Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
MATHEMATICS

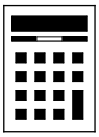
F

Foundation Tier Paper 2 Calculator

Thursday 3 November 2022 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments
- the Formulae Sheet (enclosed).



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	
22–23	
24–25	
26	
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

.CG Maths.

Answer **all** questions in the spaces provided.

Do not write outside the box

1 Circle the number that is a multiple of 25

[1 mark]

55 65 75 85

25 x 3 = 75 so 75 is a multiple of 25

2 Circle the value of the digit 3 in the number 10.23

[1 mark]

$\frac{3}{1000}$ $\frac{3}{100}$ $\frac{3}{10}$ 3

The 3 is in the hundredths place

3 Circle the lowest of these temperatures.

[1 mark]

–2.1°C 0.4°C –5°C 1°C

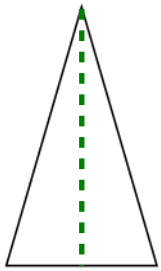
-5 is the most negative

Do not write outside the box

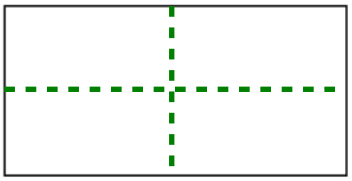
4 Circle the letter of the shape that has **exactly one** line of symmetry.

[1 mark]

P

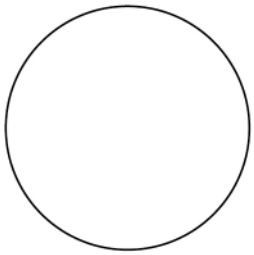


Q



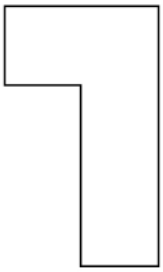
Two lines of symmetry

R



Infinite lines of symmetry

S



No lines of symmetry

A line of symmetry is a line which cuts a shape into two equal halves which are reflections of each other

Turn over for the next question

4

Do not write outside the box

5 (a) Simplify fully $d \times d$

[1 mark]

Answer d^2

d multiplied by itself

5 (b) Simplify fully $n \div n$

[1 mark]

Answer 1

Anything divided by itself is 1

5 (c) Simplify fully $\frac{1}{3} \times 6t$

[1 mark]

Answer $2t$

1/3 of 6t can be found by dividing 6t by 3

Do not write outside the box

6 (a) Write a number in the box to make the calculation correct.

[1 mark]

$$16 \div \boxed{1000} = 0.016$$

The decimal point has been moved 3 places to the left. So 16 is divided by ten 3 times

6 (b) Write a number in the box to make the calculation correct.

[1 mark]

$$18.4 + 3.9 + \boxed{4.7} = 27$$

27 - 18.4 - 3.9 = 4.7 ← Subtracting the 18.4 and 3.9 from both sides of the equation finds the missing number

6 (c) Write a fraction in the box to make the calculation correct.

[1 mark]

$$\frac{1}{2} \times \boxed{\frac{1}{4}} = \frac{1}{8}$$

1/8 ÷ 1/2 = 1/4 ← Dividing both sides of the equation by 1/2 finds the missing fraction

6 (d) Write the **same** number in both boxes to make the calculation correct.

[1 mark]

$$\boxed{19} \times \boxed{19} = 361$$

$\sqrt{361} = 19$ ← The square root of 361 finds the number which multiplied by itself gives 361

7

Do not write outside the box

7 Three groups of people, A, B and C, have taken driving tests.

7 (a) Here is information about the number of tests taken by the people in A.

Group A

Key: ○ represents 4 people

One test	○ ○ ○
Two tests	○ ○ ○ ○
Three tests	○ (

Here is information about the number of tests taken by the people in B.

One test Half the number in A who have taken one test.

Two tests 4 fewer than the number in A who have taken two tests.

Three tests 10 more than the number in A who have taken three tests.

Complete this pictogram for the people in B.

[3 marks]

Group B

Key: ○ represents 4 people

One test	○ (
Two tests	○ ○ ○
Three tests	○ ○ ○ ○

Half of 3 symbols is 1.5 symbols so this many symbols are for one test. 4 fewer people means one less symbol so 3 symbols are for two tests. 10 ÷ 4 = 2.5 so another 2.5 symbols are drawn for three tests, which means 4 are drawn in total

Do not write outside the box

7 (b) In group C there are 25 people.

