

Write your name here

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Level 1/Level 2 GCSE (9–1)

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Mathematics

Paper 1 (Non-Calculator)

Foundation Tier

Thursday 24 May 2018 – Morning

Time: 1 hour 30 minutes

Paper Reference

1MA1/1F

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
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.
- 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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.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 6324 correct to the nearest thousand.

The 6 is in the thousands place. The 3 in the next place causes the 6 to stay the same and all other digits become 0 (rounding down to 6000)

6000

(Total for Question 1 is 1 mark)

- 2 (a) Write the following numbers in order of size.
Start with the smallest number.

-6 6 -5 0 12

The more negative or less positive a number, the smaller the number is. Negative numbers are smaller than positive numbers

-6, -5, 0, 6, 12

(1)

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

0.078 0.780 0.870 0.708

Writing all the numbers to the same number of decimal places makes them easier to compare

0.078, 0.708, 0.78, 0.87

(1)

(Total for Question 2 is 2 marks)

- 3 Write 20% as a fraction.

Percent means out of 100

$\frac{20}{100}$

(Total for Question 3 is 1 mark)

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4 Here is a list of four fractions.

$$\frac{4}{16} \qquad \frac{2}{8} \qquad \frac{15}{60} \qquad \frac{3}{9}$$

One of these fractions is **not** equivalent to $\frac{1}{4}$

Write down this fraction.

To simplify the fractions, divide the numerator and denominator by the same number. They all simplify to $\frac{1}{4}$ apart from $\frac{3}{9}$, which simplifies to $\frac{1}{3}$

$\frac{3}{9}$

(Total for Question 4 is 1 mark)

5 Write down the first even multiple of 7

7, 14 ← Counting in 7s lists the multiples of 7. Even numbers are divisible by 2 and end 0, 2, 4, 6 or 8

14

(Total for Question 5 is 1 mark)

6 (a) Simplify $3 \times 4t$

$3 \times 4 = 12$. Writing t next to this means that it is multiplied

$12t$

(1)

(b) Simplify $8a - 3a + 2a$

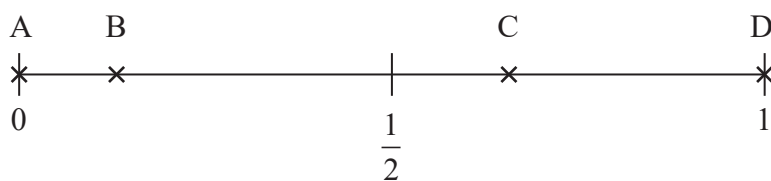
Collecting like terms. $8 - 3 + 2 = 7$ so $8a - 3a + 2a = 7a$

$7a$

(1)

(Total for Question 6 is 2 marks)

- 7 Here is a probability scale.
It shows the probability of each of the events A, B, C and D.



- (a) Write down the letter of the event that is certain.

The probability of anything which is certain is 1

D
(1)

- (b) Write down the letter of the event that is unlikely.

Less than $\frac{1}{2}$ but more than 0

B
(1)

There are 12 counters in a bag.

- 3 of the counters are red.
- 1 of the counters is blue.
- 2 of the counters are yellow.
- The rest of the counters are green.

Caitlin takes at random a counter from the bag.

- (c) Show that the probability that this counter is yellow or green is $\frac{2}{3}$

$3 + 1 + 2$ ← Adding the 3 red, 1 blue and 2 yellow works out that there are 6 which are not green

$12 - 6$ ← Subtracting the 6 which are not green from the 12 counters leaves 6 which are green

$6 + 2$ ← Adding the 2 yellow to the 6 green works out that 8 are yellow or green

$\frac{8}{12} = \frac{2}{3}$ ← Expressing the 8 which are yellow or green as a fraction of the 12 counters.
Simplifying the fraction by dividing both the numerator and denominator by 4

(3)

(Total for Question 7 is 5 marks)

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- 8 3 kg of meat costs £54
Nina buys 2 kg of the meat.

