

Write your name here

Surname

Other names

Centre Number

Candidate Number

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

Mathematics

Paper 3 (Calculator)

Foundation Tier

Wednesday 8 November 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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6/6/6/7/7/2/

.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 3758 correct to the nearest 1000

The 3 is in the 1000s place. The 7 after this causes the 3 to round up to a 4. Everything after the 1000s place is then set to 0 and ignored

4000

(Total for Question 1 is 1 mark)

- 2 Simplify $y + 3y - 2y$

$1 + 3 - 2 = 2$, so $y + 3y - 2y = 2y$

2y

(Total for Question 2 is 1 mark)

- 3 Write down all the factors of 18

Listing the factors in pairs starting with the smallest and largest. $1 \times 18 = 18$ so both 1 and 18 are factors

1, 18, 2, 9, 3, 6

(Total for Question 3 is 2 marks)

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4 The table gives information about the prices of cinema tickets.

Cinema ticket	Price
adult ticket	£7.80
child ticket	£5.80
family ticket (for 4 people)	£24.30

Mr Edwards and his 3 children go to the cinema.

It is cheaper for Mr Edwards to buy 1 family ticket rather than 4 separate tickets.

(a) How much cheaper?

5.80×3 ← Multiplying the price of a child ticket by 3 works out that the cost for the 3 children is £17.40

$17.40 + 7.80$ ← Adding the price of an adult ticket to the cost for the 3 children works out that it costs £25.20 for 4 separate tickets

$25.20 - 24.30$ ← Subtracting the price of a family ticket from the cost for 4 separate tickets works out the difference, which is how much cheaper it is

£0.90

(3)

The film starts at 6.45 pm.
The film lasts 102 minutes.

(b) What time does the film finish?

$6^{\circ}45^{\circ} + 0^{\circ}102^{\circ}$ ← Adding 102 minutes to 6 hours 45 minutes on the calculator as sexagesimals

$8^{\circ}27'0''$ can be read as 8 hours 27 minutes, or 8.27 pm

8.27 pm

(2)

(Total for Question 4 is 5 marks)

- 5 Thais has a large bottle of shampoo.
There are 2 litres of shampoo in the large bottle.

Thais also has some empty small bottles.
Each small bottle can be completely filled with 150 ml of shampoo.

How many small bottles can be completely filled with shampoo from the large bottle?

2×1000 ← 1 litre = 1000 millilitres. So multiplying the 2 litres by 1000 converts it to 2000 millilitres






$2000 \div 150$ ← Dividing the 2000 millilitres in the large bottle by the 150 millilitres in each small bottle works out how many small bottles go into the large bottle

13.3... small bottles is rounded down to 13 as it is asking for how many can be completely filled so it needs to be a whole number. 14 is too many

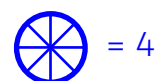
13

(Total for Question 5 is 3 marks)

- 6 The incomplete pictogram shows information about the number of cycles sold in a shop on Tuesday, on Wednesday and on Thursday.

Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	

Key:



A total of 20 cycles were sold on Tuesday, Wednesday and Thursday.

8 cycles were sold on Friday.

15 cycles were sold on Saturday.

Use this information to complete the pictogram.

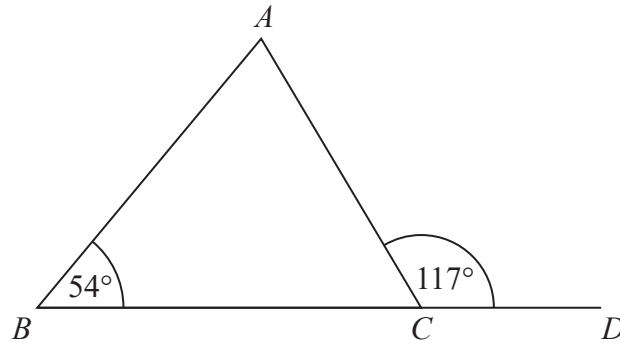
$20 \div 5$ ← There are a total of 5 symbols for Tuesday, Wednesday and Thursday. Dividing the 20 cycles by the 5 symbols works out that 1 symbol represents 4 cycles

$8 \div 4$ ← Dividing the 8 cycles on Friday by the 4 cycles represented by each symbol works out that 2 symbols are needed for Friday

$15 \div 4$ ← Dividing the 15 cycles on Saturday by the 4 cycles represented by each symbol and formatting the answer as a mixed fraction works out that $3\frac{3}{4}$ symbols are needed for Saturday

(Total for Question 6 is 5 marks)

7



BCD is a straight line.

