

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 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

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 7 after the 3 in the thousands place causes it to round up to a 4. All digits after the thousands are ignored and are set to 0

4000

(Total for Question 1 is 1 mark)

2 Simplify $y + 3y - 2y$

$$\begin{aligned} y + 3y &= 4y \\ 4y - 2y &= 2y \end{aligned}$$

2y

(Total for Question 2 is 1 mark)

3 Write down all the factors of 18

Listing them 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?

$$7.80 + 3 \times 5.80 - 24.30$$

Working out the total cost of 1 adult and 3 children

Subtracting the cost of a family ticket to work out the difference in price

10.90

(3)

The film starts at 6.45 pm.

The film lasts 102 minutes.

(b) What time does the film finish?

FACT B On the calculator, type $6^{\circ}45' + 0^{\circ}102'$.
 Press the button on the left to get the °

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?

$$2000 \div 150$$






Convert the 2 litres into millilitres so the units are the same.
There are 1000ml in 1L so $2 \times 1000 = 2000$ ml. Dividing by 150 works out how many lots of 150ml go into the 2000ml

The answer of 13.3 is rounded down as the bottles need to be completely filled

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:

$$\bigcirc = 4$$

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.

$$20 \div (1 + 2.5 + 1.5)$$

This works out that 1 of the circles represent 4 cycles by dividing the 20 cycles by the total number of circles for Tuesday, Wednesday and Thursday

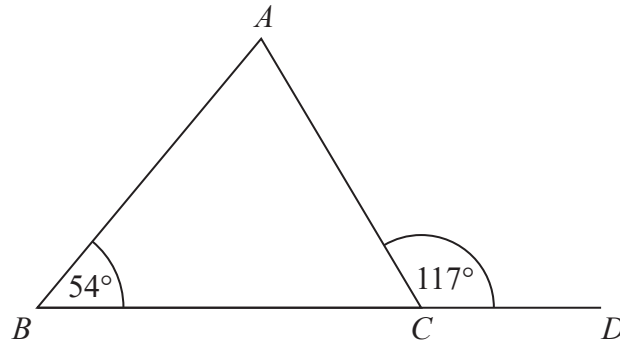
$$8 \div 4 = 2$$

$$15 \div 4 = 3 \frac{3}{4}$$

Working out how many circles are needed for Friday and Saturday

(Total for Question 6 is 3 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.

$$180 - 117 = 63$$

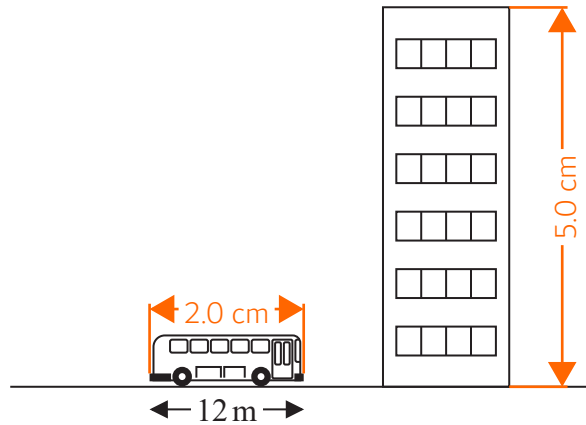
Angle ACB is 63° as angles around a point on a straight line add up to 180 degrees.

$$180 - 54 - 63 = 63$$

Angle BAC is 63° as angles in a triangle add up to 180 degrees.

Therefore 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.

$$\frac{12}{2} \times 5$$

Dividing 12m by 2 to work out the worth of 1cm on the diagram then multiplying by 5 to find the worth of 5cm

..... 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.

$$\begin{aligned} 2 + 3 &= 5 \\ 2 + 5 &= 7 \\ 2 + 7 &= 9 \end{aligned}$$

2 is the smallest prime number. Trying adding different prime numbers to it (starting with the smallest) until we get a square number

..... 2 , 7

(Total for Question 9 is 2 marks)

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10 Jim thinks of a number.