Work out how much Nina pays.

$$\begin{array}{r} 18 \\ 3 \overline{)54} \\ \underline{36} \\ 18 \\ \underline{18} \\ 0 \end{array}$$

← Dividing the £54 by the 3 kg works out that 1kg costs £18

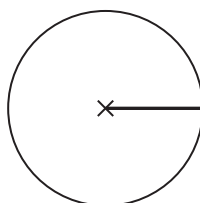
$$\begin{array}{r} 18 \\ \times 2 \\ \hline 36 \end{array}$$

← Multiplying the cost of 1 kg by 2 works out that the cost of 2 kg is £36

£ 36

(Total for Question 8 is 2 marks)

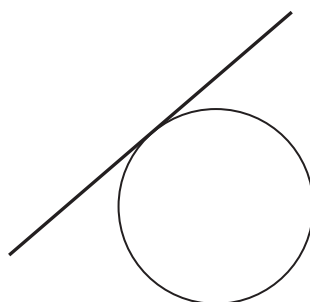
- 9 The centre of this circle is marked with a cross (×).



- (a) Write down the mathematical name of the straight line shown in the circle.

..... Radius
(1)

- (b) Write down the mathematical name of the straight line that is touching the circle.



..... Tangent
(1)

(Total for Question 9 is 2 marks)

10 Tim and three friends go on holiday together for a week.

The 4 friends will share the costs of the holiday equally.

Here are the costs of the holiday.

£1280 for 4 return plane tickets

£640 for the villa

£220 for hire of a car for the week

Work out how much Tim has to pay for his share of the costs.

$$\begin{array}{r} 1280 \\ + 640 \\ + 220 \\ \hline 2140 \end{array}$$

← Adding the costs works out that the total cost of the holiday is £2140

$$4 \overline{) 2140} \begin{array}{r} 535 \\ \underline{20} \\ 14 \\ \underline{12} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

← Dividing the total cost by the 4 friends works out that Tim has to pay £535

£ 535

(Total for Question 10 is 3 marks)

11 Write down an example to show that each of the following two statements is **not** correct.

(a) The factors of an even number are always even.

2 is even and 1 is an odd factor

1 is a factor of 2

(1)

(b) All the digits in odd numbers are odd.