ABC is a triangle.

Show that triangle ABC is an isosceles triangle.

Give a reason for each stage of your working.

$$180 - 117 = 63 \quad \leftarrow \text{Subtracting angle } ACD \text{ from } 180^\circ \text{ leaves angle } ACB$$

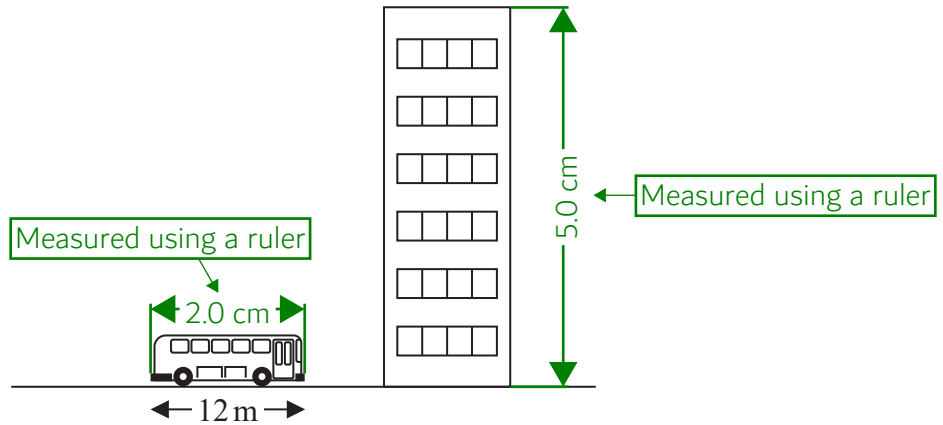
Angle $ACB = 63^\circ$ as angles around a point on a straight line add up to 180 degrees

$$180 - 54 - 63 = 63 \quad \leftarrow \text{Subtracting angles } ACB \text{ and } ABC \text{ from } 180^\circ \text{ leaves angle } BAC$$

Angle $BAC = 63^\circ$ as angles in a triangle add up to 180 degrees

So triangle ABC is isosceles as 2 angles are equal

(Total for Question 7 is 4 marks)



The picture shows a bus next to a building.
The bus has a length of 12 m.

The bus and the building are drawn to the same scale.

Work out an estimate for the height, in metres, of the building.

$$12 \div 2$$

Dividing the 12 m length of the bus by the 2 cm length of the bus on the drawing works out that 1 cm represents 6 m

$$6 \times 5$$

Multiplying the 6 m which 1 cm represents by the 5 cm height of the building on the drawing works out that the building has a height of roughly 30 m

..... 30 m

(Total for Question 8 is 2 marks)

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9 Nidah writes down two different prime numbers.

She adds together her two numbers.
Her answer is a square number less than 30

Find two prime numbers that Nidah could have written down.

1 is the first square number less than 30 but it cannot have two different prime numbers added to get it as 2 is the smallest prime number

$4 - 2 = 2$ ← 4 is the next square number less than 30. Subtracting 2 from it (the smallest prime number) works out that 2 would have to be the other number. However it says the prime numbers are different

$4 - 3 = 1$ ← Subtracting the next prime number from 4 gives 1, which is not prime

$9 - 2 = 7$ ← 9 is the next square number less than 30. Subtracting 2 from it (the smallest prime number) works out that 7 would have to be the other number, which is prime and is different to 2

Square numbers are the result of multiplying a whole number greater than 0 by itself. Prime numbers are only divisible by themselves and 1

..... 2 , 7

(Total for Question 9 is 2 marks)

10 Jim thinks of a number.

$\frac{2}{3}$ of Jim's number is 48

Work out $\frac{5}{6}$ of Jim's number.

$48 \div 2$ ← This works out that $\frac{1}{3}$ of Jim's number is 24

24×3 ← This works out that Jim's number is 72

$\frac{5}{6} \times 72$ ← Working out $\frac{5}{6}$ of Jim's number

..... 60

(Total for Question 10 is 2 marks)

11 Jack's driving school has two offers.

Offer 1
First driving lesson free
All other driving lessons normal price

Offer 2
All driving lessons
5% off the normal price

The normal price of a driving lesson is £24

Douglas is going to have 12 driving lessons.

Which is the cheaper offer for 12 driving lessons, Offer 1 or Offer 2?