17 of these people have passed a test.

One person is picked at random from C.

Work out the probability that the person has **not** passed a test.

[2 marks]

25-17 ← Subtracting the 17 people who passed from the 25 in the group leaves 8 who have not passed a test

Answer $\frac{8}{25}$

8 out of the 25 people in the group have not passed a test

8 Work out the value of $3r + 4t$ when $r = 13$ and $t = -2$

[2 marks]

3×13+4×-2 ← Substituting in the values of r and t. 3r means 3 multiplied by r

Answer 31

Turn over for the next question

7

Do not write outside the box

9 Hamish has saved 295 coins.

Each one is a 20p coin.

He gives an equal number of 20p coins to each of his 8 grandchildren.

He gives them as many coins as possible.

How much, in £, does he have left?

[4 marks]

295 ÷ 8

Dividing the 295 coins by the 8 grandchildren works out that each gets 36 coins and there are 7 coins left over which cannot be divided equally. Converting the 36.875 into a mixed fraction gives $36\frac{7}{8}$, which means there is a remainder of 7 out of the 8

0.20 × 7

Multiplying the 7 coins by 20p works out the value of how much he has left. 20p in pounds is £0.20

Answer £ 1.40

Do not write outside the box

10 Here are two sets of numbers.

Set A $2 + 12 + 13 + 27 = 54$

Set B $1 + 15 + 16 + 30 = 62$

Adding all the numbers originally in the sets to works out the total of each set

One number from Set A is swapped with one number from Set B.

The total of the numbers in each set is now the same.

Which two numbers are swapped?

[2 marks]

$62 - 54$ ← Working out that the difference between the two sets is 8

$8 \div 2 = 4$ ← Halving the difference works out what needs to be added to Set A and subtracted from Set B for them to have the same total

The difference is 8, therefore 4 needs to be added to Set A and 4 needs to be subtracted from Set B in order for the two sets to get the same total. Swapping 12 and 16 does this as 16 is 4 more than 12

Answer 12 and 16

11 Rearrange $m = p - 5$ to make p the subject.

Circle your answer.

[1 mark]

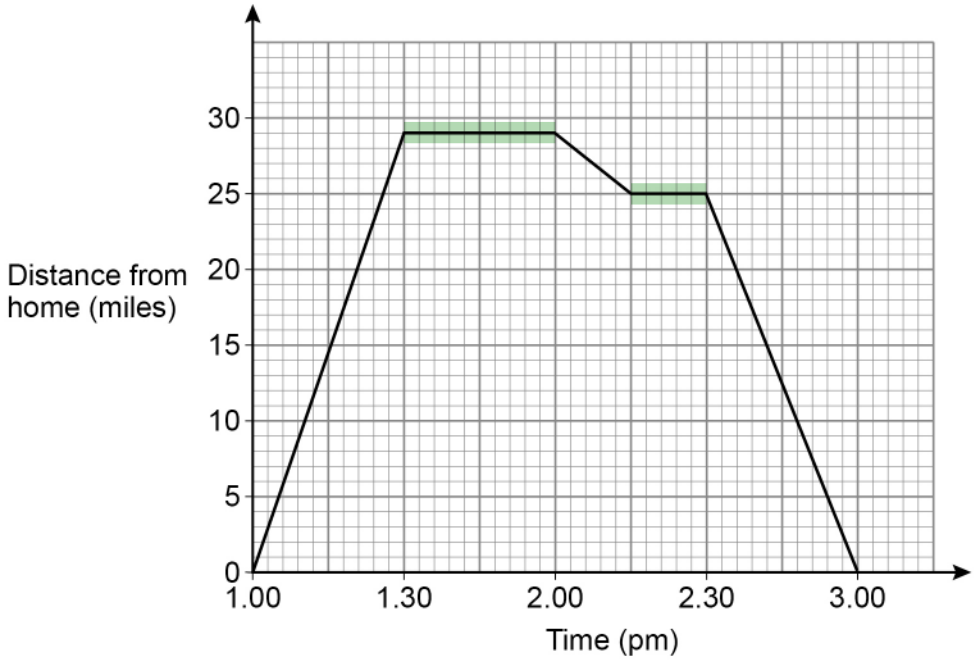
$p = \frac{m}{5}$ $\quad$ $p = m + 5$ $\quad$ $p = 5m$ $\quad$ $p = m - 5$

Adding 5 to both sides eliminates the -5 on the side with p and gets p on its own

7

Do not write outside the box

12 Here is the distance-time graph for a car between 1 pm and 3 pm



12 (a) Work out the **total** time that the car is **not** moving between 1 pm and 3 pm

State the units of your answer.

