Candidate surname | Other names

Centre Number | Candidate Number

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

Time 1 hour 30 minutes

Paper reference **1MA1/1F**

Mathematics
PAPER 1 (Non-Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, 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 not be used**.

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 0.3 as a fraction.

> The 3 is in the tenths column so is worth 3 tenths

$\frac{3}{10}$

(Total for Question 1 is 1 mark)

2 Work out 3^2

> $3^2 = 3 \times 3$

9

(Total for Question 2 is 1 mark)

3 Work out $20 \div (3 + 2)$

> The order of operations (BIDMAS) needs to followed so the brackets are done first. (3 + 2) = 5. Then 20 ÷ 5 = 4

4

(Total for Question 3 is 1 mark)

4 Write down a factor of 60 that is between 8 and 14

> 60 is divisible by 10 to get a whole number so 10 is a factor that is between 8 and 14

10

(Total for Question 4 is 1 mark)

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5 Simplify $3 \times w \times 5 \times t$

> Multiplication can be done in any order. 3 x 5 x t x w = 15 x t x w.
> Writing the letters next to the 15 and each other means to multiply

15tw

(Total for Question 5 is 1 mark)

6 Fay is planning a trip to a theme park for 1 adult and 2 children.

These are the costs for the trip.

Total cost of petrol	£23
Tickets to theme park	£33 each adult
	£24.50 each child
Meals	£15 each adult
	£10 each child

Fay has £200 to spend.
She pays all the costs.

How much money does she have left?

```
  23
 +33
 +24.50
 +24.50
 +15
 +10
 +10
 140.00
  1 2 1
```

> Adding the costs in the following order: petrol, adult ticket to theme park,
> child ticket to theme park, child ticket to theme park, meals for adult,
> meals for child, meals for child. This works out that the total cost is £140

```
  200
 -140
   60
```

> Subtracting the total cost from the £200 she has to spend works out that she has £60 left

£ 60

(Total for Question 6 is 4 marks)

.CG Maths.

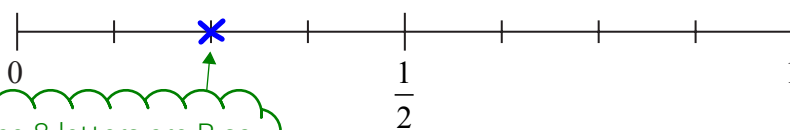**7** Here is a list of 8 letters.

$$B \quad C \quad A \quad A \quad A \quad A \quad B \quad A$$

(a) Write down the mode.

A appears 5 times. B appears 2 times. C appears 1 time. A appears the most so is the mode

.... A ....

(1)

One of the 8 letters is going to be picked at random.

(b) (i) On the probability scale, mark with a cross (×) the probability that this letter will be B.

2 out of the 8 letters are B so the probability is 2/8 or 1/4

(1)

(ii) Find the probability that this letter will be C.

1 out of the 8 letters is C

.... $\dfrac{1}{8}$ ....

(1)

(Total for Question 7 is 3 marks)

8 (a) Solve $m - 3 = 4$

Adding 3 to both sides eliminates the -3 on the left and gets m on its own. m = 4 + 3

$m =$ .... 7 ....

(1)

(b) Solve $3n + n = 24$

$4n = 24$ ◄── *3n + n = 4n*

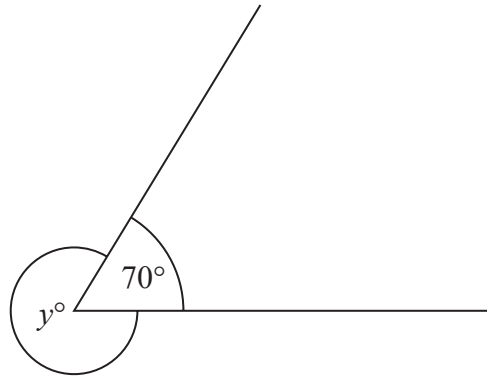*Dividing both sides by 4 eliminates the 4 on the left and gets n on its own. n = 24 ÷ 4*

$n =$ .... 6 ....