You must show how you get your answer.

$$24 \times 11 = 264$$

This works out that Offer 1 costs £264 for 12 lessons. 11 are paid for as 1 of them is free. So multiplying the £24 normal price by 11

$$\frac{5}{100} \times 24$$

Putting 5% over 100 converts it to a fraction. Multiplying this fraction by £24 works out that 5% of £24 is £1.20

$$24 - 1.20$$

Subtracting the value of 5% from £24 works out that each lesson costs £22.80 using Offer 2

$$22.80 \times 12 = 273.60$$

Multiplying the cost of each lesson using Offer 2 by the 12 lessons works out that Offer 2 costs £273.60

Offer 1

£264 is less than £273.60

(Total for Question 11 is 3 marks)

12 2.5 kg of apples cost £3.60

Work out the cost of 3.5 kg of apples.

$$3.60 \div 2.5$$

Dividing the £3.60 by the 2.5 kg this gets works out that 1 kg costs £1.44

$$1.44 \times 3.5$$

Multiplying the cost of 1 kg by 3.5 works out the cost of 3.5 kg

£.....5.04.....

(Total for Question 12 is 2 marks)

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13 (a) Complete the table of values for $y = \frac{1}{2}x - 1$

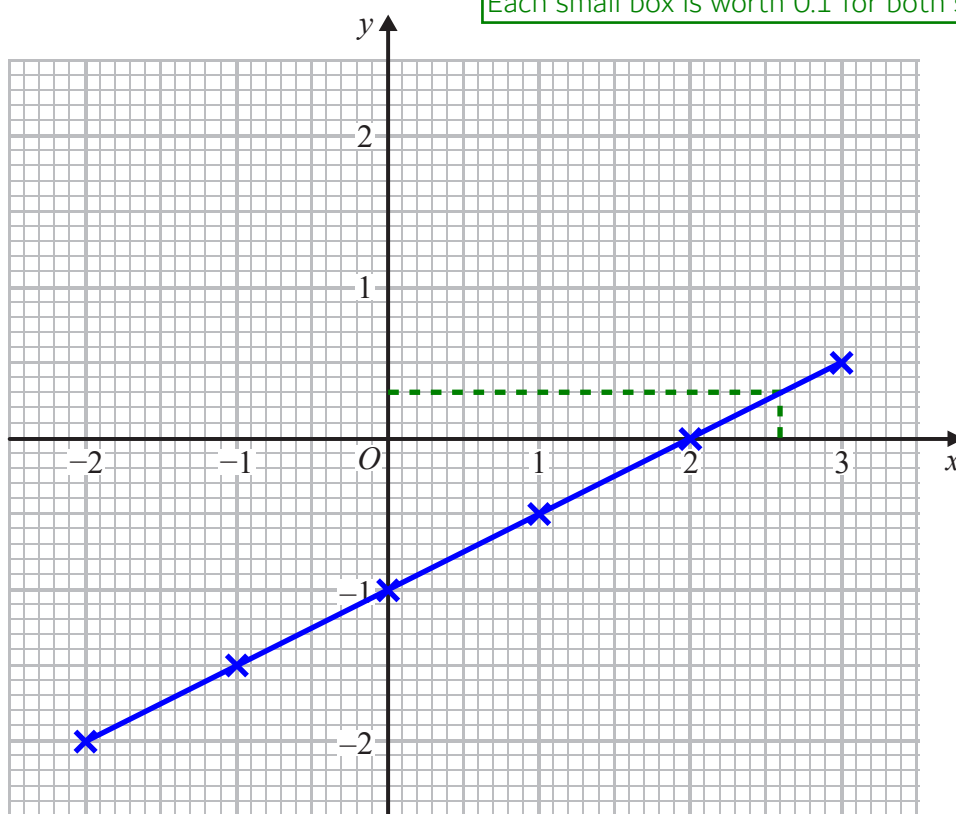
Using table mode on the calculator. Define $f(x) = 1/2 x - 1$. Start: -2. End: 3. Step: 1. This completes the table of values

x	-2	-1	0	1	2	3
y	-2	-1.5	-1	-0.5	0	0.5

(2)

(b) On the grid, draw the graph of $y = \frac{1}{2}x - 1$ for values of x from -2 to 3

Each small box is worth 0.1 for both scales



Plotting the points from the table of values then drawing a straight line through them

(2)

