AQA

Please write clearly in block capitals.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname _____

Forename(s) _____

Candidate signature _____
I declare this is my own work.

GCSE
MATHEMATICS

F

Foundation Tier   Paper 1 Non-Calculator

Friday 19 May 2023   Morning   Time allowed: 1 hour 30 minutes

Materials
For this paper you must have:
* mathematical instruments
* the Formulae Sheet (enclosed).

You must **not** use a calculator.

Instructions
* Use black ink or black ball-point pen. Draw diagrams in pencil.
* Fill in the boxes at the top of this page.
* Answer **all** questions.
* You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
* If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
* Do all rough work in this book. Cross through any work you do not want to be marked.

Information
* The marks for questions are shown in brackets.
* The maximum mark for this paper is 80.
* You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice
In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22	
TOTAL	

Please note that these worked solutions have neither been provided nor approved by AQA 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 in the spaces provided.

1 Here is a list of numbers.

14   9   20   29   3   45   33

1 (a) Which number in the list is a multiple of 4 ?

[1 mark]

Answer   20

4 can be multiplied by a whole number (which is greater than 0) to get 20. 4 x 5 = 20. So 20 is a multiple of 4

1 (b) Which number in the list is a square number?

[1 mark]

Answer   9

A whole number (which is greater than 0) can be multiplied by itself to get 9. 3 x 3 = 9. So 9 is a square number

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Do not write outside the box

1 (c) Which **two** numbers in the list have a total of 43 ?

[1 mark]

Answer ___14___ and ___29___

14 + 29 = 43. Each number could be subtracted from 43 to work out what the other number would have to be

1 (d) Work out

largest number in the list ÷ smallest number in the list

[1 mark]

$$3\overline{)4^15}$$ = 15

The largest number (which is 45) is divided by the smallest number (which is 3)
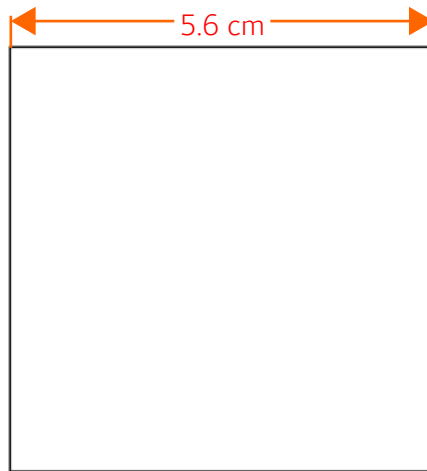
Answer ___15___

Turn over for the next question

4

Turn over ▶

2 (a) Here is a square.

5.6 cm

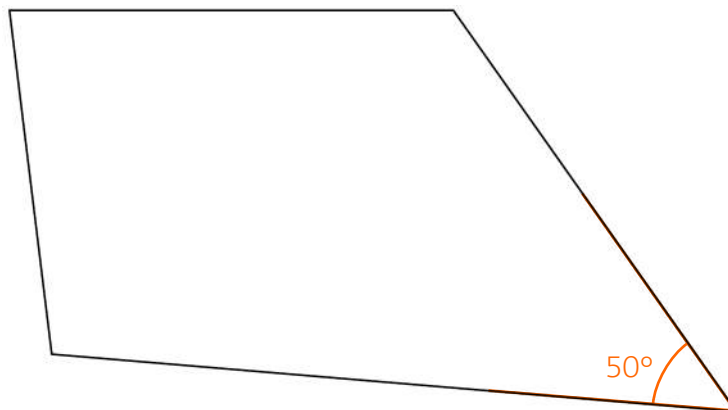Use a ruler to measure a side length of the square.

Give your answer in **millimetres**.