21 is an odd number but the digit 2 is even

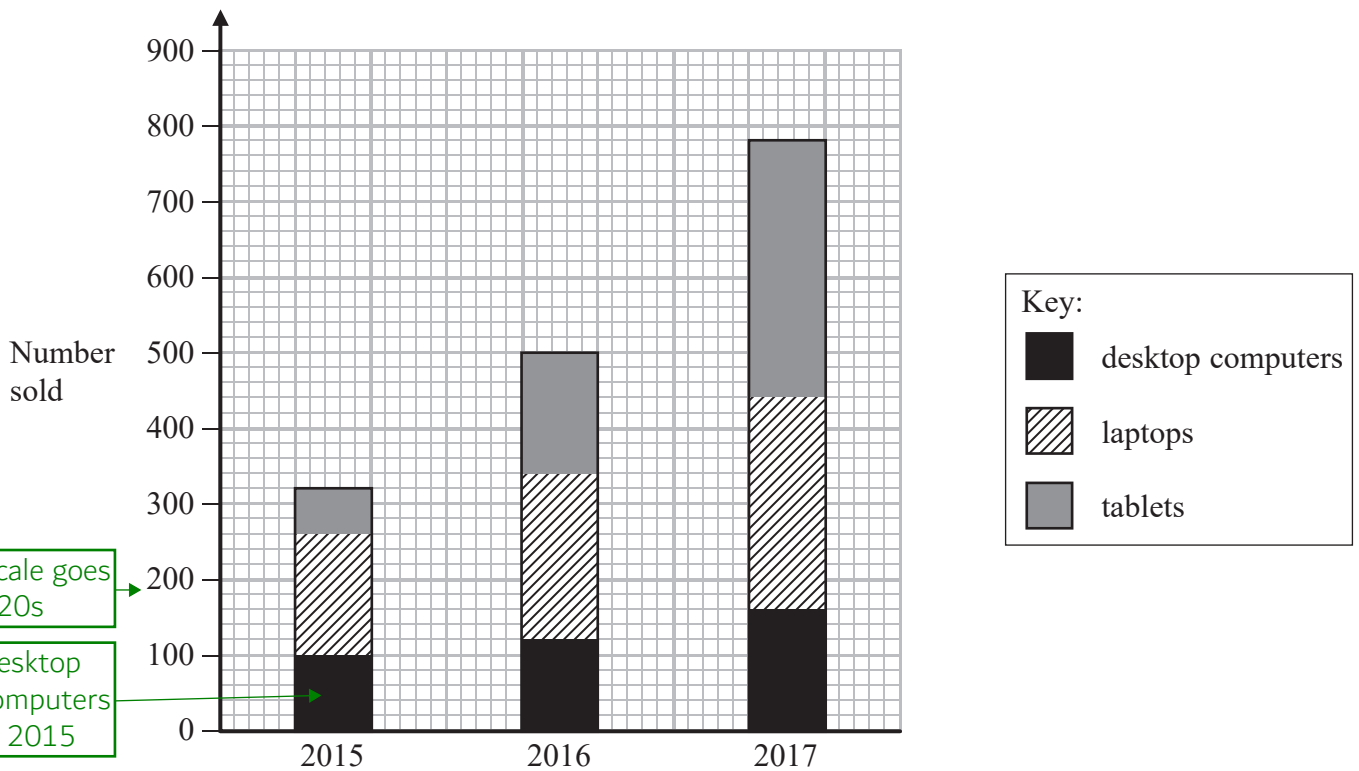
21

(1)

(Total for Question 11 is 2 marks)

12 A shop sells desktop computers, laptops and tablets.

The composite bar chart shows information about sales over the last three years.



The scale goes up in 20s

Desktop computers in 2015

(a) Write down the number of desktop computers sold in 2015

100
(1)

(b) Work out the total number of laptops sold in the 3 years.

$$260 - 100 = 160 \leftarrow \text{Laptops in 2015. The bar goes from 100 to 260}$$

$$340 - 120 = 220 \leftarrow \text{Laptops in 2016. The bar goes from 120 to 340}$$

$$440 - 160 = 280 \leftarrow \text{Laptops in 2017. The bar goes from 160 to 440}$$

$$660 \leftarrow \text{Adding the laptops in all three years gives the total}$$

660
(3)

(c) State the item that had the greatest increase in sales over the 3 years.

Give a reason for your answer.

Tablets, as they grew by 280. Desktop computers grew by 60. Laptops grew by 120

60 tablets were sold in 2015. 340 were sold in 2017. $340 - 60 = 280$

100 desktops were sold in 2015. 160 were sold in 2017. $160 - 100 = 60$

160 laptops were sold in 2015. 280 were sold in 2017. $280 - 160 = 120$

(2)

Alex says,

“In 2017, more tablets were sold than desktop computers. This means the shop makes more profit from the sale of tablets than from the sale of desktop computers.”

(d) Is Alex correct?

You must justify your answer.

No as we don't know the profit of each item

For example, there may be no profit on the tablets as the shop may sell them on special offer to attract more customers

(1)

(Total for Question 12 is 7 marks)

13 A piece of wire is 240 cm long.

Peter cuts two 45 cm lengths off the wire.

He then cuts the rest of the wire into as many 40 cm lengths as possible.

Work out how many 40 cm lengths of wire Peter cuts.

$$\begin{array}{r} 45 \\ + 45 \\ \hline 90 \end{array}$$

Adding two lots of the 45 cm works out that 90 cm is cut off in total

$$\begin{array}{r} 240 \\ - 90 \\ \hline 150 \end{array}$$

Subtracting the 90 cm cut off from the 240 cm works out that there is 150 cm left over

$$40 \overline{)150} \begin{array}{l} 003 \\ \hline \end{array}$$

Dividing the 150 cm left over by the 40 cm lengths works out that there can be 3 whole 40 cm lengths with a remainder of 30 cm

$$40, 80, 120$$

Listing the 40 times table helps with the division

3

(Total for Question 13 is 3 marks)

14 Gavin, Harry and Isabel each earn the same monthly salary.

Each month,

Gavin **saves** 28% of his salary and spends the rest of his salary

Harry spends $\frac{3}{4}$ of his salary and **saves** the rest of his salary

the amount of salary Isabel saves : the amount of salary she spends = 3 : 7

Work out who saves the most of their salary each month.