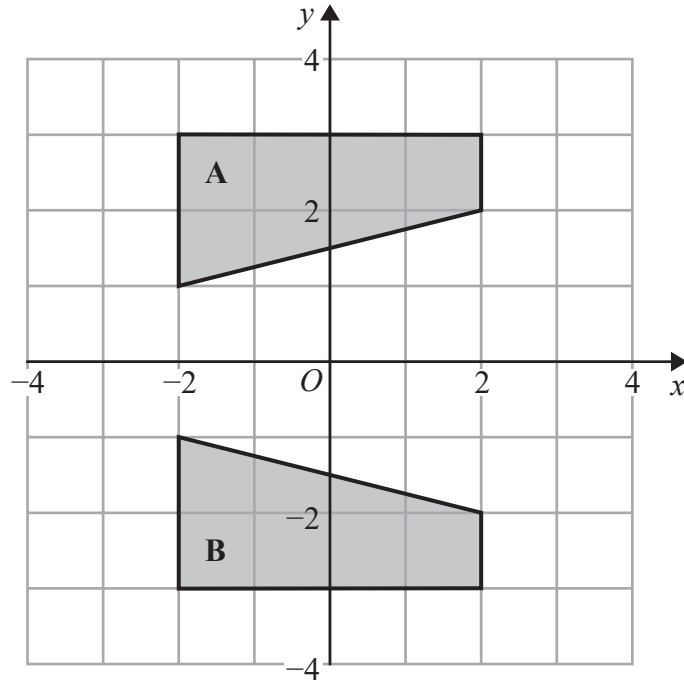
(c) Use your graph to find the value of x when $y = 0.3$

Reading across from 0.3 on the y-axis to the line then down to the x-axis

$x = 2.6$

(1)

(Total for Question 13 is 5 marks)



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

Reflection in the x-axis

B is a mirror image of A. The x-axis is halfway between shape A and B

(Total for Question 14 is 2 marks)

15 The ratio of the cost of one metre of cotton fabric to the cost of one metre of silk fabric is 2 : 5

Complete the table of costs.

- $6 \div 2$ ← Dividing the £6 by the 2 m works out that it costs £3 for 1 m of cotton fabric
- 3×6 ←
- 3×8 ← Multiplying the cost of 1 m of cotton fabric by 6, 8 and 9
- 3×9 ← works out the costs of 6 m, 8 m and 9 m of cotton fabric
- $3 \div 2$ ← Dividing the cost of 1 m of cotton fabric by the 2 parts of the ratio which represent it works out that 1 part of the ratio is worth £1.50
- 1.50×5 ← Multiplying the value of 1 part of the ratio by the 5 parts which represent the cost of 1 m of silk fabric works out that 1 m of silk fabric costs £7.50
- 7.50×2 ←
- 7.50×6 ← Multiplying the cost of 1 m of silk fabric by 2, 6, 8 and 9
- 7.50×8 ← works out the costs of 2 m, 6 m, 8 m and 9 m of silk fabric
- 7.50×9 ←

	2 m	6 m	8 m	9 m
cotton fabric	£6	£18	£24	£27
silk fabric	£15	£45	£60	£67.50

(Total for Question 15 is 3 marks)

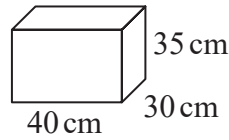
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16 Chloe has a van.

She is going to use the van to deliver boxes.
Each box is a cuboid, 40 cm by 30 cm by 35 cm.



The space for boxes in the van has

- maximum length 2.4 m
- maximum width 1.5 m
- maximum height 1.4 m

1 m = 100 cm. So multiplying all of these by 100 converts them to cm

The space for boxes is empty.
Chloe wants to put as many boxes as possible into the van.

She can put 3 boxes into the van in one minute.
Assume that the space for boxes is in the shape of a cuboid.

(a) Work out how many minutes it should take Chloe to put as many boxes as possible into the van.

$240 \div 40 = 6$ ← Dividing the maximum length of the space in cm by the length of each box works out that 6 boxes can fit along the length of the space

$150 \div 30 = 5$ ← Dividing the maximum width of the space in cm by the width of each box works out that 5 boxes can fit along the width of the space

$140 \div 35 = 4$ ← Dividing the maximum height of the space in cm by the height of each box works out that 4 boxes can fit along the height of the space

$6 \times 5 \times 4$ ← Multiplying the 6 along the length by the 5 along the width by the 4 along the height works out that 120 boxes will fit in the space

$120 \div 3$ ← Dividing the 120 boxes that can be put in the van by the 3 boxes per minute works out that it will take 40 minutes

..... 40 minutes
(4)

The space for boxes might **not** be in the shape of a cuboid.