[1 mark]

Answer _____ 56 _____ mm

There are 10 mm in 1 cm so multiplying the 5.6 cm by 10 converts it into 56 mm
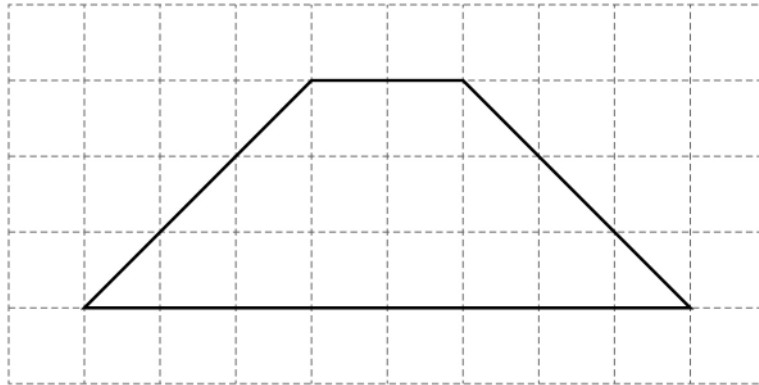
2 (b) Here is a quadrilateral.

50°

Use a protractor to measure the size of the **smallest** angle.

[1 mark]

Answer _____ 50 _____ °

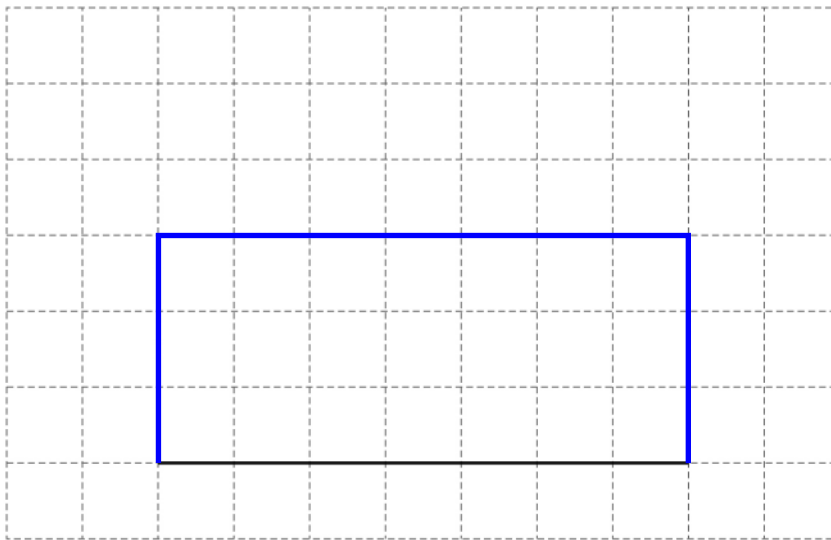.CG Maths.

2 (c) A different quadrilateral is drawn on a centimetre grid.

By counting squares, work out the **area** of the quadrilateral.

[1 mark]

Answer _____ IS _____ cm^2

There are 12 whole squares and 6 half squares. Two halves make a whole so there are 15 whole squares in total. Each square is 1 cm^2 as is is drawn on a centimetre grid

2 (d) One side of a rectangle is drawn on this centimetre grid.

Complete the rectangle so that it has a **perimeter** of 20 cm

[1 mark]

Perimeter is the distance around the outside of the shape. The side given is 7 cm. The opposite sides of a rectangle are equal so the opposite side must also be 7 cm. 7 + 7 = 14 so there is 14 cm so far. Subtracting the 14 cm from the 20 cm works out that the other two sides must add up to 6 cm. Dividing the 6 cm by the 2 remaining sides works out that each one must be 3 cm

4

Turn over ▶

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3 (a) Work out $(-4) \times (-3)$

[1 mark]

A negative multiplied by a negative is a double negative so becomes positive. 4 x 3 = 12

Answer _____12_____

3 (b) Work out $6 \times (-5)$

[1 mark]

6 x 5 = 30 so 6 x -5 must be -30

Answer _____-30_____

3 (c) Work out $(-8)^2$

[1 mark]

This means -8 x -8, which is a negative multiplied by a negative which is a double negative so becomes positive. 8 x 8 = 64

Answer _____64_____

3 (d) Work out 10^3

[1 mark]

10^3 = 10 x 10 x 10 = 1000

Answer _____1000_____

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4   Write   18 out of 30   as a fraction in its simplest form.