(2)

(Total for Question 8 is 3 marks)

.CG Maths.

9

(a) Find the value of y.

$^2\cancel{3}^1\cancel{6}0$
-70
$\overline{290}$

There are 360° in total around a point. Subtracting the 70° from the 360° works out angle y

$y =$ ....290..............

(1)

(b) Give a reason for your answer.

Angles around a point add up to 360°

(1)

(Total for Question 9 is 2 marks)

.CG Maths.

10 A shop sells jars of coffee.
Each jar of coffee costs £4

Michael has £23

(a) Work out the greatest number of jars of coffee Michael can buy.

$\begin{array}{r} 0\ 5\ r3 \\ 4\overline{)2\ ^23} \end{array}$

Dividing the £23 by the £4 works out that £23 is 5 lots of £4 with a remainder of £3. Therefore 5 jars can be bought with £3 left over

........5........

(2)

In a sale on Wednesday, jars of coffee are sold at half price.

Michael thinks that he can now buy exactly twice the number of jars of coffee for £23

(b) Is Michael correct?
You must give a reason for your answer.

$4 \div 2 = 2$

Dividing the cost of £4 by 2 works out that half price is £2 each

$\begin{array}{r} 1\ 1\ r1 \\ 2\overline{)2\ 3} \end{array}$

This works out that 11 jars can be bought with £1 left over
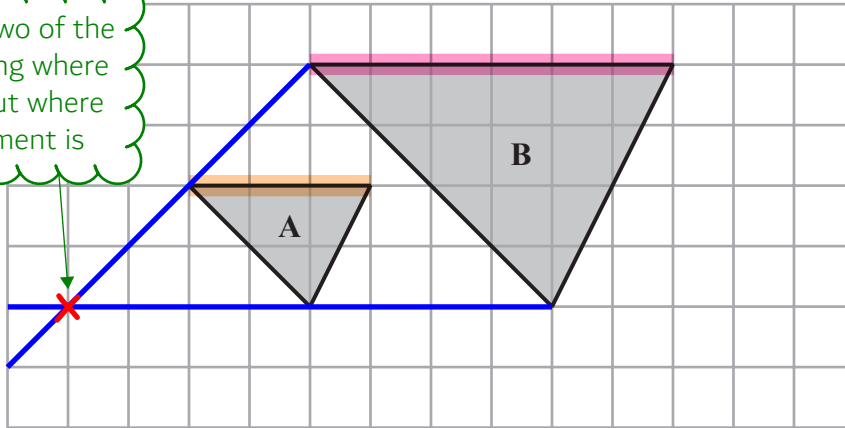
$5 \times 2 = 10$

Twice as many jars would be 10 jars

No, he can buy 11 and this is more than twice the number

(1)

(Total for Question 10 is 3 marks)

.CG Maths.

11 Here are two triangles on a grid.

Drawing lines through two of the same corners then seeing where the lines meet works out where the centre of enlargement is

A

B

Triangle **B** is an enlargement of triangle **A**.

(a) (i) Write down the scale factor of the enlargement.

The side length highlighted in orange had a side length of 3cm. This has been multiplied by 2 to get the side length of 6cm highlighted in pink
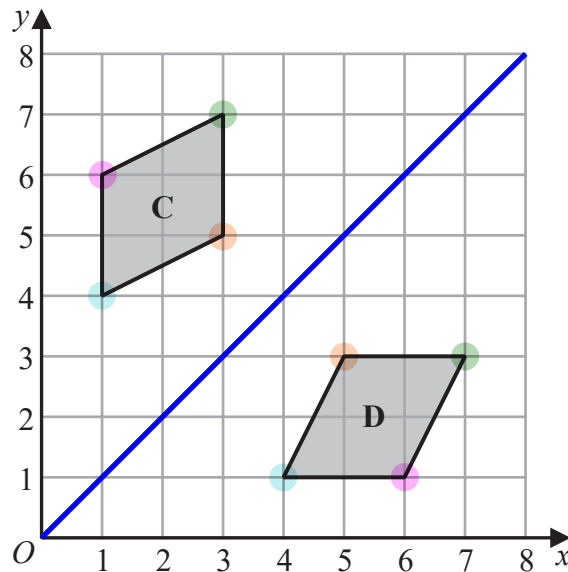
2