[2 marks]

30+15 ← It is not moving when the distance is not changing. From 1.30pm to 2.00pm is 30 minutes. From 2.15pm to 2.30pm is 15 minutes. Adding these together gives 45 minutes

Answer 45 minutes

12 (b) Work out the **total** distance the car travels between 1 pm and 3 pm

[2 marks]

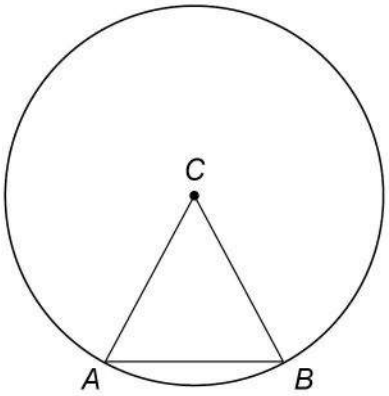
29×2 ← The car's distance continually increases up to 29 miles from home. It then decreases back to 0 miles from home. It has therefore travelled 2 lots of 29 miles

Answer 58 miles

Do not write outside the box

13 *A* and *B* are points on a circle.

C is the centre of the circle.



Not drawn accurately

Tick **one** box for each statement.

[3 marks]

	Definitely true	Might be true	Cannot be true
Line *AB* is a tangent to the circle	☐	☐	✓
AC is an arc of the circle	☐	☐	✓
Triangle *ABC* is equilateral	☐	✓	☐

Line AB cannot be a tangent as it touches the circle twice. Tangents only touch a curve once when extended infinitely.

AC cannot be an arc as it is a radius. An arc is part of the circumference, which is the curve around the outside of the circle.

Triangle ABC might be equilateral as it is possible for all the sides and angles to be the same. However it is also possible for the sides and angles to not be the same

Turn over for the next question

7

Do not write outside the box

14 To travel to a festival, a group of people will hire a minibus.

This formula has all costs in £

$$\text{Cost per person} = \frac{165 + \text{cost of the minibus}}{\text{number of people in the group}}$$

14 (a) With 12 people in the group, the cost of the minibus will be £567

Work out the cost per person.

[2 marks]

$\frac{165+567}{12}$ ← Substituting in the cost of the minibus and number of people in the group into the formula. The cost per person is already the subject so there is no need to rearrange

Answer £ 61

14 (b) With 15 people in the group, they will hire a different minibus.

The cost per person will be £50

Work out the cost of this minibus.

[3 marks]

$50 = \frac{165+c}{15}$ ← Substituting in the cost per person and the number of people in the group into the formula. Using c to represent the cost of the minibus

$750 = 165+c$ ← Multiplying both sides by 15 eliminates the denominator on the right

Subtracting 165 from both sides gets c on its own and finds that c = 585

Answer £ 585

Do not write outside the box

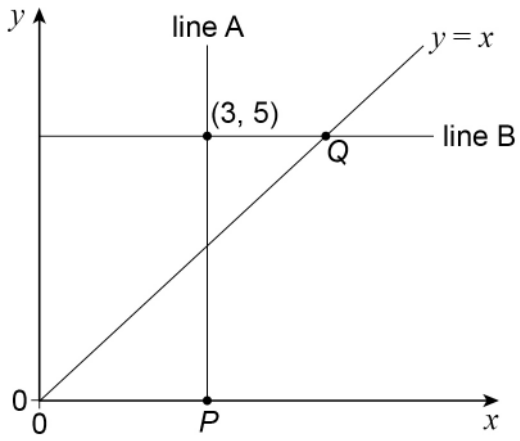
15 The sketch shows

the line $y = x$

line A, which is vertical

line B, which is horizontal.

The point (3, 5) is on both line A and line B.



Write down the coordinates of *P* and *Q*.