[2 marks]

$\frac{18}{30}$ ← 18 out of 30

$\frac{9}{15}$ ← Both the numerator and denominator were even so both can be divided by 2 to simplify the fraction

Answer $\frac{3}{5}$

Both the numerator and denominator were multiples of 3 so can be divided by 3 to simplify the fraction. 3 and 5 cannot be divided by the same amount to get smaller whole numbers so this is the simplest form

5   At a shop

the normal price of one pen is 24p

the normal price of one calculator is £7

The shop has these special offers.

Pens	**Calculators**
Half the normal price	£1.50 less than the normal price

Work out the **total** price of 5 pens and 1 calculator using the special offers.

[4 marks]

$2\overline{)24}$ → $\frac{1\ 2}{}$ ← Half means to divide by 2 so dividing the normal price of one pen by 2 works out that the special offer price of one pen is 12p

$12 \times 5 = 60$ ← Multiplying the special offer price of one pen by 5 works out that the price of 5 pens will be 60p using the special offer

$\begin{array}{r} ^6 7.00 \\ -1.50 \\ \hline 5.50 \\ +0.60 \\ \hline 6.10 \end{array}$

← Subtracting the £1.50 from the £7 works out that the special offer price of 1 calculator is £5.50
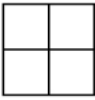
← Adding the 60p (which is £0.60) works out that the total price using the special offers is £6.10
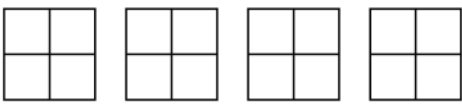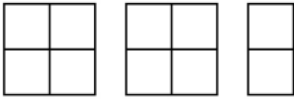
Answer £   6.10

10

Turn over ▶

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6 (a) Write $3\dfrac{2}{5}$ as an improper fraction.

[1 mark]

Answer $\dfrac{17}{5}$

The whole number should be multiplied by the denominator and the result added to the numerator. Multiplying the 3 by the 5 gives 15 then adding this 15 to the 2 gives 17. The denominator stays the same

6 (b) Write 0.19 as a fraction.

[1 mark]

Answer $\dfrac{19}{100}$

19 can be divided by 100 to give 0.19

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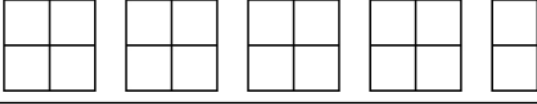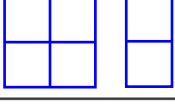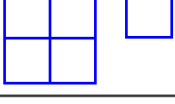
7 Misha recorded the main type of weather each day for **55 days**.

The pictogram shows the results for rain, snow and cloud.

Key: = 4 days

Rain	
Snow	
Cloud	
Sun	
Fog	

Sun was recorded on 1 **more** day than fog.

Complete the pictogram for the 55 days.

[4 marks]

11×4 ← There are 11 symbols for rain, snow and cloud in total. Each symbol represents 4 days so multiplying the 11 symbols by 4 works out that rain, snow and cloud were 44 days in total

55 − 44 = 11 ← Subtracting the 44 days for rain, snow and cloud leaves 11 days in total for sun and fog

Two numbers which add up to 11 where one of them is 1 more than the other are 6 and 5. So there must be 6 days for sun and 5 days for fog. Each quarter of a symbol is 1 day so drawing 6 quarters for sun and 5 quarters for fog

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8

$$T = 5P - W$$

8 (a) Work out the value of T when $P = 4$ and $W = 2$

[2 marks]

5×4 ← The order of operations (BIDMAS) needs to be followed so the multiplication is done first. 4 is substituted for P

$20 - 2$ ← Then the 2 is subtracted from the result

$T =$ _____18_____

8 (b) Work out the value of P when $T = -40$ and $W = 10$

[3 marks]