....

(1)

(ii) On the grid, mark with a cross (×) the centre of enlargement.

(1)

Here are two parallelograms on a coordinate grid.

C

D

The corners in the same colours have been reflected to each other. The mirror line must be halfway between the shapes

Parallelogram **D** is a reflection of parallelogram **C**.

(b) (i) On the grid, draw the mirror line.

(1)

(ii) Write down an equation of this mirror line.

The y-coordinate is the same as the x-coordinate at all points on the line

$y = x$

....

(1)

(Total for Question 11 is 4 marks)

.CG Maths.

12 Elena spent 120 minutes at a sports centre.

She played badminton for 50 minutes.

She used the swimming pool for $\frac{1}{6}$ of the 120 minutes.

She used the gym for 20% of the 120 minutes.
She then spent the rest of the 120 minutes in the cafe.

(a) Work out the total time, in minutes, that Elena spent in the cafe.

$$\begin{array}{r} 0\ 2\ 0 \\ 6\overline{)1\ ^{1}2\ 0} \end{array}$$

This works out that 1/6 of the 120 minutes is 20 minutes, so this is how long she used the swimming pool for

$120 \div 10$

10% = 1/10 so dividing the 120 minutes by 10 works out that 10% is 12 minutes

$12 \times 2 = 24$

Multiplying the value of 10% by 2 works out that 20% of 120 minutes is 24 minutes, so this is how long she used the gym for

$$\begin{array}{r} 50 \\ +20 \\ +24 \\ \hline 94 \end{array}$$

Adding the amount of time spent playing badminton, using the swimming pool and gym works out that 94 minutes were not spent in the cafe

$$\begin{array}{r} ^{0}1\,^{11}2\,0 \\ -\ 94 \\ \hline 26 \end{array}$$

Subtracting the 94 minutes from the 120 minutes works out that the rest of the 120 minutes is 26 minutes. So this must be how long was spent in the cafe

.......26...... minutes

(4)

Elena got to the sports centre at 1.30 pm.
She had asked her friend to meet her in the cafe at 3 pm.

(b) Did Elena get to the cafe by 3 pm?
Give a reason for your answer.

$$\begin{array}{r} 1{:}30 \\ +0{:}94 \\ \hline 3{:}04 \end{array}$$

Adding the 94 minutes which were spent playing badminton, using the swimming pool and gym works out that she finished at 3.04pm. Carrying over 2 hours on the addition as 120 minutes is 2 hours

No, she arrived after 3.04pm

(1)

(Total for Question 12 is 5 marks)

.CG Maths.