[2 marks]

P (3 , 0) *Q* (5 , 5)

P is vertically bellow (3 , 5) so has the same x-coordinate. The y-coordinate must be 0 as it is on the x-axis

Q is horizontal to (3 , 5) so has the same y-coordinate of 5. The x-coordinate must be the same as the y-coordinate as it is on the line y = x

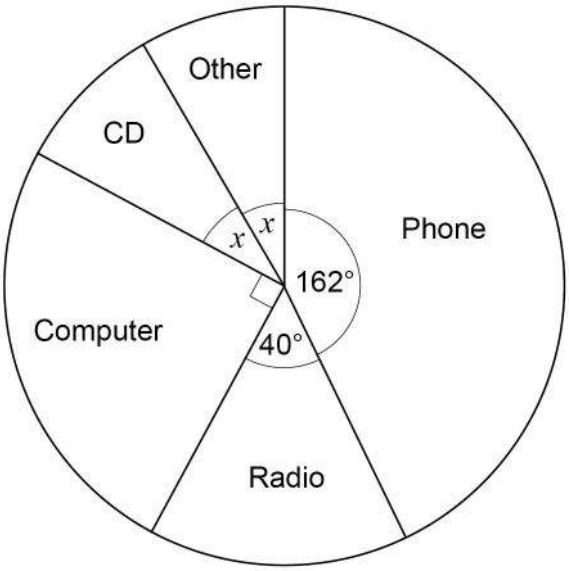
Turn over for the next question

7

Do not write outside the box

16 Some people were asked for the main way they listen to music.

A pie chart is drawn to represent their answers.



Not drawn accurately

16 (a) Work out the size of angle x.

[2 marks]

360−90−40−162

There are 360° in total in a pie chart. Subtracting the other angles apart from x from 360 works out that there are 68° left in the pie chart

68÷2

There are two equal angles which must add up to the 68° left over. Dividing the 68° by 2 works out that each of the equal angles is 34°

Answer 34 degrees

Do not write outside the box

16 (b) 135 people said Computer.

How many people said Phone?

[3 marks]

135 ÷ 90 ← Dividing the 135 people who said Computer by the 90° which represent it works out that each degree represents 1.5 people

1.5 x 162 ← Multiplying the value of each degree by the 162° for Phone works out how many said Phone

Answer 243

17 Complete this statement.

[1 mark]

$10^8 =$ 100 million

10^8 = 100,000,000. Converting it into ENG notation gives 100 x 10^6, which means 100 million

Turn over for the next question

6

Do not write outside the box

18 A football team plays two matches.

18 (a) For the first match, 40 000 tickets are sold.

Assume that each ticket costs £38.50

Work out the total amount of money from ticket sales for this match.

[2 marks]

40000×38.50 ← Multiplying the cost of each ticket by the 40000 tickets sold works out the total amount of money from ticket sales

Answer £ 1540000

18 (b) In fact, for the first match,

some of the tickets cost less than £38.50

and

some of the tickets cost more than £38.50

What does this mean about the total amount of money from ticket sales for this match?

Tick **one** box.

[1 mark]

- ☐ It will be more than the answer to part (a)
- ☐ It will be the same as the answer to part (a)
- ☐ It will be less than the answer to part (a)
- ☑ It is not possible to tell

Is it not told how many were less and how many were more

Do not write outside the box

18 (c) For the second match, the number of tickets sold increases from 40 000 to 55 000

Is the increase in tickets sold **more** than 35% ?

You **must** show your working.

[3 marks]

$40000 \times \frac{100+35}{100} = 54000$

Increasing 40000 by 35% gives 54000. 100% is the original amount. Adding 35% to this expresses the percentage it increases to. Putting this over 100 converts it into a fraction, which when multiplied by increases by 35%

Yes

The 55000 it increased to is more than the 54000 it would increase to if it increased by only 35%. Therefore the increase must be more than 35%

19 On a train, there are between 60 and 70 people.

The ratio of adults to children is 5 : 4

Work out the **total** number of people on the train.