$-40 = 5P - 10$ ← Substituting in the values of T and W

$-30 = 5P$ ← Adding 10 to both sides to eliminate the -10 on the right

Dividing both sides by 5 to eliminate the 5 on the right and get P on its own
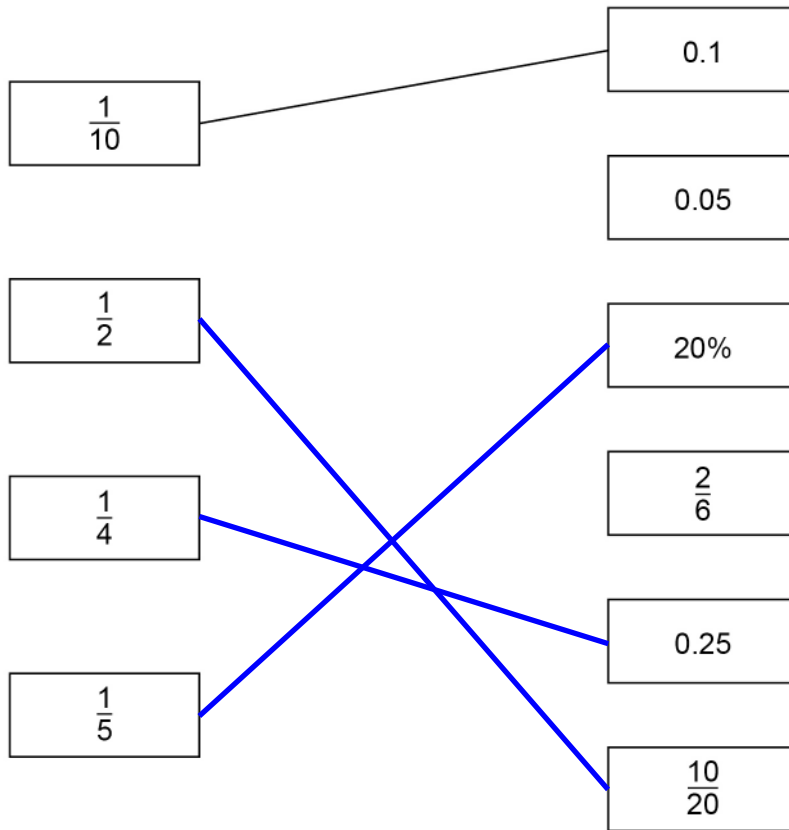
$P =$ _____-6_____

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9 Match each box on the left to the box on the right with the same value.

One has been done for you.

[3 marks]

$\frac{1}{10}$ —— 0.1

0.05

$\frac{1}{2}$

20%

$\frac{1}{4}$

$\frac{2}{6}$

0.25

$\frac{1}{5}$

$\frac{10}{20}$

10/20 simplifies to 1/2 by dividing both the numerator and denominator by 10.

1/4 as a decimal is 0.25. Dividing the 1 by the 4 could work this out.

20% = 20/100 = 2/10 = 1/5

Turn over for the next question

8

Turn over ▶

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1 1

10 Here are two calculations, A and B.

A	$8 \times 3 + 2$
B	$21 - (15 - 4)$

Work out answer to A × answer to B

[3 marks]

The order of operations (BIDMAS) needs to be followed for both calculations

$24 + 2 = 26$

The 8 x 3 is done first to get 24. Then adding the 2 works out that the answer to A is 26

$21 - 11 = 10$

The 15 - 4 is done first as this is in brackets. Then subtracting the result from the 21 works out that the answer to B is 10

26×10

Multiplying the answer to A by the answer to B

Answer _____260_____

To multiply a whole number by 10, add a zero on the end

11 Convert 7 gallons to litres.

Use 1 gallon = 4.5 litres

[2 marks]

$$\begin{array}{r} 4.5 \\ \times\ 7 \\ \hline 31.5 \\ {}_3 \end{array}$$

7 gallons is 7 x 1 gallon so also multiplying the 4.5 litres by 7

Answer _____31.5_____ litres

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12 The table shows monthly payments for electricity.