(b) Explain how this could affect the time it would take Chloe to put as many boxes as possible into the van.

It would take less time as there would be fewer boxes

The maximum dimensions would be the same however it would be less than these in some places meaning that fewer boxes could fit in the van

(1)

(Total for Question 16 is 5 marks)

17 (a) Factorise $4m + 12$

4 is the highest common factor of $4m$ and 12 . Bringing this out as a factor, dividing both terms by 4 and leaving the result in a bracket

$$\frac{4(m + 3)}{\dots\dots\dots}$$

(1)

expression	equation	formula	identity
inequality	term	factor	multiple

(b) Choose two words from the box above to make this statement correct.

$5y$ is a **term** in the **expression** $3x + 5y$

(2)

(Total for Question 17 is 3 marks)

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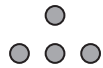
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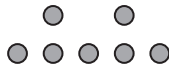
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18 Here is a sequence of patterns made with counters.



pattern number 1



pattern number 2



pattern number 3

(a) Find an expression, in terms of n , for the number of counters in pattern number n .

The number of counters increases by 3 between each pattern so it must involve $3n$. Going backward in the sequence finds that pattern 0 would have 1 counter. So the expression is $3n + 1$

$$3n + 1$$

(2)

Bayo has 90 counters.

(b) Can Bayo make a pattern in this sequence using all 90 of his counters?
You must show how you get your answer.

$3n + 1 = 90$ ← Setting the expression for the number of counters in pattern n equal to the 90 counters

$3n = 89$ ← Subtracting 1 from both sides eliminates the +1 on the left and gets the n term on its own

$n = 29.\dot{6}$ ← Dividing both sides by 3 eliminates the 3 on the left and gets n on its own

No ← n is the pattern number and it is not a whole number, which it needs to be for it to be a pattern in the sequence

(2)

(Total for Question 18 is 4 marks)

19 The table shows information about the heights of 80 children.

Height (h cm)	Frequency
$130 < h \leq 140$	4
$140 < h \leq 150$	11
$150 < h \leq 160$	24
$160 < h \leq 170$	22
$170 < h \leq 180$	19

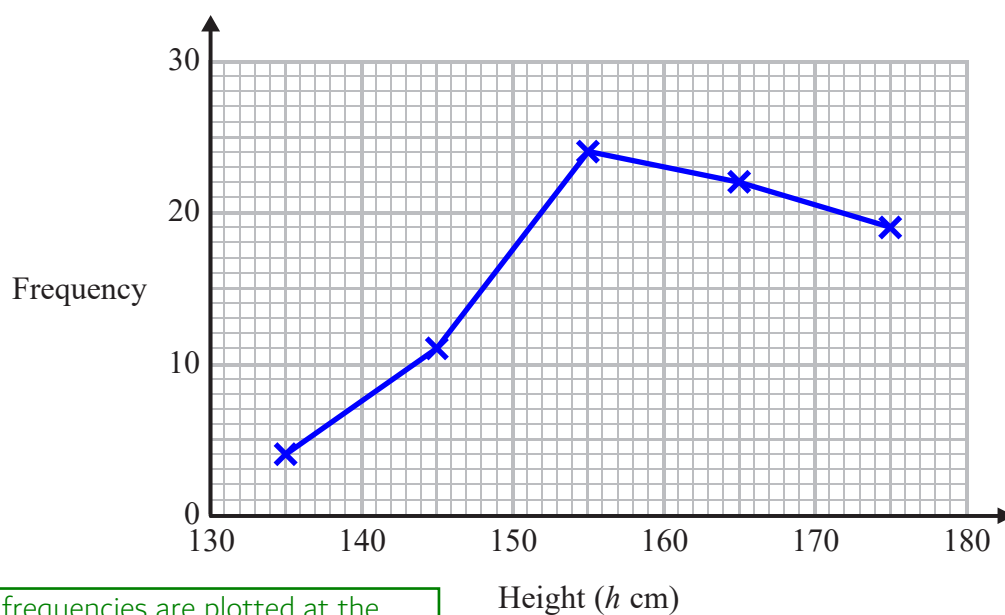
(a) Find the class interval that contains the median.