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

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

$$\frac{2}{3}x = 48$$

Let x be Jim's number. 'Of' means to multiply

$$x = 48 \div \frac{2}{3} = 72$$

Rearranging to find x works out Jim's number

$$\frac{5}{6} \times 72$$

'Of' means to multiply

..... 60

(Total for Question 10 is 2 marks)

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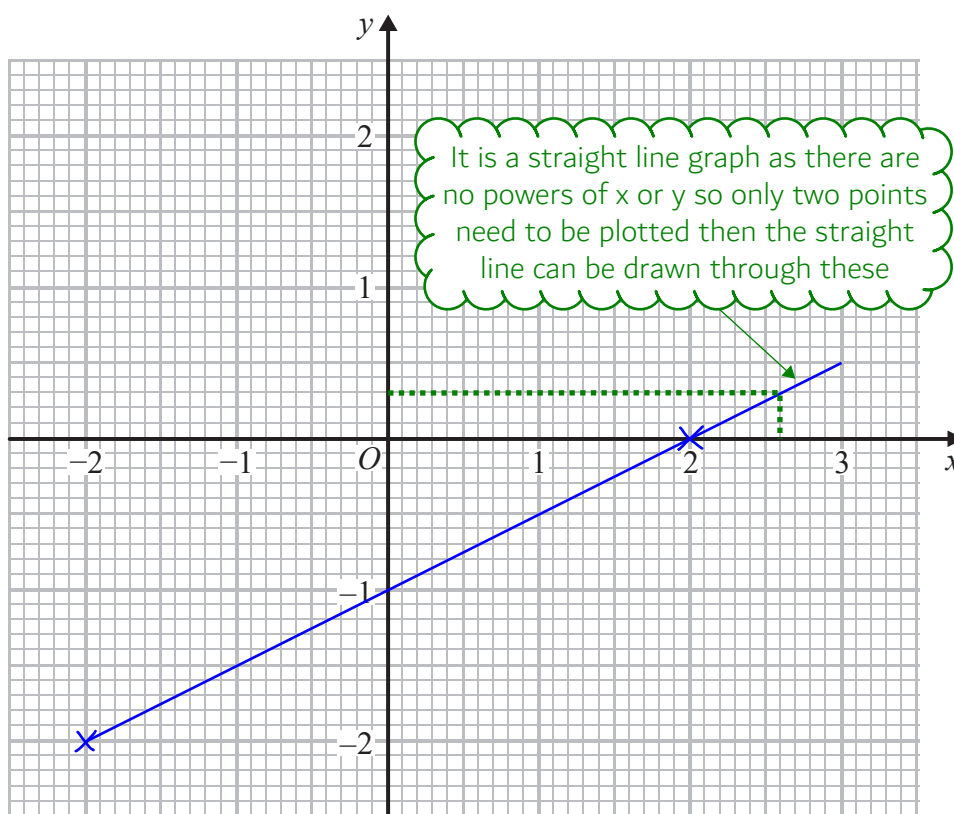
13 (a) Complete the table of values for $y = \frac{1}{2}x - 1$

Using table mode (press Menu then 3), type $f(x) = 1/2 x - 1$. Ignore $g(x)$ then set Start to -2, End to 3 and Step to 1. We then get a completed table

| | | | | | | |
|---|----|------|----|------|---|-----|
| 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



(2)

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

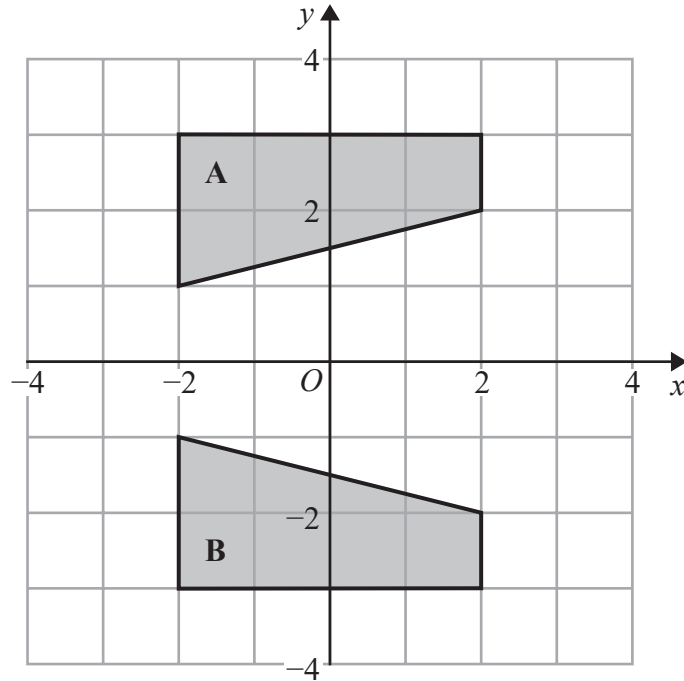
$$x = \dots\dots\dots 2.6 \dots\dots\dots$$

(1)

(Total for Question 13 is 5 marks)

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

Reflection in the x axis

(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.

$$\frac{6}{2} \times 5$$

Dividing by 2 works out the worth of 1 part of the ratio then multiplying by 5 works out the worth of 5

8m is 4 times 2m so multiply the costs by 4

6m is 3 times 2m so multiply the costs by 3

9m is 4.5 times 2m so multiply the costs by 4.5

| | 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)

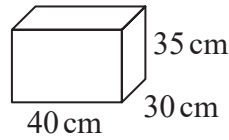
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16 Chloe has a van.