	October	November
	£120	£240

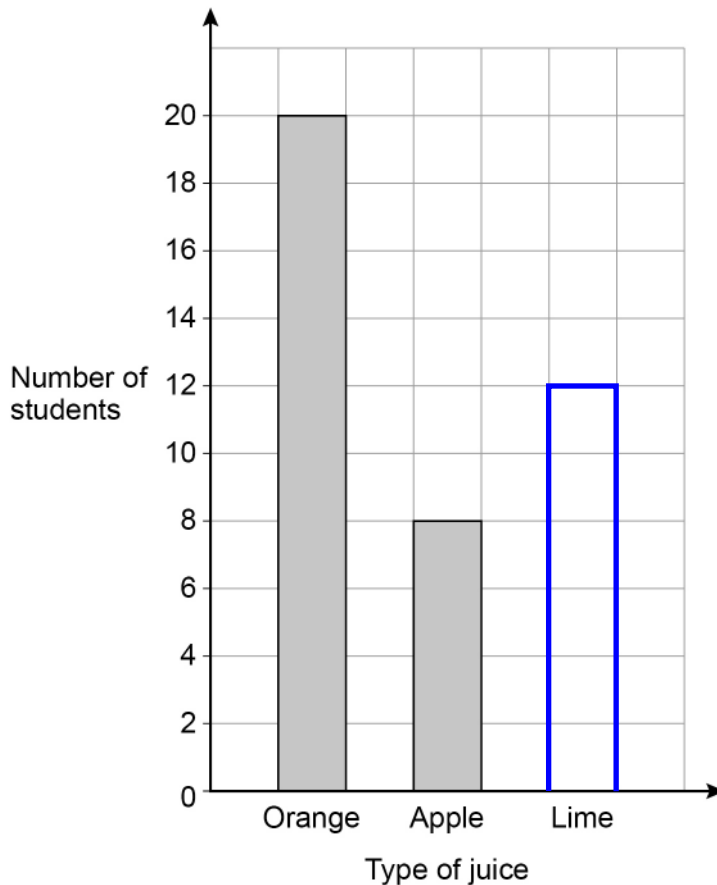Write down the percentage increase from October to November.

[1 mark]

Answer _____ 100 _____ %

It increased by £120, which is the full amount of the £120 in October

13 Students choose juice with their school meal in the ratio

orange : apple : lime $= 5 : 2 : 3$

Complete the bar chart.

[3 marks]

$2p = 8$
$p = 4$
$3p = 12$

2 parts of the ratio represent the 8 students who chose apple. Dividing both sides by 2 works out that 1 part of the ratio represents 4 students. Multiplying the value of 1 part of the ratio by 3 works out that the 3 parts representing lime is 12 students

9

Turn over ▶

14 Here is some data about people visiting a gym one week.

	Percentage of all visitors	Mean number of hours visiting	Range of number of hours visiting
Members	64	4	6
Guests	36	$2\frac{1}{2}$	8

Compare the data for the members with the data for the guests.

Make **three** comparisons.

[3 marks]

Comparison 1

The percentage of all visitors was greater for members

Comparison 2

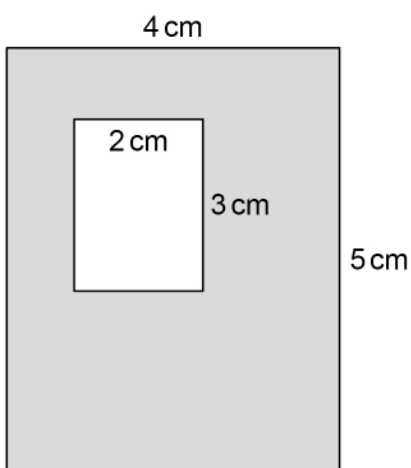The mean number of hours visiting was greater for members

Comparison 3

The range of number of hours visiting was greater for guests

A comparison can just be stating which was greater

15 A large rectangle has a rectangular hole cut out.

Not drawn accurately

4 cm

2 cm

3 cm

5 cm

Work out the percentage of the large rectangle that is shaded.