13 The composite bar chart shows information about the number of people living in a village.
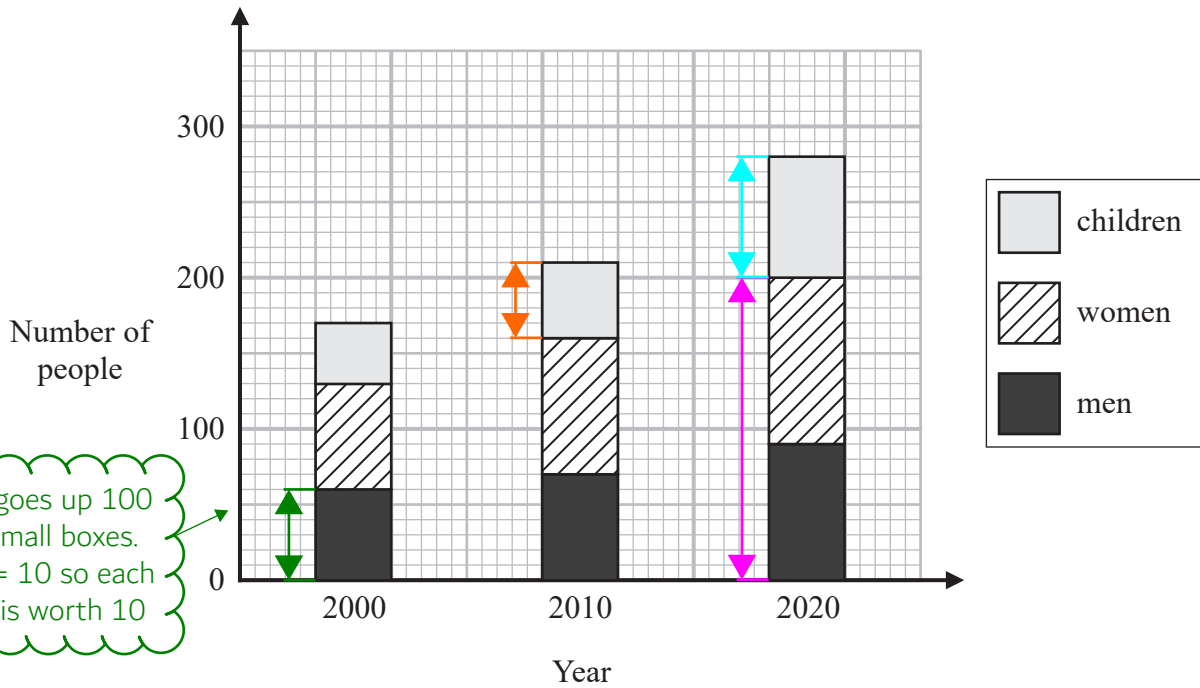
The scale goes up 100 over 10 small boxes. 100 ÷ 10 = 10 so each small box is worth 10

(a) Write down the number of men living in the village in the year 2000

The bar reaches 6 small boxes so is worth 60. It is indicated by the green arrows

60

(1)

(b) Find the number of children living in the village in the year 2010

The bar reaches 5 small boxes so is worth 50. It is indicated by the orange arrows

50

(1)

For the people living in the village in the year 2020

(c) find the ratio of the number of children to the **total** number of men and women.

The bar for children in 2020 reaches 8 small boxes so is worth 80. It is indicated by the blue arrows. The bars for both men and women in 2020 reach 20 small boxes so is worth 200. It is indicated by the pink arrows. Writing the ratio. There is no need to simplify

80:200

(2)

(Total for Question 13 is 4 marks)

.CG Maths.

Turn over ▶

14 Jenny drives from London to Swindon at an average speed of 54 miles per hour.

She drives for $1\frac{1}{2}$ hours.

(a) Work out the distance from London to Swindon.

$S \overset{d}{t}$ ← Writing the formula triangle for speed, distance, time. Distance = speed x time = 54 x $1^1/_2$

$2\overline{)5\,^{1}4}$ $\frac{2\,7}{}$ ← Working out that 54 x 1/2 = 27

$\frac{54}{+27}$ ← Adding 1/2 of 54 to 1 lot of 54 works out 54 x $1^1/_2$
$\overline{81}$

.... 81 .... miles

(2)

Aleksy is using a map.

The map has a scale of $1:25\,000$

On the map a road has a length of 6 cm.

(b) Work out the length, in kilometres, of the real road.