[2 marks]

5+4

The ratio cannot be simplified and there are 9 parts in total in the ratio. Therefore the total number of people needs to be a multiple of 9

70÷9

This works out that 7 lots of 9 can go into 70, which is the most people there could be

7×9

7 lots of 9 is 63

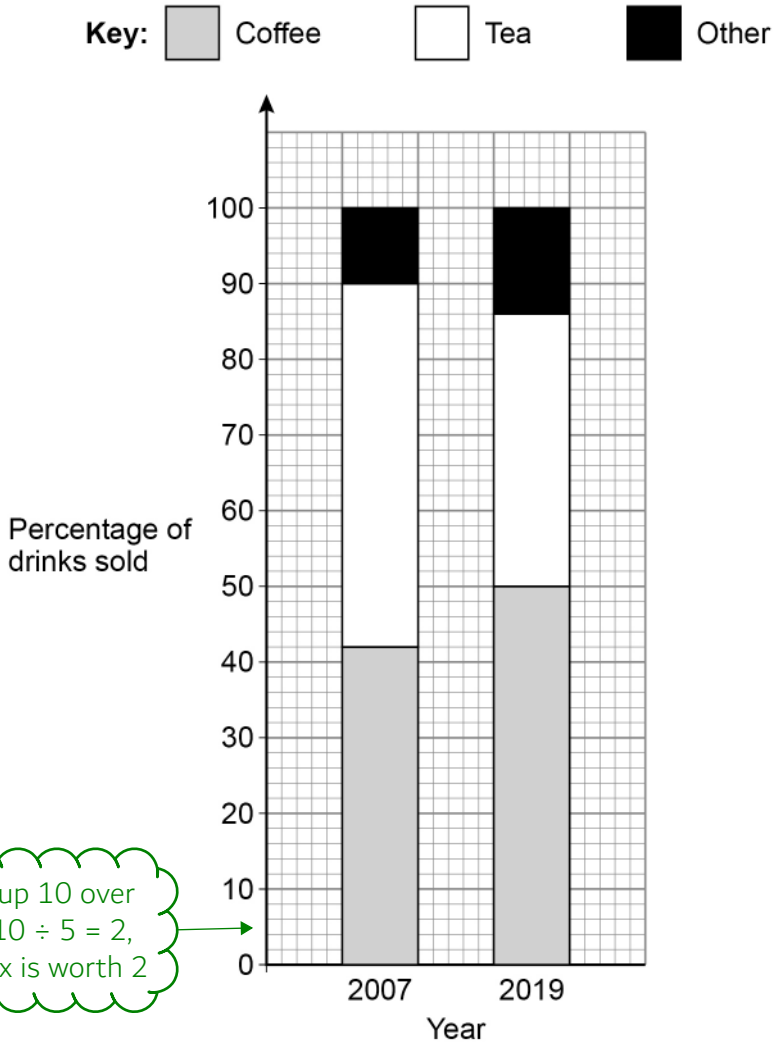
Answer 63

Knowing the times tables could help with this question. 63 is the only multiple of 9 which is between 60 and 70

8

Do not write outside the box

20 The composite bar chart shows information about the **percentage** of drinks sold by a café in 2007 and 2019



The scale goes up 10 over 5 small boxes. 10 ÷ 5 = 2, so each small box is worth 2

20 (a) In 2007 the café sold a total of 24 000 drinks.

How many **more** teas than coffees were sold?

[2 marks]

90−42 ← Working out that 48% of drinks sold were tea. The bar for tea goes from 42% up to 90%. Subtracting these from each other works out how tall the bar is

48−42 ← Subtracting the 42% for coffee from the 48% for tea works works out that tea had 6% more than coffee

$\frac{6}{100} \times 24000$ ← Doing 6% of the 24000 drinks. Percentage is out of 100

Answer 1440

Do not write outside the box

20 (b) Were more coffees sold at the café in 2019 than in 2007 ?

Tick a box.

☐ Yes ☐ No ☑ Cannot tell

Give a reason for your answer.

[1 mark]

Only given percentages for 2019

Percentage is a proportion, not an amount. There is a higher percentage of coffee in 2019 but there may be fewer drinks sold in total, meaning that there could possibly be less coffees sold in 2019

21 (a) k is a whole number between 40 and 50

The cube root of k is 3, to the nearest whole number.

Work out the **largest** possible value of k.

[2 marks]

Using table mode, enter f(x) = $\sqrt[3]{x}$. Start: 40. End: 50. Step: 1

This lists out the cube roots of all the whole numbers between 40 and 50. $\sqrt[3]{42}$ = 3.4... which rounds to 3. Then $\sqrt[3]{43}$ = 3.5... which rounds to 4. So 42 is the largest k can be

Answer 42

21 (b) Fay tries to solve $x^2 = 100$

She says,

"The only possible value of x is 10"

Give a reason why she is **not** correct.