[3 marks]

$5 \times 4 = 20$
$2 \times 3 = 6$

Area of rectangle = length x width. So the area of the large rectangle is 20 cm² and the area of the rectangular hole is 6 cm²

$20 - 6 = 14$

Subtracting the area of the hole from the large rectangle finds that 14 cm² is shaded

$\frac{14}{20} = \frac{7}{10} = \frac{70}{100}$

14 cm² out the 20 cm² is shaded. Expressing this as a fraction, dividing both the numerator and denominator by 2 to simplify it then multiplying both the numerator and denominator by 10 to convert into a fraction with 100 as the denominator

Answer _____70_____ %

Percentage is out of 100

16 Liz travels 18 miles in 20 minutes.

Work out her average speed in miles per hour.

[3 marks]

$\begin{array}{r} 18 \\ \times\ 3 \\ \hline 54 \end{array}$

There are 3 lots of 20 minutes in an hour (an hour is 60 minutes and 20 x 3 = 60) therefore 3 lots of the 18 miles would be done in an hour
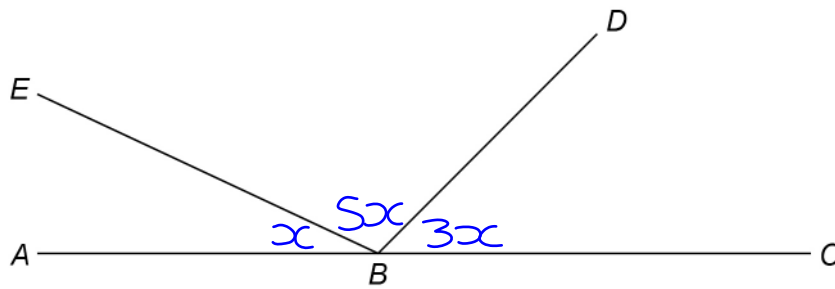
Answer _____54_____ mph

9

Turn over ▶

17   *ABC*, *BD* and *BE* are straight lines.

D

Not drawn
accurately

E

x $5x$ $3x$

A ———————————————— C

B

Let angle ABE be x as this is the smallest angle.
The other angles are expressed in terms of x

angle *EBD* = 5 × angle *ABE*

angle *DBC* = 3 × angle *ABE*

Work out the size of angle *EBD*.

[3 marks]

$9x = 180$ ← Adding all three angles together works out that there is 9x in total
around the point on a straight line, which must also add up to 180°

$\dfrac{020}{9\overline{)1\,^180}}$ ← Dividing both sides by 9 finds that x = 20°

$\begin{array}{r} 20 \\ \times\ 5 \\ \hline 100 \end{array}$ ← Angle EBD = 5x

Answer   100   °

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18 Two prime numbers are multiplied together.

The answer is an **even** number between 50 and 60

Complete the calculation.

[3 marks]

$$\boxed{2} \times \boxed{29} = \boxed{58}$$

$50 \div 2 = 25$
$60 \div 2 = 30$

At least one of the two numbers must be even in order to multiply to an even. The only even prime number is 2 so one of the numbers must be 2. Dividing both 60 and 50 by 2 works out that the other prime number must be between 25 and 30

$\begin{array}{r} 29 \\ \times\ 2 \\ \hline 58 \end{array}$

The only prime number between 25 and 30 is 29 so this must be the other prime number

19 Andrew and Bruce share some money in the ratio 5 : 6

Bruce gets £96

Andrew gives $\frac{1}{4}$ of his share to Carl.

Bruce gives $\frac{2}{3}$ of his share to Carl.

How much money does Carl receive?

[4 marks]

$\begin{array}{r} 16 \\ 6\overline{)9^36} \end{array}$

6 parts of the ratio represent the £96 which Bruce gets. Dividing by 6 works out that 1 part of the ratio is worth £16

$\begin{array}{r} 16 \\ \times\ 5 \\ \hline 80 \end{array}$

Multiplying the value of 1 part of the ratio by 5 works out that the 5 parts representing Andrew is worth £80