Method is on the next page

$$160 < h \leq 170$$

(1)

(b) Draw a frequency polygon for the information in the table.



The frequencies are plotted at the midpoint of each class interval then joined up with a series of straight lines

(2)

(Total for Question 19 is 3 marks)

$$\frac{80 + 1}{2}$$

The median can be found by putting all the children in order of height then finding the child in the middle. Doing the mean of child 1 and child 80 works out that child 40.5 is the median. This is halfway between the 40th and 41st

$$40.5 - 4$$

Subtracting the first 4 children in $130 < h \leq 140$ from the 40.5 works out that there is another 36.5 children to count to get to the median

$$36.5 - 11$$

Subtracting the next 11 children in $140 < h \leq 150$ from the 36.5 left to count works out that there is another 25.5 children to count to get to the median

$$25.5 - 24$$

Subtracting the next 24 children in $150 < h \leq 160$ from the 25.5 left to count works out that there is another 1.5 children to count to get to the median

The 22 children in $160 < h \leq 170$ is more than the 1.5 children left to count so the median must be in this interval

- 20 In London, 1 litre of petrol costs 108.9p
In New York, 1 US gallon of petrol costs \$2.83

1 US gallon = 3.785 litres
£1 = \$1.46

In which city is petrol better value for money, London or New York?
You must show your working.

$2.83 \div 1.46$ ← Every \$1.46 is £1. So dividing the \$2.83 by \$1.46 converts it to £1.93...

$1.93... \times 100$ ← £1 = 100p. So multiplying the £1.93... by 100 converts it to 193.8...p

$193.8... \div 3.785 = 51.2...$ ← 193.8...p gets 1 US gallon, which is 3.785 litres. So dividing the 193.8...p by 3.785 works out that the cost of 1 litre from New York is 51.2...p

New York ← 51.2...p for 1 litre is less than 108.9p for 1 litre

(Total for Question 20 is 3 marks)

- 21 A gold bar has a mass of 12.5 kg.

The density of gold is 19.3 g/cm^3

Work out the volume of the gold bar.
Give your answer correct to 3 significant figures.

d^m_v ← Writing a formula triangle for density, mass, volume

12.5×1000 ← The mass needs to be in g as this is involved in the g/cm^3 . $1 \text{ kg} = 1000 \text{ g}$.
So multiplying the 12.5 kg by 1000 converts it to 12500 g

$12500 \div 19.3$ ← Covering v in the formula triangle finds that volume = mass \div density

647.6... is given to 3 significant figures

..... 648 cm^3

(Total for Question 21 is 3 marks)

22 There are only blue pens, green pens and red pens in a box.

The ratio of the number of blue pens to the number of green pens is 2 : 5

The ratio of the number of green pens to the number of red pens is 4 : 1

There are less than 100 pens in the box.

What is the greatest possible number of red pens in the box?

B G R
2 5
 4 1
8 20 5

Green is described by both ratios so making the same number of parts for green. 20 is a common multiple of 5 and 4. Multiplying both sides of the 2 : 5 by 4 and multiplying both sides of the 4 : 1 by 5 gets 20 parts for green. The ratios can then be combined into one ratio for all the colours

$8 + 20 + 5$

The ratio cannot be simplified. Adding all the parts in the ratio works out that the smallest possible number of pens is 33

$100 \div 33$

Dividing the 100 pens by the smallest number of pens works out that there can be 3 lots of the smallest number of pens and still be less than 100 pens

5×3

If there are 3 lots of the total number of pens there will be 3 lots of the red pens

15

(Total for Question 22 is 3 marks)

23 (a) Find the value of the reciprocal of 1.6

Give your answer as a decimal.

$\frac{1}{1.6}$

Reciprocal means to do 1 divided by or flip the fraction

0.625

(1)

Jess rounds a number, x , to one decimal place.

The result is 9.8

(b) Write down the error interval for x .

