

Raya pays a deposit for the van.

She then pays the rest of the cost in 12 equal payments of £531.25 each month.

Find the ratio of the deposit Raya pays to the total of the 12 equal payments.

Give your answer in its simplest form.

$$\frac{20}{100} \times 8500$$

Putting the 20% over 100 converts it to a fraction, which when multiplied by the £8500 finds that 20% of £8500 is £1700

$$8500 + 1700 = 10200$$

Adding the value of the 20% VAT to the original £8500 works out that the van costs £10200 including the VAT

$$531.25 \times 12 = 6375$$

Multiplying the £531.25 monthly payment by the 12 equal payments works out that the total of the 12 equal payments is £6375

$$10200 - 6375$$

Subtracting the total of the equal payments from the cost of the van works out that the deposit is £3825

$$3825 : 6375$$

Expressing the ratio of the deposit to the total of the 12 equal payments

Entering the fraction 3825/6375 into the calculator simplifies it to 3/5. So the ratio simplifies to 3 : 5 as ratios simplify in a similar way to fractions

3 : 5

(Total for Question 23 is 5 marks)

24 (a) Complete the table of values for $y = x^2 - x - 6$

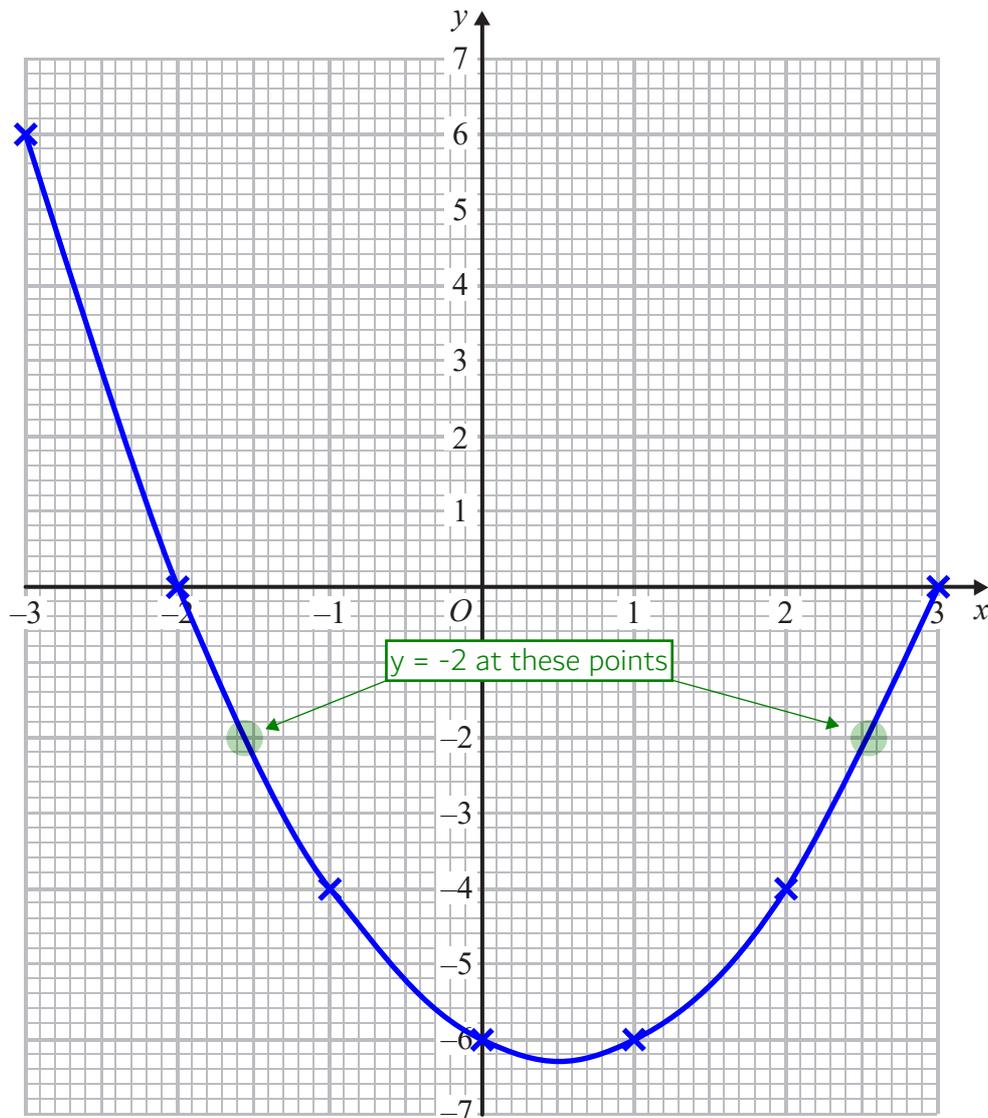
x	-3	-2	-1	0	1	2	3
y	6	0	-4	-6	-6	-4	0

Using table mode on the calculator. Define $f(x) = x^2 - x - 6$.
Start: -3. End: 3. Step: 1. This completes the table of values