You must show how you get your answer.

$$4 \overline{) 11020} \begin{array}{r} 025 \\ \underline{40} \\ 1020 \\ \underline{80} \\ 220 \\ \underline{20} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

The rest of Harry's salary is $\frac{1}{4}$, so this is the fraction saved. To convert a fraction to a percentage it can be multiplied by 100. Doing $\frac{1}{4}$ of 100 does this. So Harry saves 25%

$$\frac{3}{10} = \frac{30}{100} = 30\%$$

$3 + 7 = 10$ parts in total in the ratio. 3 out of the 10 parts are saved so $\frac{3}{10}$ is saved. Multiplying both the numerator and denominator by 10 gives $\frac{30}{100}$. So Isabel saves 30% as percentage is out of 100

Isabel

30% saved by Isabel is more than 28% saved by Gavin and 25% saved by Harry

(Total for Question 14 is 4 marks)

15 Work out 15% of 160 grams.

$$160 \div 10 = 16$$

Dividing 160 grams by 10 works out that 10% of 160 grams is 16 grams

$$16 \div 2$$

Dividing the value of 10% by 2 works out that 5% of 160 grams is 8 grams

$$16 + 8$$

Adding the value of 10% and 5% works out 15%

..... 24 grams

(Total for Question 15 is 2 marks)

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16 $P = 4x + 3y$

$x = 5$

$y = -2$

(a) Work out the value of P .

$4(5) + 3(-2)$ ← Substituting 5 for x and -2 for y in the right side. P is equal to this

$20 - 6$ ← $4(5) = 20$ and $3(-2) = -6$

14

(2)

(b) Expand $4e(e + 2)$

$4e \times e = 4e^2$ and $4e \times 2 = 8e$

$4e^2 + 8e$

(2)

(c) Solve $3(m - 4) = 21$

$m - 4 = 7$ ← Dividing both sides by 3 eliminates the 3 on the left. The brackets are no longer needed

Adding 4 to both sides eliminates the -4 on the left and gets m on its own

$m = 11$

(2)

(Total for Question 16 is 6 marks)

17 There are some chocolates in a box.

$\frac{1}{4}$ of the chocolates contain nuts.

The rest of the chocolates do not contain nuts.

Write down the ratio of the number of chocolates that contain nuts to the number of chocolates that do not contain nuts.

Give your answer in the form $1 : n$

$$\frac{1}{4} : \frac{3}{4}$$

← $\frac{1}{4}$ contain nuts so $\frac{3}{4}$ do not contain nuts

Multiplying both sides of the ratio by 4 eliminates the denominators and gets 1 part on the left

$$1 : 3$$

(Total for Question 17 is 2 marks)

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18 $A = \{\text{multiples of 5 between 14 and 26}\}$ 15, 20, 25 ← Members of set A

$B = \{\text{odd numbers between 14 and 26}\}$ 15, 17, 19, 21, 23, 25 ← Members of set B

(a) List the members of $A \cup B$

A or B or both

Listing the members of A and the members of B. Not repeating any numbers

15, 17, 19, 20, 21, 23, 25 (2)

(b) Describe the members of $A \cap B$

A and B

Odd multiples of 5 between 14 and 26 (1)

(Total for Question 18 is 3 marks)

19 (a) Work out $2\frac{1}{7} + 1\frac{1}{4}$

$$\frac{15}{7} + \frac{5}{4}$$

Converting the mixed numbers into improper fractions by multiplying the whole number by the denominator then adding the result to the numerator

$$\frac{60}{28} + \frac{35}{28}$$

Making the denominators the same by multiplying both the numerator and denominator of the 1st fraction by 4 and multiplying both the numerator and denominator of the 2nd fraction by 7

Adding the numerators. The denominator stays the same

$$\frac{95}{28}$$

(2)

(b) Work out $1\frac{1}{5} \div \frac{3}{4}$

Give your answer as a mixed number in its simplest form.

$$\frac{6}{5} \times \frac{4}{3}$$

Converting the mixed number into an improper fraction by multiplying the whole number by the denominator then adding the result to the numerator. To divide by a fraction: Keep the 1st number, change the sign to multiplication and flip the 2nd fraction

$$\frac{24}{15} = \frac{8}{5}$$

Multiplying the numerators and denominators to get 24/15. Simplifying by dividing both the numerator and denominator by 3