25000
$\times \qquad 6$
$\overline{150000}$ ← The scale means that the real length is 25000 times the length on the map as 25000 is 25000 times greater than 1
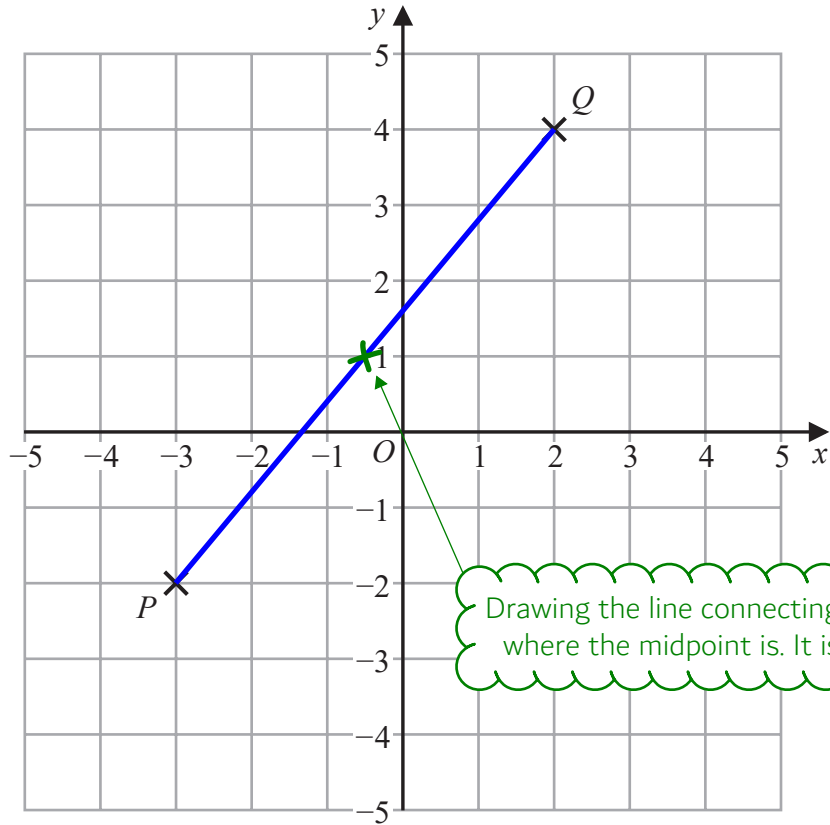
1500 ← Converting the 150000cm into metres by dividing by 100. There are 100cm in 1m

Converting the 1500m into kilometres by dividing by 1000. There are 1000m in 1km

.... 1.5 .... kilometres

(3)

(Total for Question 14 is 5 marks)

.CG Maths.

15

Find the coordinates of the midpoint of *PQ*.

(........−0.5........ , ...1........)

(Total for Question 15 is 2 marks)

16 Here is a quadrilateral $ABCD$.

$$A \quad x+1 \quad B$$
$$x-1$$
$$2x-5 \qquad\qquad C$$
$$2x$$
$$D$$
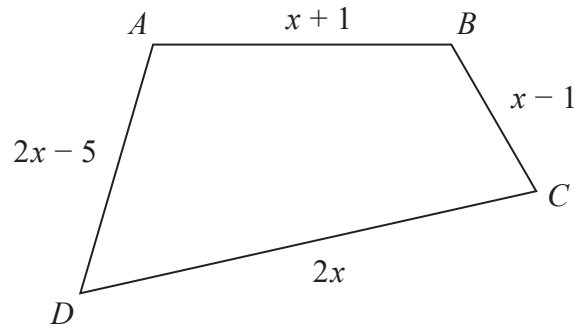
All the measurements are in centimetres.

The perimeter of $ABCD$ is 52 centimetres.

Work out the length of DC.