[1 mark]

x can be -10

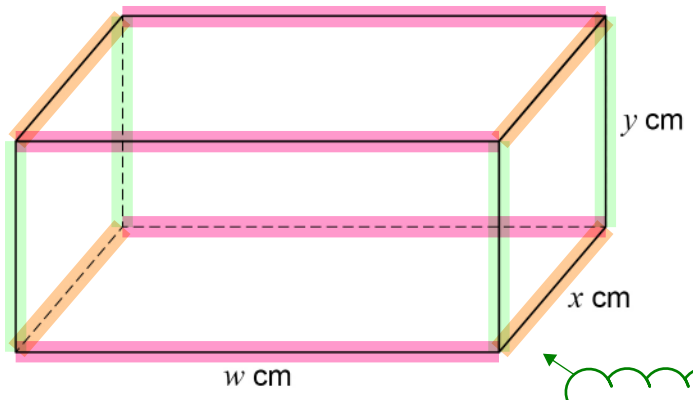
$\sqrt{100}$ is 10 or -10, as $(-10)^2 = 100$

6

Do not write outside the box

22 (a) Here is a cuboid.

w, x and y are **different** whole numbers.



The length w is shown in pink, the length x is shown in orange and the length y is shown in green

The total length of **all** the edges of the cuboid is 80 cm

The volume is **greater** than 200 cm^3

Work out one possible set of values for w, x and y.

[2 marks]

$4w+4x+4y=80$ ← There are 4w, 4x and 4y which must add up to 80

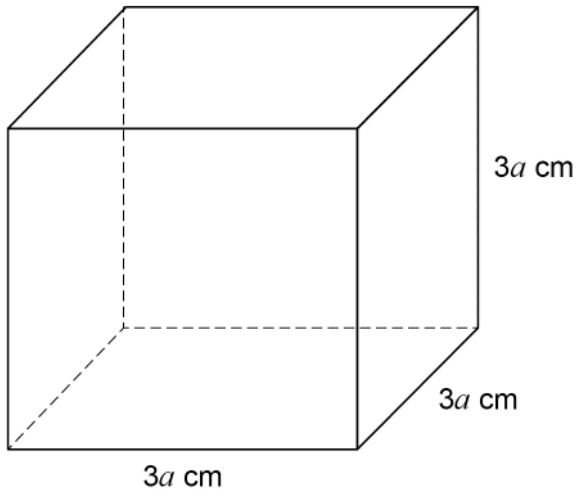
$w+x+y=20$ ← Dividing all terms on both sides by 4 simplifies the equation

$10\times6\times4=240$ ← Volume of cuboid = length x width x height. So multiplying w, x and y must give a result more than 200. 10, 6 and 4 are different whole numbers which add up to 20 and when multiplied gives 240

$w =$ 10 $x =$ 6 $y =$ 4

Do not write outside the box

22 (b) Here is a solid cube.



Circle the expression for the **total** surface area in cm^2

[1 mark]

$36a$ $54a$ $36a^2$ $54a^2$

Each face is a square. Area of square = length^2. The length is 3a. $(3a)^2 = 9a^2$. There are 6 square faces so multiplying the $9a^2$ by 6 works out that the surface area is $54a^2$

23 The equation of a line is $y = 3x - 6$

Circle the coordinates of the y-intercept.

[1 mark]

(0, –6) (–6, 0) (0, 3) (3, 0)

The x-coordinate must be 0 as the y-intercept is on the y-axis. When x = 0, y = 3(0) - 6 = -6, so the y-coordinate must be -6

4

Do not write outside the box

24 (a) Work out $2.8^4 + \sqrt{158.76}$

Give your answer as a decimal.

[2 marks]

Type it into the calculator exactly as it is above

Answer 74.0656

24 (b) Work out $\dfrac{6.09 \times 10^{14}}{4.2 \times 10^{9}}$

Give your answer in standard form.

[2 marks]

145000 ← Typing it into the calculator exactly as it is above gives this

Answer 1.45×10^5

145000 must be divided by 10 5 times to get 1.45, which is between 1 and 10. The 1.45 must be multiplied by 10 5 times to make it equal

25 A tank contains 40 litres of water.

25 (a) Water leaks out of the tank at a rate of 1.2 litres per minute.