Dividing the numerator by the denominator gives 1 remainder 3. The 1 is the whole number and leaving the remainder in the fraction

$$1\frac{3}{5}$$

(2)

(Total for Question 19 is 4 marks)

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20 In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

$50 \div 5$

Dividing the 50 bungalows by the 5 parts of the 2nd ratio which represent them works out that 1 part of the 2nd ratio is worth 10

10×8

Multiplying the value of 1 part of the 2nd ratio by the 8 parts which represent the flats works out that there are 80 flats

$80 \div 4$

Dividing the 80 flats by the 4 parts of the 1st ratio which represent them works out that 1 part of the 1st ratio is worth 20

20×7

Multiplying the value of 1 part of the 1st ratio by the 7 parts which represent the houses works out that there are 140 houses

.....140

(Total for Question 20 is 3 marks)

21 Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

$$5 \times 1000 \leftarrow \boxed{1 \text{ k g} = 1000 \text{ g. So multiplying the 5 kg by 1000 converts it to 5000 g}}$$

$$250 \overline{) 5000} \begin{array}{r} 0020 \\ 5 \end{array} \leftarrow \boxed{\text{Dividing the 5000 g of sweets by the 250 g of sweets in each bag works out that there are 20 bags}}$$

$$\begin{array}{r} 0.65 \\ \times 20 \\ \hline 13.00 \end{array} \leftarrow \boxed{65\text{p is } \pounds 0.65. \text{ Multiplying the } \pounds 0.65 \text{ each bag is sold for by the 20 bags works out that she receives } \pounds 13 \text{ income}}$$

$$13.00 - 10 \leftarrow \boxed{\text{Subtracting the } \pounds 10 \text{ costs from the } \pounds 13 \text{ income works out that she gets } \pounds 3 \text{ profit}}$$

$$\frac{3}{10} = \frac{30}{100} \leftarrow \boxed{\text{Putting the } \pounds 3 \text{ profit over the } \pounds 10 \text{ costs expresses the profit as a fraction. Multiplying both the numerator and denominator by 10 gives } 30/100}$$

Percentage is out of 100 so 30/100 is 30%

..... 30 %

(Total for Question 21 is 4 marks)

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22 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour. For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.

$s \begin{matrix} d \\ t \end{matrix}$

Writing a formula triangle for distance, speed, time

$$15 \overline{) 3000}$$

Covering t in the formula triangle finds that time = distance ÷ speed. Rounding the distance to 3000 miles and the speed to 15 miles per hour to make the estimate easier. So it would take about 200 hours

$$8 \overline{) 200}$$

Dividing the 200 hours by the 8 hours per day works out that it would take about 25 days

25
(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

(b) How does this affect your answer to part (a)?

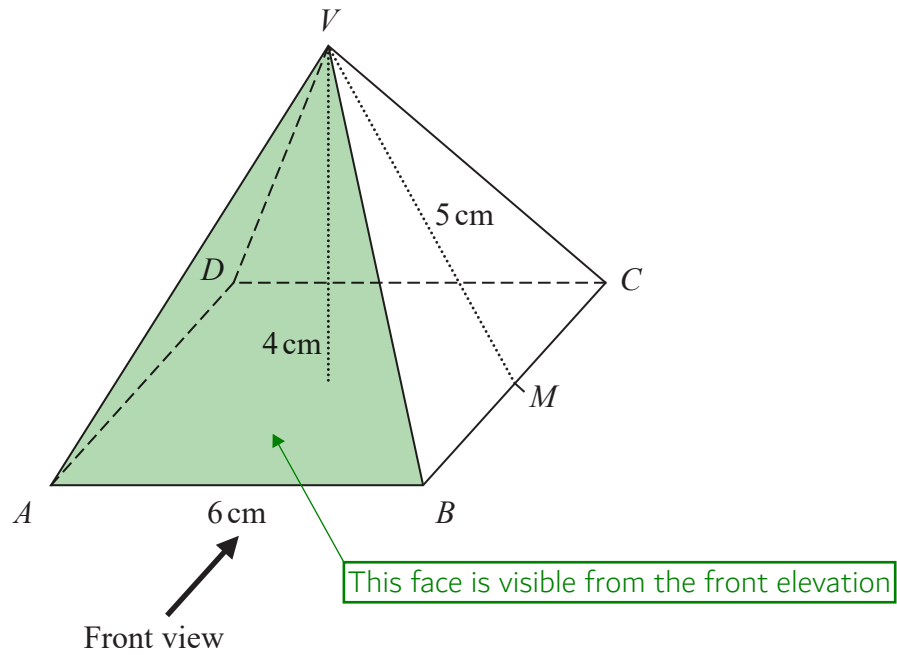
It will take less time

Dividing the same distance by more speed will result in less time

(1)