The method continues on the next page

Answer £ _____ 84 _____

10

Turn over ▶

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$$\begin{array}{r} 2\ 0 \\ 4\overline{)8\ 0} \end{array}$$

$$\begin{array}{r} 3\ 2 \\ 3\overline{)9\ 6} \end{array}$$

This works out that 1/3 of the £96 Bruce has is £32

$$\begin{array}{r} 3\ 2 \\ \times\ \ 2 \\ \hline 6\ 4 \end{array}$$

Multiplying the 1/3 by 2 works out 2/3 of the £96 Bruce has and therefore finds that Bruce gives Carl £64
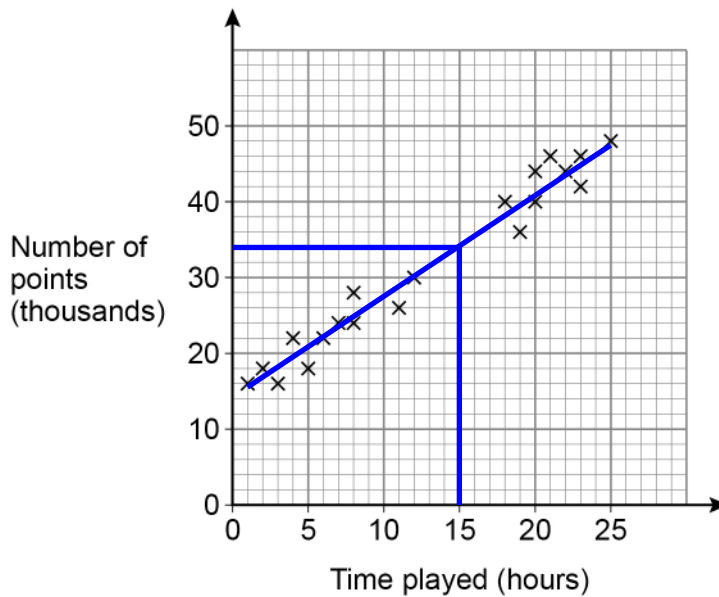
$$\begin{array}{r} +2\ 0 \\ \hline 8\ 4 \end{array}$$

Adding the £20 Andrew gives to Carl and the £64 Bruce gives to Carl works out that Carl receives £84

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20 Players score points in a game.

The scatter graph shows the time played and the points scored by some players.

20 (a) Circle the strength and type of correlation shown.

[1 mark]

weak positive   (strong positive)   weak negative   strong negative

As there is a clear upward trend

20 (b) Players get one extra life for every 2000 points they score.

Jonah plays the game for 15 hours.

Use a line of best fit to estimate the number of extra lives he gets.

[3 marks]

Drawing a line of best fit by using a clear ruler, lining it up with the points so that it goes in the same direction and there is a roughly even spread of points above and below the line. Then reading up from 15 hours to the line and across to the number of points estimates that Jonah will get 34000 points

$$2000\overline{)3\,{}^{3}4\,{}^{4}0\,{}^{34}0\,{}^{140}0} = 00017$$

Answer _____ 17

Dividing the 34000 points by the 2000 points which get one extra life works out that the 34000 is 17 lots of 2000 and therefore estimates that Jonah will get an extra 17 lives

21 $2^a \times 3 \times 5^2 = 600$

Work out the value of a.

You **must** show your working.

[3 marks]

$$\begin{array}{r} 2\,0\,0 \\ 3\overline{)6\,0\,0} \end{array}$$

$$\begin{array}{r} 0\,4\,0 \\ 5\overline{)2\,0\,0} \end{array}$$

$40 \div 5 = 8$

Dividing both sides of the equation by the 3, then a 5 and another 5 finds that $2^a = 8$. This is 2^3 as 2 x 2 x 2 = 8 so a must be 3

$a =$ _____ 3 _____

22 Expand and simplify fully $5(3x + 4) - 2(x - 1)$

[2 marks]