$9.8 \pm \frac{0.1}{2}$

Adding and subtracting half of the resolution works out the upper and lower bound. The resolution is 0.1 as this is what the 1st decimal place goes up in

9.75 is the lowest it can be and still round to 9.8 to one decimal place. If it reaches 9.85 this is too high as it will round to 9.9 to one decimal place

$9.75 \leq x < 9.85$

(2)

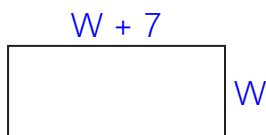
(Total for Question 23 is 3 marks)

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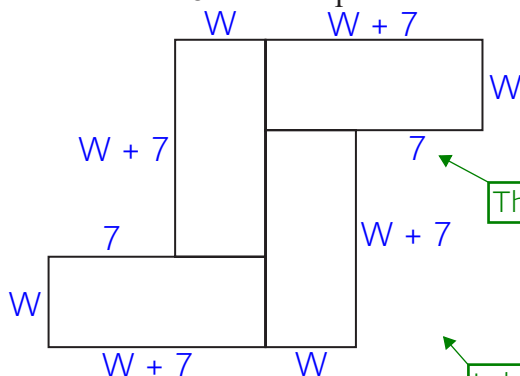
24 Here is a rectangle.



Labelling the width as W. The length is W + 7 as it is 7 cm longer than the width

The length of the rectangle is 7 cm longer than the width of the rectangle.

4 of these rectangles are used to make this 8-sided shape.



This length is 7 cm as it is W + 7 - W

Labelling all the sides in terms of W

The perimeter of the 8-sided shape is 70 cm.

Work out the area of the 8-sided shape.

$8W + 42 = 70$

Adding all the outside sides of the 8-sided shape in terms of W finds that the perimeter is $8W + 42$ cm, which must be equal to the 70 cm

$8W = 28$

Subtracting 42 from both sides eliminates the +42 on the left and gets the W term on its own

$W = 3.5$

Dividing both sides by 8 eliminates the 8 on the left and gets W on its own. So the width of the rectangle is 3.5 cm

$3.5 + 7$

The length is 7 cm more than the width so the length of the rectangle is 10.5 cm

10.5×3.5

Area of rectangle = length \times width

36.75×4

The 8-sided shape is made of 4 rectangles so multiplying the area of one of the rectangles by 4 works out the area of the 8-sided shape

..... 147 cm²

(Total for Question 24 is 5 marks)

25 Work out $(13.8 \times 10^7) \times (5.4 \times 10^{-12})$
Give your answer as an ordinary number.

7.452×10^{-4} ← Typing it into the calculator exactly as it is above gives this

$\times 10^{-4}$ means to divide by ten 4 times. So moving the decimal point 4 times to the left

0.000752

(Total for Question 25 is 2 marks)

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26 When a drawing pin is dropped it can land point down or point up.

Lucy, Mel and Tom each dropped the drawing pin a number of times.

The table shows the number of times the drawing pin landed point down and the number of times the drawing pin landed point up for each person.

	Lucy	Mel	Tom
point down	31	53	16
point up	14	27	9

Rachael is going to drop the drawing pin once.

- (a) Whose results will give the best estimate for the probability that the drawing pin will land point up?
Give a reason for your answer.

Mel as she dropped the pin the most times

The more times it is dropped, the more reliable the estimate of the probability is

(1)

Stuart is going to drop the drawing pin twice.

- (b) Use all the results in the table to work out an estimate for the probability that the drawing pin will land point up the first time and point down the second time.

$$31 + 53 + 16 = 100$$

← Adding together the point down for Lucy, Mel and Tom works out that there were 100 point down in total

$$14 + 27 + 9 = 50$$

← Adding together the point up for Lucy, Mel and Tom works out that there were 50 point up in total

$$100 + 50$$

← Adding the 100 point down and 50 point up works out that there were 150 drops in total

$$\frac{50}{150} \times \frac{100}{150}$$

← Point up AND point down. AND means to multiply the probabilities. 50 out of the 150 drops were point up and 100 out of the 150 drops were point down

$$\frac{2}{9}$$

(2)

(Total for Question 26 is 3 marks)

27 Solve the simultaneous equations

$$x + 3y = 12 \leftarrow \text{1st equation}$$

$$5x - y = 4 \leftarrow \text{2nd equation}$$

$$5x + 15y = 60$$

Multiplying the 1st equation by 5 to get the same number of x as the 2nd equation. This forms the 3rd equation

$$16y = 56$$

Subtracting the 2nd equation from the 3rd equation cancels out the x terms and gets an equation just in terms of y. Dividing both sides by 16 finds that $y = 3.5$

$$x + 3(3.5) = 12$$

Substituting 3.5 for x in the 1st equation. Then subtracting $3(3.5)$ from both sides finds that $x = 1.5$

$$x = \dots\dots\dots 1.5$$

$$y = \dots\dots\dots 3.5$$

(Total for Question 27 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

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