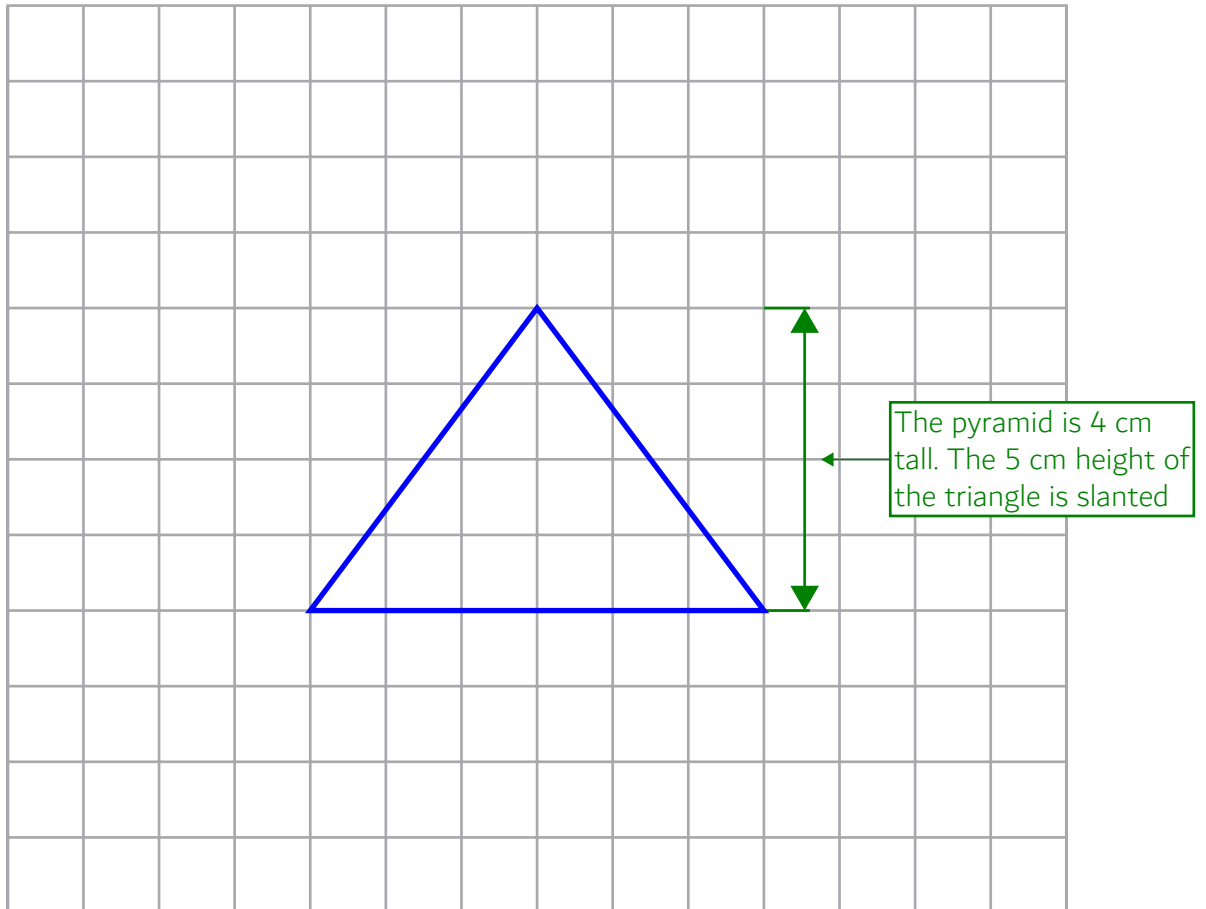
(Total for Question 22 is 4 marks)

23 Here is a solid square-based pyramid, $VABCD$.



The base of the pyramid is a square of side 6 cm.
 The height of the pyramid is 4 cm.
 M is the midpoint of BC and $VM = 5$ cm.