$x+1+x-1+2x+2x-5 \leftarrow$ Expressing the perimeter in terms of x. Perimeter is all of the outside sides added together. AB + BC + CD + DA

$6x-5=52 \leftarrow$ Simplifying the expression by collecting like terms. x + x + 2x + 2x = 6x. 1 - 1 - 5 = -5. Setting it equal to the actual value of the perimeter

$6x=57 \leftarrow$ Adding 5 to both sides get the x term on its own

$x=\frac{57}{6} \leftarrow$ Dividing both sides by 6 gets x on its own. 57 is not in the 6 times table so leaving it as a fraction rather than dividing to get a decimal

$\frac{57}{6}\times 2 \leftarrow$ DC is 2x so multiplying the value of x by 2

$3\overline{)5^27}\; \frac{1\;9}{} \leftarrow$ Dividing the denominator by 2 multiplies the fraction by 2 as the 57 is being divided by half the amount. Working out 57/3

.... **19** .... centimetres

(Total for Question 16 is 4 marks)

.CG Maths.

17 There are only blue counters, green counters, red counters and yellow counters in a bag.

The table shows the number of blue counters in the bag.

Colour	blue	green	red	yellow
Number of counters	30			

There is a total of 100 counters in the bag.

Ashin takes at random a counter from the bag.

(a) Find the probability that the counter is **not** blue.

$$\begin{array}{r} {}^{0}\overset{9}{\cancel{1}}00 \\ -\ 30 \\ \hline 70 \end{array}$$

Subtracting the 30 blue counters from the 100 counters works out that there are 70 counters which are not blue

70 out of the 100 counters are not blue

$$\frac{70}{100}$$

(2)

The ratio of the number of blue counters to the number of green counters is $2:3$

(b) Work out the number of green counters in the bag.

$$\begin{array}{r} 1\ 5 \\ 2\overline{)3\ {}^{1}0} \end{array}$$

2 parts of the ratio represent the 30 blue counters. So dividing the 30 blue counters by 2 works out that 1 part of the ratio is worth 15 counters

$$\begin{array}{r} 15 \\ \times\ 3 \\ \hline 45 \end{array}$$

Multiplying the value of 1 part of the ratio by 3 works out that the value of the 3 parts representing green is 45, so there are this many green counters

45

(2)

Bradley says,

"The number of red counters in the bag is the same as the number of yellow counters in the bag."

(c) Can Bradley be correct?
Give a reason for your answer.

$$\begin{array}{r} {}^{0}\overset{9}{\cancel{1}}{}^{1}00 \\ -\ 30 \\ -\ 45 \\ \hline 25 \end{array}$$

Subtracting the number of blue and number of green counters from the 100 counters works out that there are 25 red and yellow counters in total

No, as there is an odd number of red and yellow counters in total

(1)

(Total for Question 17 is 5 marks)

Odd numbers cannot be divided by 2 to get a whole number and there needs to be a whole number of counters of each colour. Dividing the total number of red and yellow counters by 2 would work out how many of each colour there are

.CG Maths.

18 There are 240 cans of drink on a shelf.
Each can contains cola or lemonade or orange.

$$\begin{array}{ccc} \text{the number of cans} & : & \text{the number of cans} & : & \text{the number of cans} \\ \text{of cola} & & \text{of lemonade} & & \text{of orange} \end{array} = 5:3:2$$

$\dfrac{1}{2}$ of the cans of lemonade and $\dfrac{1}{12}$ of the cans of orange are removed from the shelf.

Work out the number of cans of cola as a percentage of the total number of cans of drink remaining on the shelf.