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

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.

2.4m is 240cm as there are 100cm in a metre. Dividing by 40cm works out how many lots of the boxes can fit along the maximum length

1.5m is 150cm. Dividing by 30cm works out how many lots of the boxes can fit along the maximum width

1.4m is 140cm. Dividing by 35cm works out how many lots of the boxes can fit along the maximum height

$$\frac{240}{40} \times \frac{150}{30} \times \frac{140}{35}$$

Multiplying all of these together gives the total amount of boxes which can fit in the van

Dividing by 3 works out how many lots of 3 boxes there are. Every lot of 3 takes 1 minute

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 might take less time if there is less space as there will be fewer boxes

(1)

(Total for Question 16 is 5 marks)

17 (a) Factorise $4m + 12$

4 is the highest common factor of 4 and 12 so it is brought out as a factor. There are no common factors for the letters

$$4(m+3)$$

(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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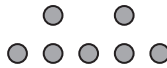
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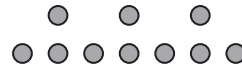
18 Here is a sequence of patterns made with counters.



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 each time so the expression must begin with $3n$. The first term of $3n$ is 3 and 1 needs to be added to this to get the 4 counters in pattern 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.

$$3n + 1 = 90$$

Set the expression equal to 90 so we can work out what pattern number n would have 90 counters

$$n = \frac{89}{3}$$

Rearranging works out that n would be $89/3$, which is not a whole number so will not be a term in the sequence

No

(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 |

Working out the cumulative frequencies. Once it goes above 40.5, that category contains the median

4
15
39
61

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

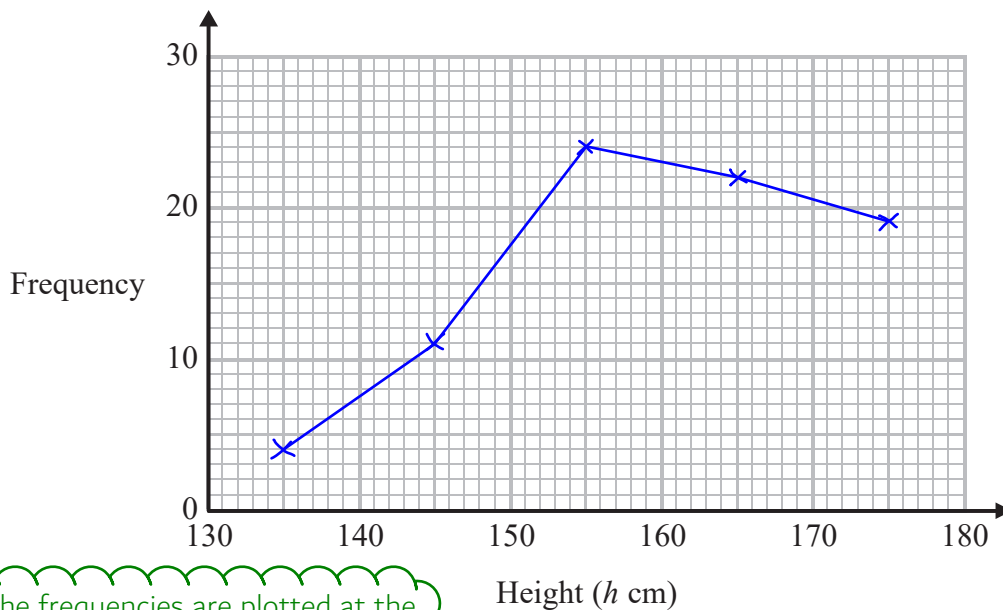
$$\frac{80+1}{2} = 40.5$$

Using the formula $(n + 1)/2$ works out that the median is halfway between the 40th and 41st value

$$160 < h \leq 170$$

(1)

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



The frequencies are plotted at the midpoint of each class interval

(2)

(Total for Question 19 is 3 marks)

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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.