(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.



(2)

(b) Work out the total surface area of the pyramid.

$$6^2 = 36 \quad \leftarrow \text{Area of square} = \text{length}^2. \text{ So the area of the square is } 36 \text{ cm}^2$$

$$\frac{1}{2} \times 6 \times 5 \quad \leftarrow \text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}. \frac{1}{2} \times 6 = 3 \text{ then } 3 \times 5 = 15. \text{ So the area of each triangle} = 15 \text{ cm}^2$$

$$\begin{array}{r} 15 \\ \times 4 \\ \hline 60 \end{array} \quad \leftarrow \text{Multiplying the area of a triangle by 4 works out that the area of all 4 triangles combined is } 60 \text{ cm}^2$$

$$\begin{array}{r} 60 \\ +36 \\ \hline 96 \end{array} \quad \leftarrow \text{Adding the area of the square to the area of the 4 triangles combined works out that the surface area is } 96 \text{ cm}^2$$

The unit of area is cm^2

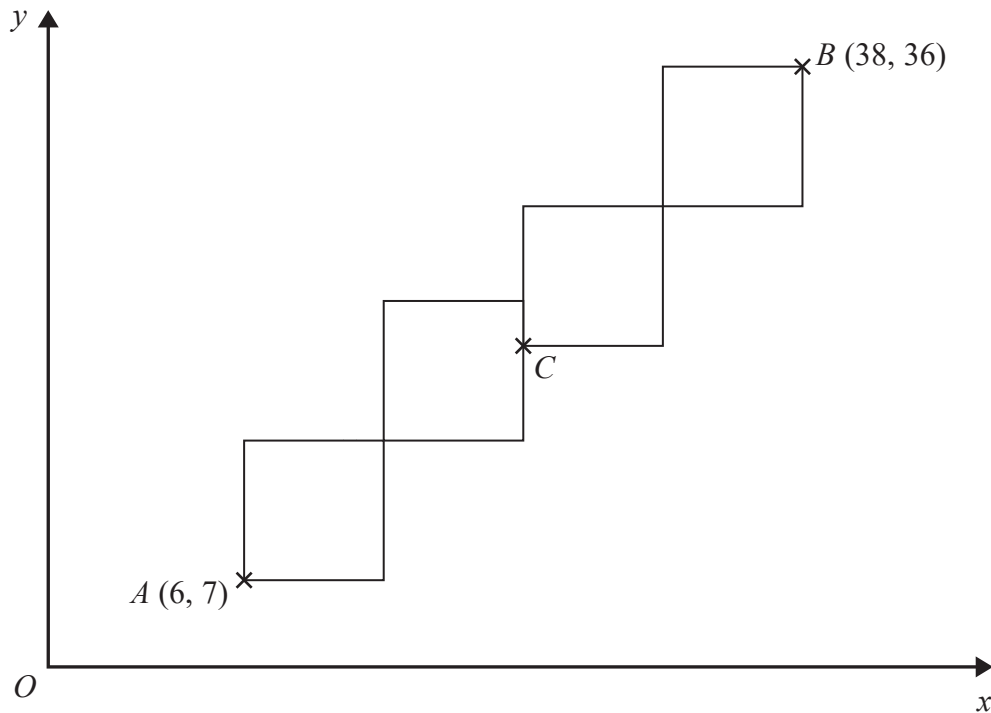
96 cm^2

(4)

(Total for Question 23 is 6 marks)

24 A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point A has coordinates $(6, 7)$

Point B has coordinates $(38, 36)$

Point C is marked on the diagram.

Work out the coordinates of C .