(2)

(b) On the grid, draw the graph of $y = x^2 - x - 6$ for values of x from -3 to 3

(2)



Plotting the points from the table of values then joining them up with a curve

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Use your graph to find estimates of the solutions to the equation $x^2 - x - 6 = -2$

y has been replaced with -2 in the equation so it is basically asking what x is when $y = -2$

2.55, -1.55
(2)

(Total for Question 24 is 6 marks)

25 A force of 70 newtons acts on an area of 20 cm^2

The force is increased by 10 newtons.

The area is increased by 10 cm^2

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Helen says,

“The pressure decreases by less than 20%”

Is Helen correct?

You must show how you get your answer.

$$\frac{20}{100} \times \frac{70}{20} = 0.7$$

Putting the force of 70 newtons over the area of 20 cm^2 expresses the original pressure. Putting the 20% over 100 converts it to a fraction, which finds that 20% of the original pressure is 0.7 newtons/cm^2 when multiplied

$$\frac{70}{20} - \frac{80}{30} = 0.8...$$

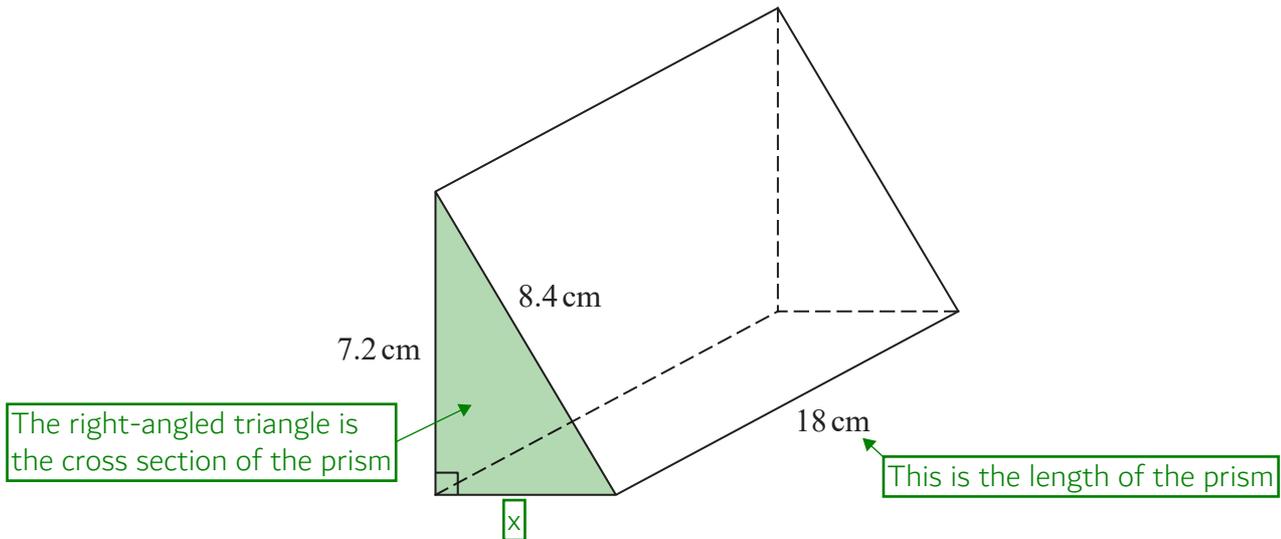
The force increases to 80 newtons and the area increases to 30 cm^2 . Putting the 80 newtons over the 30 cm^2 expresses the new pressure. Subtracting the new pressure from the original pressure works out that the difference is $0.8... \text{ newtons/cm}^2$, which must be what the original pressure decreases by

No

The pressure decreased by $0.8... \text{ newtons/cm}^2$, which is not less than than the 0.7 newtons/cm^2 (20% of the original pressure)

(Total for Question 25 is 3 marks)

26 Here is a triangular prism.



Work out the volume of the prism.

Give your answer correct to 3 significant figures.

$$x^2 + 7.2^2 = 8.4^2$$

Using Pythagoras' Theorem in the right-angled triangle. $a^2 + b^2 = c^2$, where a and b are the shorter sides and c is the longest side

$$x^2 = 18.72$$

Subtracting 7.22 from both sides to get x^2 on its own

$$x = 4.3\dots$$

Square rooting both sides gets x on its own

$$\frac{1}{2} \times 4.3\dots \times 7.2$$

Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$. So the area of the triangular cross section is $15.5\dots \text{ cm}^2$

$$15.5\dots \times 18$$

Volume of prism = area of cross section \times length

280.3... is rounded to 3 significant figures

280

cm³

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS