Candidate surname | Other names

Centre Number | Candidate Number

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

Wednesday 14 June 2023

Morning (Time: 1 hour 30 minutes)

Paper reference **1MA1/3F**

Mathematics

PAPER 3 (Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator, Formulae Sheet (enclosed). 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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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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 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

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write the number three thousand one hundred and seven in figures.

3107

(Total for Question 1 is 1 mark)

2 Write $\frac{3}{10}$ as a percentage.

To convert a fraction to a percentage it can be multiplied by 100. 3/10 x 100 = 30

30 %

(Total for Question 2 is 1 mark)

3 Simplify $m + m + m + m$

There are 4 lots of m, which is 4 x m, which is 4m

4m

(Total for Question 3 is 1 mark)

4 Change 4000 grams into kilograms.

There are 1000 grams in a kilogram. So dividing the 4000 grams by 1000 converts it into kilograms

4 kilograms

(Total for Question 4 is 1 mark)

5   7   –5   3   9   –2

Write these numbers in order of size.
Start with the smallest number.

Negative numbers are smaller than positive numbers. The more negative it is, the smaller it is. The less positive it is, the smaller it is
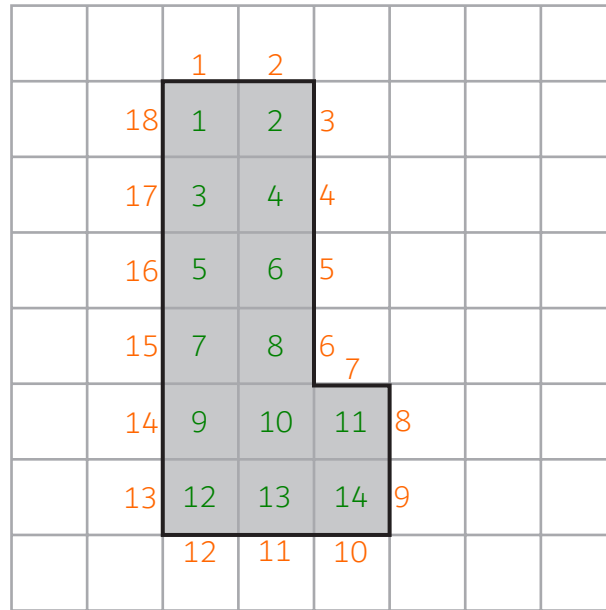
-5,-2,3,7,9

(Total for Question 5 is 1 mark)

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6 The diagram shows a shape on a centimetre grid.

		1	2				
	18	1	2	3			
	17	3	4	4			
	16	5	6	5			
	15	7	8	6 / 7			
	14	9	10	11	8		
	13	12	13	14	9		
		12	11	10			

(a) Find the area of the shape.

It is drawn on a centimetre grid so the squares can be counted (shown in green)
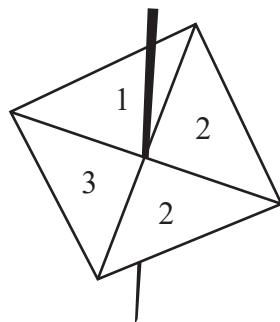
.... 14 .... cm²

(1)

(b) Find the perimeter of the shape.

It is drawn on a centimetre grid so the length around the outside can be counted (shown in orange)

.... 18 .... cm

(1)

(Total for Question 6 is 2 marks)

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7 Here is a 4-sided spinner.

Samina spins the spinner once.

(a) Choose the word that best describes the probability that the spinner lands on 2

| impossible | unlikely | evens | likely | certain |

2 out of the 4 possibilities are the number 2. This is 2/4, which simplifies to 1/2. Evens means that the probability is 1/2

.... evens ....
(1)

(b) Choose the word that best describes the probability that the spinner lands on a number less than 4

| impossible | unlikely | evens | likely | certain |

All of the possibilities are less than 4 so it is certain

.... certain ....
(1)

Ralph rolls a biased dice once.
The probability that he gets the number 5 is 0.4

(c) Work out the probability that Ralph does **not** get the number 5

The probability of events which are certain is 1. It is certain to either be the number 5 or not the number 5. So the probabilities must add up to 1. Subtracting the probability of getting the number 5 from 1 leaves the probability of not getting the number 5
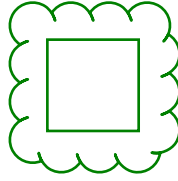
1−0.4

.... 0.6 ....
(1)

(Total for Question 7 is 3 marks)

.CG Maths.

8 A quadrilateral has 4 right angles and 4 sides of equal length.

(a) Write down the mathematical name of this quadrilateral.

.... square

(1)

The diagram shows a solid shape.
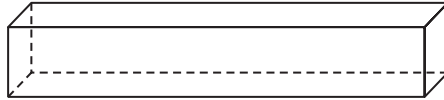
(b) Write down the mathematical name of this shape.

.... cuboid

(1)

(Total for Question 8 is 2 marks)

9 The table shows the number of books read by four people in one month.

Person	Number of books
Ximena	7
Martha	9
Kezia	1
Tabby	5

(a) Work out the median number of books.

1̶ 5 7 9̶ ← Putting them in order then crossing out from either end finds that 5 and 7 are in the middle

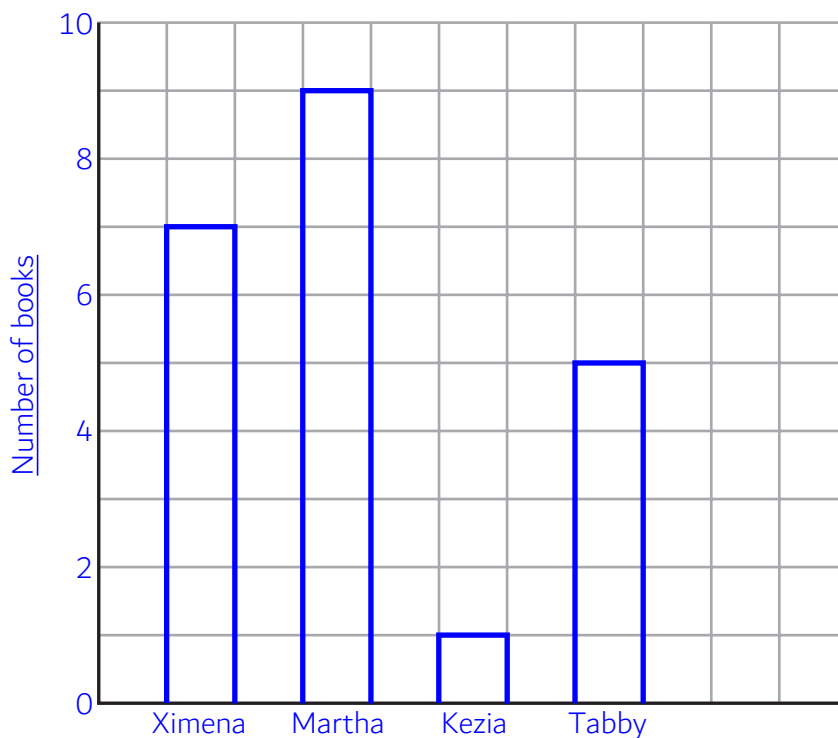$\frac{5+7}{2}$ ← Doing the mean of the 5 and the 7 works out that 6 is halfway between these

.... 6 ....

(2)

(b) Find the range.

9−1 ← Range = largest - smallest

.... 8 ....

(1)

(c) On the grid, draw a bar chart to show the information in the table.

(3)

(Total for Question 9 is 6 marks)

.CG Maths.

10 Wayne begins walking at 8 30 am.
He walks for 1 hour and 45 minutes.

Wayne then rests for 15 minutes.
He then walks for 85 minutes to a cafe.

Does Wayne get to the cafe before 12 noon?
You must show how you get your answer.

$8°30° + 1°45° + 0°15° + 0°85° = 11°55'0"$

Entering 8 30 as a sexagesimal on the calculator. Adding all the times as sexagesimals. Writing down what was put into the calculator and the answer it gives. 11°55'0" can be interpreted as 11 55 am

Yes ← 11 55 am is before 12 noon

(Total for Question 10 is 4 marks)

.CG Maths.

Turn over ▶

11 Gabriel thinks of a number.

He multiplies his number by 5 and then adds 7
His answer is 72

What number did Gabriel think of?

$72 - 7$ ← Doing the opposite operations in the opposite order goes from the answer to the original number. The opposite of adding 7 is subtracting 7
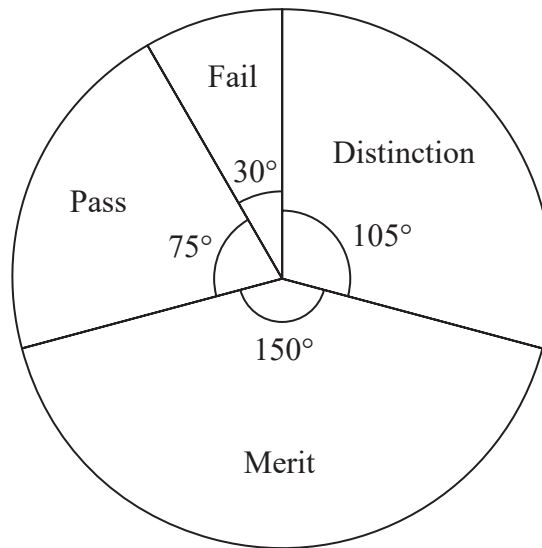
$65 \div 5$ ← Then the opposite of multiplying by 5 is dividing by 5

13

(Total for Question 11 is 3 marks)

.CG Maths.

12 Some students took a guitar exam.

The pie chart shows information about the grades the students got.

(a) Write down the modal grade.

Merit had the largest number of degrees so must have been the grade with the highest frequency

.... Merit

(1)

7 students got distinction.

(b) Work out the total number of students who took the guitar exam.

$\frac{7}{105} \times 360$ ← *105° represent 7 students. Dividing the 7 students by the 105° expresses how many students are represented by 1°. Multiplying this by 360 works out the total number of students as there are 360° in total in a pie chart*
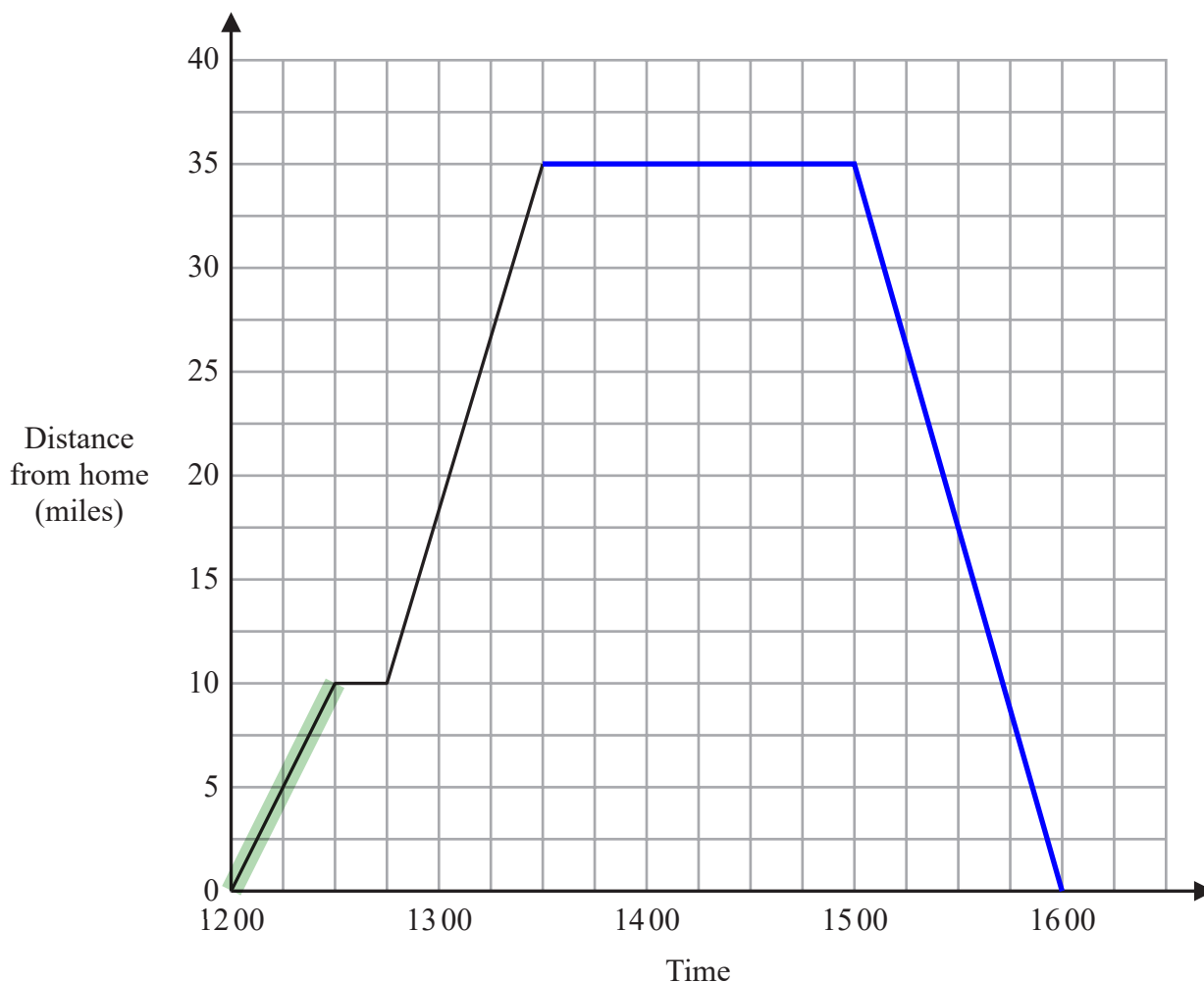
.... 24

(3)

(Total for Question 12 is 4 marks)

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13 Rowena drove from her home to a beach.

Here is a travel graph for her journey.

Rowena stopped at a cafe on her way to the beach.

(a) (i) How many minutes did Rowena take to drive to the cafe?

> There are 60 minutes between 12 00 and 13 00. There are 4 boxes between 12 00 and 13 00. Dividing the 60 minutes by the 4 boxes works out that each box is worth 15 minutes. She is driving to the cafe for the highlighted region on the graph. This is 2 boxes along the time axis and 2 lots of 15 minutes is 30 minutes

............................30............................ minutes

(1)

(ii) Write down the distance from Rowena's home to the cafe.

> The distance at the end of the highlighted region on the graph is 10 miles

............................10............................ miles

(1)

.CG Maths.

Rowena stayed at the beach for $1\frac{1}{2}$ hours.

She then drove home without stopping.
Rowena arrived home at 16 00

1½ hours after 13 30 is 15 00. So drawing a straight horizontal line until 15 00 as this means the distance is not changing. Then drawing a line continually going downward to a distance of 0 at 16 00. As she returned home the distance from home will be 0

(b) On the grid, complete the travel graph.

(2)

(c) Work out the average speed for the journey from the beach to Rowena's home.

35 miles were travelled in 1 hour. Miles per hour can be worked out by dividing the miles by the hours. 35 ÷ 1 = 35

.............3S............. miles per hour

(1)

(Total for Question 13 is 5 marks)

---

14 120 boxes cost £6
270 bags cost £10

A bag is cheaper than a box.

How much cheaper?
Give your answer in pence correct to 1 decimal place.

$600 \div 120 = 5$

There are 100p in £1 so multiplying the £6 by 100 converts it into 600p. Dividing this by the 120 boxes works out that each box is 5p

$1000 \div 270 = 3.7...$

There are 100p in £1 so multiplying the £10 by 100 converts it into 1000p. Dividing this by the 270 bags works out that each bag is 3.7...p

$5 - 3.7...$

Subtracting the cost of each bag from the cost of each box works out how much cheaper each bag is. Using the exact value for 3.7... using the Ans button on the calculator (this should be the previous answer on the calculator)

Rounding 1.29... to 1 decimal place

..............1.3..............p

(Total for Question 14 is 4 marks)

15 There are only red beads and green beads in a bag.

number of red beads : number of green beads = 1 : 4

There are 35 red beads in the bag.

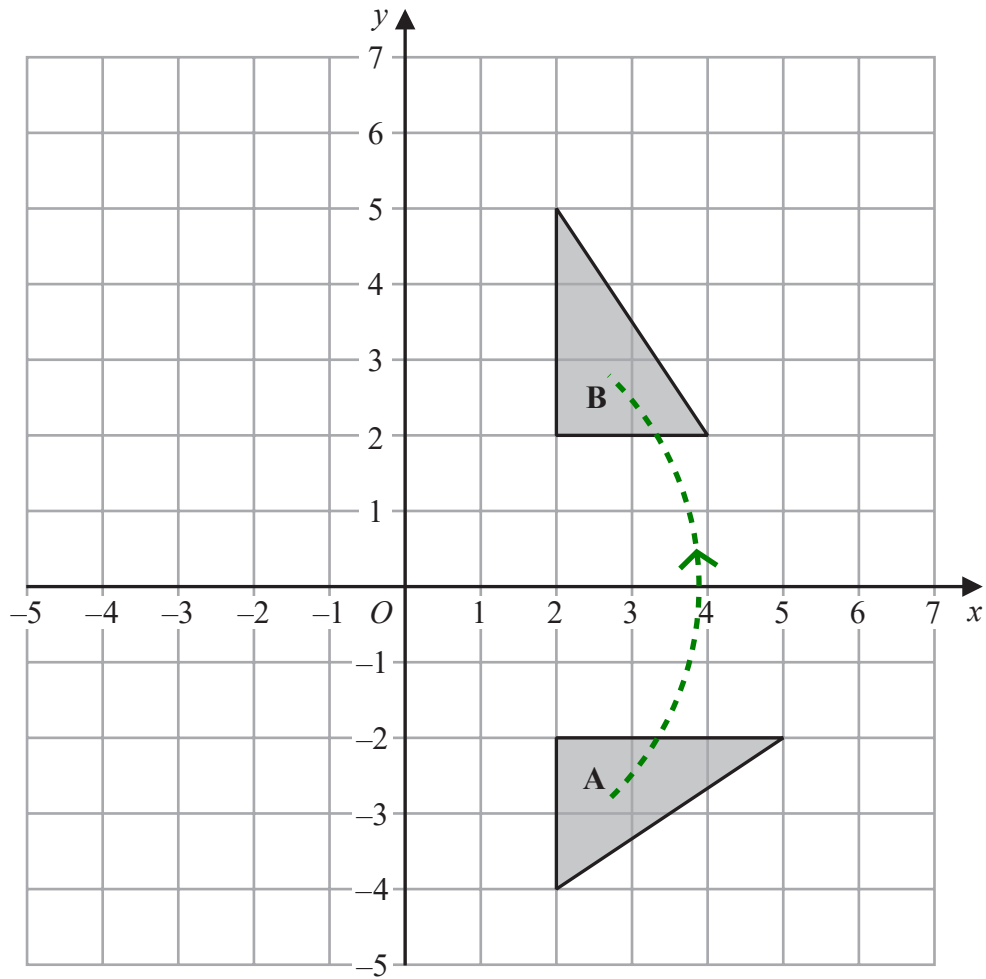Work out the total number of beads in the bag.

1+4

Adding the 1 part for red and the 4 parts for green works out that there are 5 parts in total in the ratio, which represent the total number of beads

35×5

1 part represents 35 beads. Multiplying the value of 1 part by 5 works out the value of the 5 parts

.... 175 ....

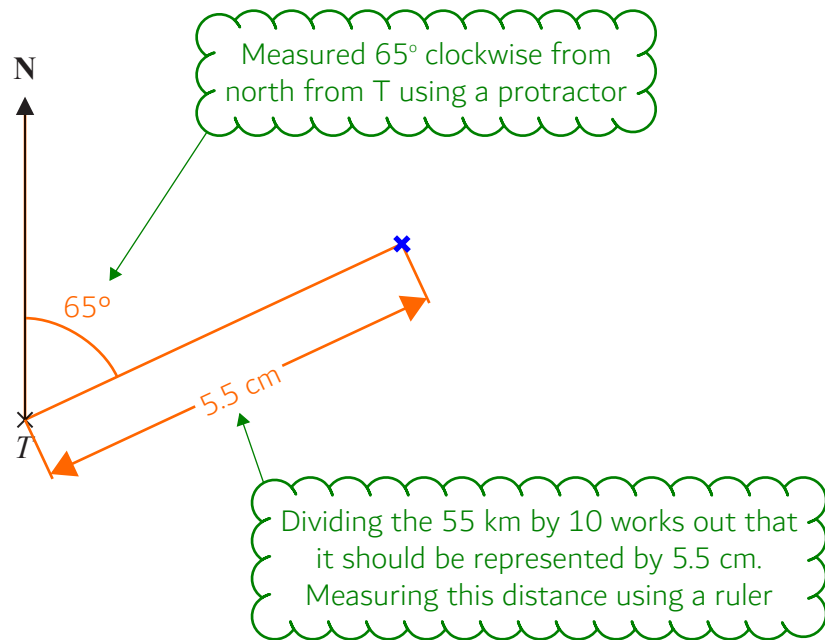**(Total for Question 15 is 2 marks)**

.CG Maths.

16

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

Rotation, 90° anticlockwise, centre (0 , 0)

> It is not the same way up and is the same size so this could be a rotation. Sketching around shape A on tracing paper then rotating it 90° anticlockwise around (0 , 0) takes it from A to B

(Total for Question 16 is 2 marks)

17 The diagram shows the position of town *T*.

N

Measured 65° clockwise from north from T using a protractor

65°

5.5 cm

T

Dividing the 55 km by 10 works out that it should be represented by 5.5 cm. Measuring this distance using a ruler

Town *R* is 55 km from town *T* on a bearing of 065°

Mark the position of town *R* with a cross (×).
Use a scale of 1 cm to 10 km.

(Total for Question 17 is 2 marks)

.CG Maths.

18 Solve $4(2x - 3) = 20$

$2x - 3 = 5$ ← Dividing both sides by 4 eliminates the 4 on the left. The brackets are then not necessary

$2x = 8$ ← Adding 3 to both sides eliminates the -3 on the left to get the x term on its own

Dividing both sides by 2 eliminates the 2 on the left and gets x by itself

$x = $ .... 4 ....

(Total for Question 18 is 3 marks)

19 Jenny invests £3000 for 6 years at y% simple interest per year.

At the end of the 6 years, Jenny has received a total of £450 in interest.

Work out the value of y.

$\dfrac{450}{3000} \times 100$ ← Expressing the interest as a fraction of what was invested then multiplying it by 100 to convert it into a percentage. This works out that the total interest over the 6 years is 15%

$15 \div 6$ ← As it is simple interest, the interest is the same every year. So dividing the 15% by the 6 years works out the percentage interest per year and therefore works out the value of y

$y = $ .... 2.5 ....

(Total for Question 19 is 3 marks)

.CG Maths.

20 (a) Simplify $(m^2)^3$

(a^x)^y = a^{xy}, so the powers should be multiplied. 2 x 3 = 6

m^6

(1)

(b) Simplify $x^5 \times x^8$

a^x x a^y = a^{x+y}, so the powers should be added. 5 + 8 = 13

x^{13}

(1)

(c) Expand $4p(p^2 + 3p)$

4p x p^2 = 4p^3 and 4p x 3p = 4 x 3 x p x p = 12p^2

$4p^3 + 12p^2$

(2)

(Total for Question 20 is 4 marks)

.CG Maths.

21 Jonny wants to know how much coffee he will need for 800 people at a meeting.

Each person who drinks coffee will drink 2 cups of coffee.
10.6 g of coffee is needed for each cup of coffee.

Jonny assumes 68% of the people will drink coffee.

(a) Using this assumption, work out the amount of coffee Jonny needs.
Give your answer correct to the nearest gram.

$\dfrac{68}{100} \times 800$

This works out that 68% of the 800 people is 544. Percentage is out of 100 so putting the 68 over 100 converts it into a fraction. 'Of' means to multiply so multiplying this fraction by the 800

544×2

Multiplying the 544 people who want coffee by the 2 cups each person will drink works out that there will need to be 1088 cups of coffee

1088×10.6

Multiplying the 1088 cups of coffee needed by the 10.6 g needed for each cup works out that 11532.8 g of coffee will be needed

The answer of 11532.8 is rounded to the nearest gram

11533 .... g

(4)

Jonny's assumption is wrong.
72% of the people will drink coffee.

(b) How does this affect your answer to part (a)?
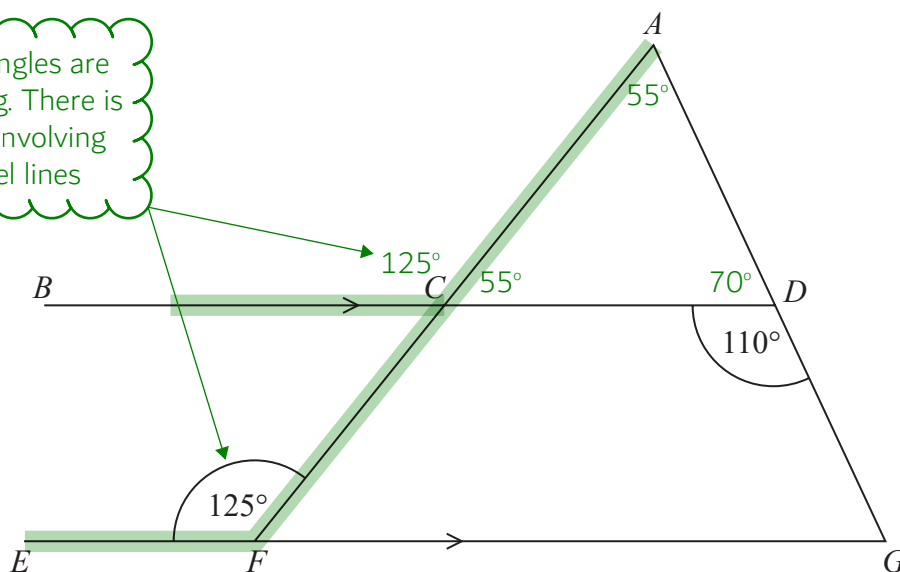
It will be greater

As 72% is greater than 68% so more people want coffee. This will mean more cups of coffee and therefore more coffee will be needed

(1)

(Total for Question 21 is 5 marks)

.CG Maths.

Turn over ▶

22 *ACF* and *ADG* are straight lines.
BCD and *EFG* are parallel lines.

These two angles are corresponding. There is an F-shape involving two parallel lines

Show that triangle *ACD* is isosceles.
Give a reason for each stage of your working.

180 - 110 = 70
Angle ADC = 70° as angles on a straight line add up to 180°

Angles ADC and CDG lie around a point on a straight line. So subtracting angle CDG from 180° leaves angle ADC

Angle ACB = 125° as corresponding angles are equal

See diagram above

180 - 125 = 55
Angle ACD = 55° as angles on a straight line add up to 180°

Angles ACD and ACB lie around a point on a straight line. So subtracting angle ACB from 180° leaves angle ACD

180 - 55 - 70 = 55
Angle CAD = 55° as angles in a triangle add up to 180°

Subtracting angles ACD and ADC from 180° leaves angle CAD

Therefore triangle ACD is isosceles as it has two equal angles

Angles ACD and CAD are both 55°

(Total for Question 22 is 5 marks)

.CG Maths.

23 It takes 14 hours for 5 identical pumps to fill a water tank.

How many hours would it take 4 of these pumps to fill another water tank of the same size?

14×5 ← Multiplying the 14 hours by the 5 pumps doing this work finds that 70 hours worth of work is being done

70÷4 ← Dividing the 70 hours worth of work by the 4 pumps which are next doing the work finds that each pump will be needed for 17.5 hours

............17.5............ hours

(Total for Question 23 is 2 marks)

.CG Maths.

24 *A* and *B* are numbers such that

$$A = 2^2 \times 3^4 \times 7$$
$$B = 3^2 \times 7^2$$

(a) Find the highest common factor (HCF) of *A* and *B*.

$3^2 \times 7$

Multiplying the lowest power of each prime in both lists finds the highest common factor. There are no 2s in B so the 2s are ignored. The lowest power of 3 out of 3^4 and 3^2 is 3^2. The lowest power of 7 out of 7 and 7^2 is 7

.... 63 ....

(1)

(b) Find the lowest common multiple (LCM) of *A* and *B*.

$2^2 \times 3^4 \times 7^2$

Multiplying the highest power of each prime in both lists finds the lowest common multiple. The highest power of 2 out of 2^2 and no 2s is 2^2. The highest power of 3 out of 3^4 and 3^2 is 3^4. The highest power of 7 out of 7 and 7^2 is 7^2

.... 15876 ....

(2)

(Total for Question 24 is 3 marks)

.CG Maths.

25 Lava flows from a volcano at a constant rate of $11.9\,\text{m}^3/\text{s}$

How many days does it take for $67\,205\,600\,\text{m}^3$ of lava to flow from the volcano?
Give your answer correct to the nearest day.

s^{d}_{t}

This is basically a speed, distance, time problem so writing the formula triangle

$\dfrac{67205600}{11.9}$

From the formula triangle, time = distance/speed. The distance is basically the volume of lava in m^3 and the speed is basically the 11.9 m^3/s. As they both involve m^3 they are compatible and seconds is the unit of time as this is involved in the unit of the speed

$5647529.4...\div 60$

There are 60 seconds in a minute so dividing the time in seconds by 60 converts it into minutes

$94125.4...\div 60$

There are 60 minutes in an hour so dividing the time in minutes by 60 converts it into hours

$1568.7...\div 24$

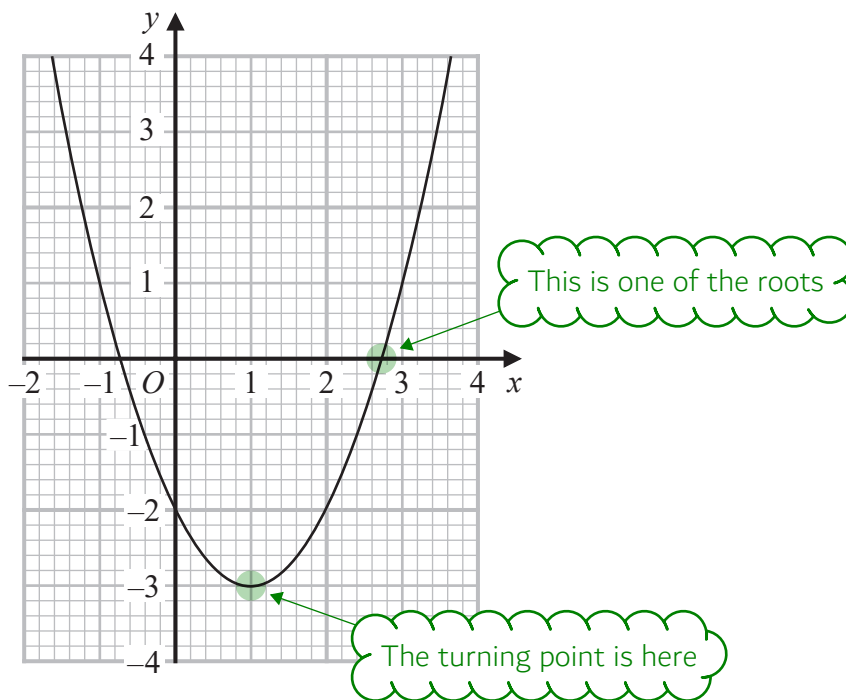*There are 24 hours in a day so dividing the time in hours by 24 converts it into days*

.................65................. days

(Total for Question 25 is 3 marks)

The answer of 65.3... days is rounded to the nearest day

26 Here is the graph of $y = x^2 - 2x - 2$

This is one of the roots

The turning point is here

(a) Write down the coordinates of the turning point on the graph of $y = x^2 - 2x - 2$

(....1.... , ...-3....)

(1)

(b) Write down an estimate for one of the roots of $x^2 - 2x - 2 = 0$

y has been changed to 0, so it is basically asking what x is when y = 0, or where the curve crosses the x-axis. The scale on the x-axis goes up in 0.2s, so half a box is 0.1

.......2.7.......

(1)

(Total for Question 26 is 2 marks)

.CG Maths.

27 A solid cuboid is made of metal.

The metal has a density of $9\,\text{g/cm}^3$
The volume of the cuboid is $72\,\text{cm}^3$

Work out the mass of the cuboid.

$d\,{}^M\!{}_V$ ← Writing the formula triangle for density, mass, volume

9×72 ← From the formula triangle, mass = density x volume

The units are compatible as both involve cm^3. The unit of mass calculated will be grams as this is involved

.... **648** .... g

(Total for Question 27 is 2 marks)

28 (a) Write $(9 \times 10^4):(4.5 \times 10^6)$ in the form $1:n$ where n is an integer.

$\dfrac{4.5 \times 10^6}{9 \times 10^4}$ ← Dividing both sides of the ratio by 9×10^4 gets 1 on the left

.... **1:50** ....

(2)

(b) Write the following numbers in order of size.
Start with the smallest number.

5.625×10^4 5625 $56\,250 \times 10^{-3}$ $0.005\,625 \times 10^5$

56250   **56.25**   **562.5**

Using the calculator to convert all of the number into ordinary form

$56250 \times 10^{-3}, 0.005625 \times 10^5, 5625, 5.625 \times 10^4$

(2)

(Total for Question 28 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

.CG Maths.