- $38 - 6$ ← Subtracting the x-coordinate of A from the x-coordinate of B works out that the distance between A and B is 32 in the x-direction
- $32 \div 4$ ← 4 squares are the same length as the 32 in the x-direction. So dividing the 32 in the x-direction by 4 works out that the length of one of the squares is 8
- 8×2 ← Multiplying the length of one square by 2 works out that the length of two squares is 16
- $38 - 16$ ← C is two squares left from B . So subtracting the length of two squares from the x-coordinate of B works out that the x-coordinate of C is 22
- $36 - 16$ ← C is two squares down from B . So subtracting the length of two squares from the y-coordinate of B works out that the y-coordinate of C is 20

(..... 22 , 20)

(Total for Question 24 is 5 marks)

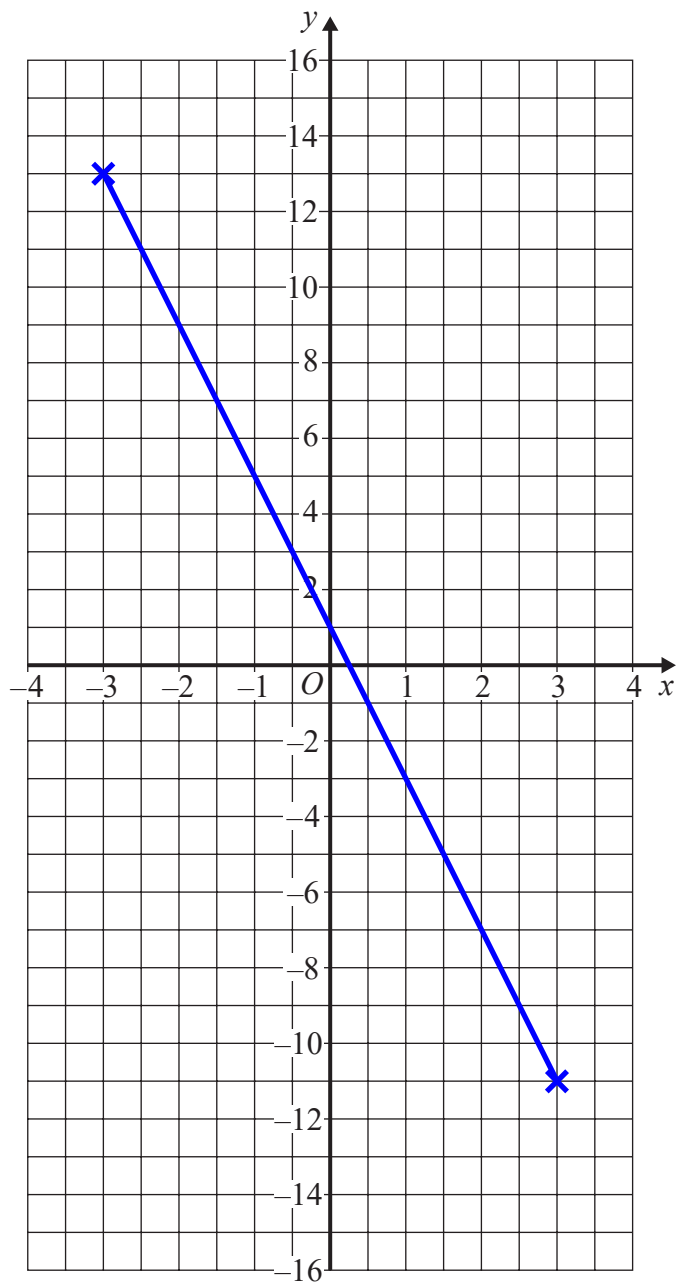
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25 On the grid below, draw the graph of $y = 1 - 4x$ for values of x from -3 to 3

It is a straight line graph as it can be written in the form $y = mx + c$. When $x = -3$, $y = 1 - 4(-3) = 1 - -12 = 1 + 12 = 13$. This gives the coordinate of $(-3, 13)$.
When $x = 3$, $y = 1 - 4(3) = 1 - 12 = -11$. This gives the coordinate of $(3, -11)$.
Plotting these two points then joining them with a straight line gives the graph



(Total for Question 25 is 3 marks)

$$26 \quad \mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -1 \\ 7 \end{pmatrix}$$

x-component

y-component

Work out $2\mathbf{a} + \mathbf{b}$ as a column vector.

$$2 \times 5 - 1$$

Doing 2 times the x-component of a add the x-component of b works out that the x-component is 9

$$2 \times 2 + 7$$

Doing 2 times the y-component of a add the y-component of b works out that the y-component is 11

$$\begin{pmatrix} 9 \\ 11 \end{pmatrix}$$

(Total for Question 26 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS

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