The leak is stopped after 20 minutes.

Show that, when the leak is stopped, the tank contains 16 litres of water.

[1 mark]

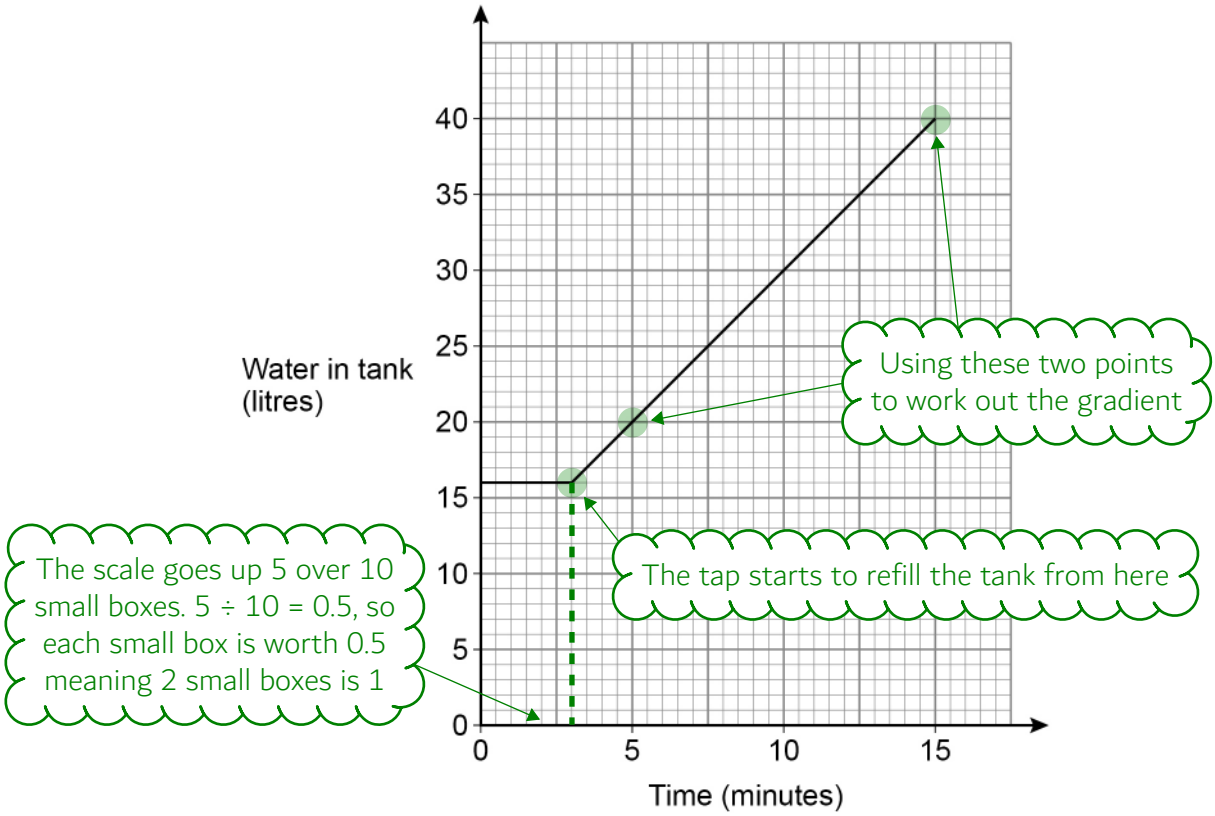
1.2×20 ← Multiplying the rate of 1.2 litres per minute by the 20 minutes works out that 24 litres had leaked by the time the leak is stopped

40−24=16 ← Subtracting the 24 litres which had leaked from the 40 litres it started with shows that the tank contains 16 litres when the leak is stopped

Do not write outside the box

25 (b) The tank is refilled with water from a tap.

The graph shows the amount of water in the tank **after** the leak is stopped.



Complete this report by writing a number in each answer space.

[3 marks]

6 small boxes after 0, so this is 3 minutes

Report

3 minutes after the leak is stopped, the tap starts to refill the tank.