5+3+2 ← There are 240 cans in total. These are represented by a total of 10 parts in the ratio

240÷10 ← Dividing the 240 cans by the 10 parts which represent them works out that 1 part of the ratio is worth 24 cans

$\begin{array}{r} 24 \\ \times\ 5 \\ \hline 1\overset{2}{2}0 \end{array}$ ← Multiplying the value of 1 part of the ratio by the 5 parts which represent the number of cans of cola works out that there were 120 cans of cola

$\begin{array}{r} 24 \\ \times\ 3 \\ \hline 7\underset{1}{2} \end{array}$ ← Multiplying the value of 1 part of the ratio by the 3 parts which represent the number of cans of lemonade works out that there were 72 cans of lemonade

$\begin{array}{r} 24 \\ \times\ 2 \\ \hline 48 \end{array}$ ← Multiplying the value of 1 part of the ratio by the 2 parts which represent the number of cans of orange works out that there were 48 cans of orange

$2\overline{)7^{3}2^{6}}$ ← If 1/2 of the cans of lemonade are removed, 1/2 of the cans of lemonade remain. This works out that there are now 36 cans of lemonade

48÷12 ← This works out that 1/12 of the cans of orange is 4 cans

48−4=44 ← Subtracting the 4 cans from the 48 cans of orange works out that there are now 44 cans of orange

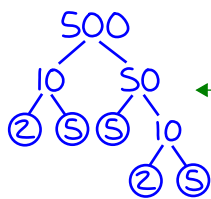$\begin{array}{r} 120 \\ +36 \\ +44 \\ \hline 2\overset{1}{0}0 \end{array}$ ← This works out that there are now 200 cans in total

$2\overline{)1^{1}2^{0}0}^{060}$ ← 120/200 of the cans are cola. Percentage is out of 100 so dividing both the numerator and denominator by 2 converts it into 60/100, so it must be 60%

........................60........................ %

(Total for Question 18 is 5 marks)

.CG Maths.

19 Write 500 as a product of powers of its prime factors.

500

10   50

2 5 5 10

2 5

Doing a factor tree for 500. Splitting each number into two factors which multiply to give it. Circling any primes and not going any further than these

Multiplying the primes which are circled gives a product of prime factors as 2 x 2 x 5 x 5 x 5. Writing this using powers. 2 x 2 = 2^2 and 5 x 5 x 5 = 5^3

$2^2 \times 5^3$

(Total for Question 19 is 3 marks)

20 (a) Work out $1\frac{3}{5} + 2\frac{1}{4}$

Give your answer as a mixed number.

$\frac{3}{5} + \frac{1}{4}$ ← First adding the fraction parts of the mixed numbers

$\frac{12}{20} + \frac{5}{20} = \frac{17}{20}$ ← Making the denominators the same so that they can be added. 20 is a common multiple of 5 and 4 so multiplying the numerator and denominator of the first fraction by 4 and the second fraction by 5 to get 20 as the denominators. Then the numerators can be added and the denominators stay the same

$1+2=3$ ← Adding the whole numbers

Combining the result of the fractions added and the whole numbers added to get a mixed number → $3\frac{17}{20}$

(2)

(b) Show that $2\frac{2}{3} \div 6 = \frac{4}{9}$

$\frac{8}{3} \div \frac{6}{1}$ ← Converted $2\frac{2}{3}$ into 8/3 by multiplying the whole number by the denominator and adding the result to the numerator. Writing 6 as a fraction

$\frac{8}{3} \times \frac{1}{6}$ ← To divide by a fraction: keep the first fraction, change the division to a multiplication, flip the second fraction

$\frac{8}{18}$ ← To multiply fractions: multiply the numerators and multiply the denominators. 8 x 1 = 8 and 3 x 6 = 18

$\frac{4}{9}$ ← Simplify the fraction to 4/9 by dividing both the numerator and denominator by 2

(2)

(Total for Question 20 is 4 marks)

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21 Simplify $(2^{-5} \times 2^8)^2$

Give your answer as a power of 2

$(2^3)^2$ ← $a^x \times a^y = a^{x+y}$. –5 + 8 = 3

$(a^x)^y = a^{xy}$. 3 x 2 = 6

2^6

(Total for Question 21 is 2 marks)

22 Work out 0.004×0.32

$\begin{array}{r} 32 \\ \times\ 4 \\ \hline 128 \end{array}$ ← Ignoring the decimals and dealing just with the significant figures

There are 3 decimal places in 0.004 and 2 decimal places in 0.32. There are 5 decimal places in total so moving the decimal point 5 times to the left

0.00128

(Total for Question 22 is 2 marks)

23 A car factory is going to make four different car models **A**, **B**, **C** and **D**.

80 people are asked which of the four models they would be most likely to buy.