$$\frac{(2.83)}{1.46} \times 100 = 51$$

$$\frac{2.83}{3.785}$$

Every \$1.46 is £1 so dividing \$2.83 by \$1.46 converts it into pounds. Dividing the result by 3.785 finds the price of 1 litre from New York in pounds. Multiplying the result by 100 converts the pounds into pence so it can be compared to the London price per litre

New York

As the cost per litre in New York is just over 51p and this is less than the 108.9p per litre in London

(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/cm³

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

$$d \quad m \quad v$$

$$\frac{12.5 \times 1000}{19.3}$$

From the formula triangle for density, mass and volume, volume = mass/density

There are 1000g in 1kg so multiplying the mass by 1000 converts it into grams. This needs to be done as the unit of density is in terms of grams, not kilograms

.....648..... cm³

(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 |

Both ratios have green in common. A common multiple of 5 and 4 is 20 so multiplying the 2:5 by 4 and the 4:1 by 5 makes the ratios both have 20 parts for green and therefore they can be combined

$$\frac{100}{33} \approx 3$$

The combined ratio of 8:20:5 can't be simplified so the fewest total amount of pens is 33 as there are 33 parts in total in the ratio (8 + 20 + 5). If there were 100 pens in the box, just over 3 lots of 33 would go into it. As there are less than 100, it gets rounded down to 3 lots of 33

$$5 \times 3$$

As the total amount of pens is multiplied by 3 (to get 99 pens in total in the box) the number of red pens needs to be multiplied by 3 to keep the same ratio of pen colours

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.

$$\boxed{1/1.6}$$

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 .

The resolution of one decimal place is 0.1. Dividing this by 2 gives 0.05. Adding and subtracting this from 9.8 gives the upper and lower bounds for x

$$9.75 \leq x < 9.85$$

(2)

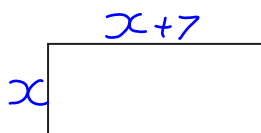
(Total for Question 23 is 3 marks)

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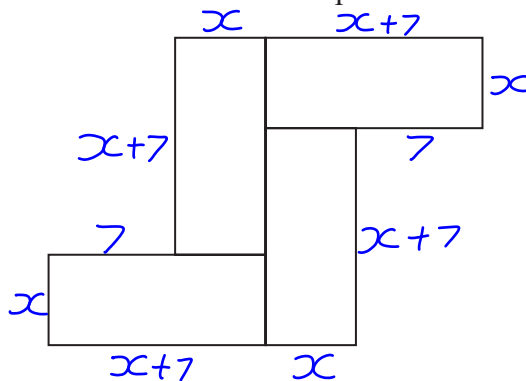
24 Here is a rectangle.



We don't know the width of the rectangle so we can label this as x . The length is 7cm longer than this so it is $x + 7$

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.



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

Work out the area of the 8-sided shape.

$$8x + 42 = 70$$

Adding together all of the sides gives the perimeter in terms of x . This is equal to 70cm

$$8x = 28$$

Subtracting 42 from both sides

$$x = 3.5$$

Dividing both sides by 8

$$3.5 + 7 = 10.5$$

The width of each rectangle is 3.5cm. Adding 7cm finds the length of each rectangle

$$3.5 \times 10.5 \times 4$$

Area of one of the rectangles is length \times width. There are 4 of these rectangles so the area of one is multiplied by 4

..... 147 cm^2

(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.

Typing it into the calculator gives 7.452×10^{-4}

Divide 7.452 by ten 4 times to
convert into an ordinary number

.....0.0007452

(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

(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.

$$31 + 53 + 16 = 100$$

$$14 + 27 + 9 = 50$$

$$100 + 50 = 150$$

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

Adding together the total amount of point down and point up results

Working out how many results there are altogether

Point up AND point down, so the probabilities should be multiplied together. The fraction of results which were point up multiplied by the fraction of results which were point down

$\frac{2}{9}$

(2)

(Total for Question 26 is 3 marks)

27 Solve the simultaneous equations

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

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

$$5x + 15y = 60$$

Multiply equation 1 by 5 to get the same magnitude of x as equation 2. This is equation 3

$$16y = 56$$

Subtract equation 2 from equation 3 to eliminate the x terms

$$y = 3.5$$

Divide both sides by 16 to find y

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

Substitute y for 3.5 in equation 1 then subtract $3(3.5)$ from both sides to find x

$$x = \dots 1.5 \dots$$

$$y = \dots 3.5 \dots$$

(Total for Question 27 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

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