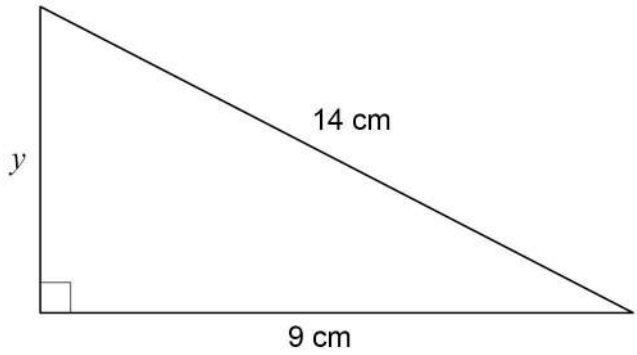
The rate at which the tank refills is 2 litres per minute.

$\frac{40-20}{15-5}$ ← The gradient of the line is the rate the tank refills. Gradient = (change in y)/(change in x). From (5 , 20) to (15 , 40), change in y is 40 - 20 and change in x is 15 - 5

8

Do not write outside the box

26 Here is a triangle.



Not drawn accurately

Use Pythagoras' theorem to work out the value of y.

Give your answer as a decimal.

[3 marks]

$a^2 + b^2 = c^2$ ← Starting by writing Pythagoras' Theorem, where a and b are the shorter sides and c is the longest side

$y^2 + 9^2 = 14^2$ ← Substituting y for a, 9 for b and 14 for c

$y^2 = 14^2 - 9^2$ ← Subtracting 9^2 from both sides gets y^2 on its own

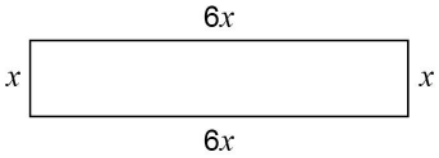
$y = \sqrt{14^2 - 9^2}$ ← Square rooting both sides eliminates the square and gets y on its own

$y =$ 10.7 cm

10.72... can be written rounded to 1 decimal place

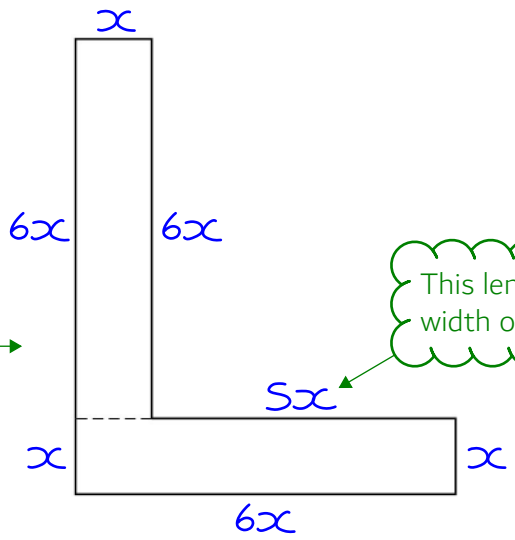
Do not write outside the box

27 The length of this rectangle is 6 times the width.



Not drawn accurately

Two of these rectangles are joined, with no overlap, to make this L-shape.



Not drawn accurately

Labelling all of the lengths on the perimeter in terms of x

This length must be 5x as subtracting the width of x from the length of 6x leaves 5x

The perimeter of the L-shape is 98.8 cm

Work out the value of the perimeter of **one** of the rectangles.

[4 marks]

$26x = 98.8$ ← Adding all of the x on the perimeter of the L-shape gives 26x. This must be equal to the actual perimeter of 98.8cm

$x = 98.8 \div 26$ ← Dividing both sides by 26 gets x on its own and finds that x is 3.8cm

3.8×14 ← 6x + 6x + x + x = 14x, so there are 14 lots of x on the perimeter of one of the rectangles. Multiplying the value of x by 14 works out the perimeter

Answer 53.2 cm

7

Do not write outside the box

28 Written as the product of prime factors,

$12\,600 = 2^3 \times 3^2 \times 5^2 \times 7$

and

$14\,112 = 2^5 \times 3^2 \times 7^2$

Work out the highest common factor (HCF) of 12 600 and 14 112

Give your answer as an integer.

[2 marks]

$2^3 \times 3^2 \times 7$ ← Multiplying the lowest power of each prime in both lists works out the HCF

Answer 504

END OF QUESTIONS

2