$15x + 20 - 2x + 2$

*5 x 3x = 15x
5 x 4 = 20
-2 x x = -2x
-2 x -1 = 2*

Answer _____ $13x + 22$ _____

*Collecting like terms
15x - 2x = 13x
20 + 2 = 22*

9

Turn over ▶

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23 Erika tries to sketch the graph $y = \dfrac{1}{x}$ with $x \neq 0$
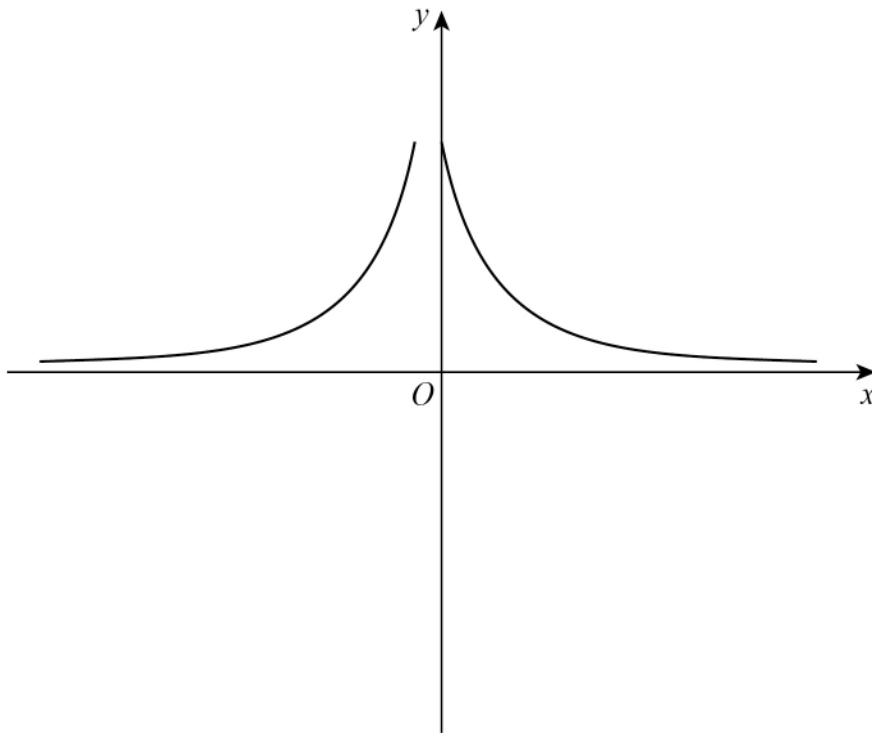
Make **two** different criticisms of her sketch.

[2 marks]

Criticism 1

Should not have a value for x = 0

As x ≠ 0. Dividing by 0 would not give a value as it is undefined

Criticism 2

It is wrong for the negative values of x

As dividing by a negative x value should give a negative y value

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24 Sunita is x years old.

Beth is one year younger than Sunita.

Joel is double Sunita's age.

The mean of their ages is 5

How old is **Joel**?

[5 marks]

$x + x - 1 + 2x$ ← If Sunita is x years old, Beth must be x - 1 and Joel must be 2x. Adding all of these together gives the total age

$\dfrac{4x-1}{3} = 5$ ← The total age is simplified by collecting like terms. To express the mean, the total age is divided by the 3 people. This expression must be equal to the mean of 5

$4x - 1 = 15$ ← Multiplying both sides of the equation by 3 to eliminate the denominator on the left

$4x = 16$ ← Adding 1 to both sides to eliminate the -1 and get the x term on its own

$x = 4$ ← Dividing both sides by 4 eliminates the 4 on the left and gets x on its own

Answer _____ 8 _____

As x = 4, Sunita is 4 years old. Joel is double Sunita's age and 4 x 2 = 8

Turn over for the next question

7

Turn over ▶

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25   Work out $2\dfrac{1}{3} \div \dfrac{4}{5}$

Give your answer as a mixed number.

[4 marks]

$\dfrac{7}{3} \times \dfrac{5}{4}$

Converted the mixed number into an improper fraction by multiplying the 2 by the 3 to get 6 then adding this to the 1. To divide by a fraction, keep the first fraction, change the division to a multiply and flip the second fraction

$\dfrac{35}{12}$

To multiply the fractions, the numerators can be multiplied to get 35 and the denominators can be multiplied to get 12

Answer $2\dfrac{11}{12}$

To convert the improper fraction to a mixed number, the 35 can be divided by the 12 to get 2 with a remainder of 11, which is left in the fraction

END OF QUESTIONS

4