The table shows information about the results.

Car model	Number of people
A	23
B	15
C	30
D	12

The factory is going to make 40 000 cars next year.

Work out how many model **B** cars the factory should make next year.

$$\frac{0\ 0\ 5\ 0\ 0}{80\overline{)4^40^40^40\ 0\ 0}}$$

Working out that the 40000 cars is 500 times greater than the sample of 80

$$\begin{array}{r} 1\ 5 \\ \times 5\ 0\ 0 \\ \hline 7\ 5\ 0\ 0 \end{array}$$

So there needs to be 500 times more of car B than in the sample

................................7500................................

(Total for Question 23 is 2 marks)

.CG Maths.

24 Rizwan writes down three numbers *a*, *b* and *c*

$$a:b = 1:3$$
$$b:c = 6:5$$

(a) (i) Find $a:b:c$

$$\begin{array}{c|c|c} a & b & c \\ 1 & 3 & \\ & 6 & 5 \\ 2 & 6 & 5 \end{array}$$

Writing both of the ratios then combining them by getting the same number of parts for b in both ratios as b is in both ratios. 6 is a common multiple of 3 and 6 so multiplying both sides of the first ratio by 2 to get 6 parts for b. Then a : b = 2 : 6 and b : c is still 6 : 5. They can be written as a : b : c as there is the same number of parts for b meaning 1 part in the first ratio is worth the same as 1 part in the second ratio

..............$2:6:5$..............

(2)

(ii) Express *a* as a fraction of the total of the three numbers *a*, *b* and *c*

$2+6+5$

Working out that there are 13 parts in total in the combined ratio which must represent the total of the three numbers a, b and c

2 out of the 13 parts are for a. So a must be 2/13 of the total

$\dfrac{2}{13}$

(2)

Emma writes down three numbers *m*, *n* and *p*

$$n = 2m$$
$$p = 5n$$

(b) Find $m:p$

$P = 5(2m)$

Substituting n for 2m in p = 5n, as n is the same as 2m. This gets an equation just in terms of m and p

$= 10m$

5 x 2m = 10m

In the equation p = 10m, m could be 1 and p could be 10 as 10 = 10 x 1

..............$1:10$..............

(2)

(Total for Question 24 is 6 marks)

.CG Maths.

25

A storage tank exerts a force of 10 000 newtons on the ground.

The base of the tank in contact with the ground is a 4 m by 2 m rectangle.

Work out the pressure on the ground due to the tank.

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

4×2 ← Area of rectangle = length x width, so the area in contact with the ground is 8m²

01250
8)1'0⁴0²0 0 ← Dividing the force in newtons by the area in m² gives the pressure in newtons/m²

..............1250.............. newtons/m²

(Total for Question 25 is 2 marks)

.CG Maths.

26 (a) Solve $\dfrac{5x}{2} + 3 > 18$

$\dfrac{5x}{2} > 15$ ← Following the order of operations (BIDMAS) backwards tells us that the addition needs to go first. Subtracting 3 from both sides eliminates the +3 from the left

$\dfrac{x}{2} > 3$ ← Next the multiplication needs to go. Dividing both sides by 5 gets rid of the 5 on the left

Then multiplying both sides by 2 gets rid of the 2 on the left to get x on its own

$x > 6$

(3)

(b) Factorise $x^2 + 10x + 9$

Two numbers which multiply to get the 9 and add to get the 10 are 1 and 9. Putting these in brackets with x

$(x+1)(x+9)$

(2)

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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