Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
MATHEMATICS

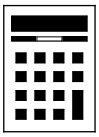
F

Foundation Tier Paper 3 Calculator

Monday 12 November 2018 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



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.
- 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	
26–27	
TOTAL	

N 0 V 1 8 8 3 0 0 3 F 0 1

IB/M/Nov18/E4

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 Add 8 mm to 7 cm

Circle your answer.

[1 mark]

150 mm 1.5 cm 7.8 cm 708 mm

There are 10 millimetres in a centimetre. 8/10 = 0.8 so 8mm is 0.8cm. 0.8 + 7 = 7.8

2 In a pie chart, one sector represents $\frac{1}{4}$ of the data.

What is the angle of that sector?

Circle your answer.

[1 mark]

4° 25° 45° 90°

There are 360° in total in a pie chart. 1/4 of 360 is 90

3 Which of these **cannot** be the number of lines of symmetry of a triangle?

Circle your answer.

[1 mark]

0 Scalene 1 Isosceles 2 3 Equilateral

Do not write outside the box

4 Circle the fraction equal to 0.12

[1 mark]

$\frac{1}{12}$ $\frac{3}{25}$ $\frac{1}{8}$ $\frac{6}{5}$

Typing 0.12 into the calculator converts it into a fraction in it's simplest form

5 (a) Solve $n + 7 = 103$

[1 mark]

Subtracting 7 from both sides makes n the subject

$n =$ 96

5 (b) Solve $\frac{m}{6} = 12$

[1 mark]

Multiplying both sides by 6 makes m the subject

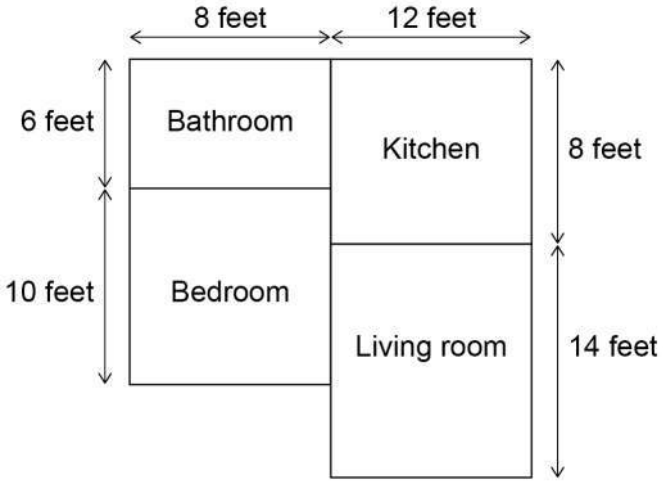
$m =$ 72

Turn over for the next question

6

Do not write outside the box

6 Here is a plan of a flat with four rectangular rooms.



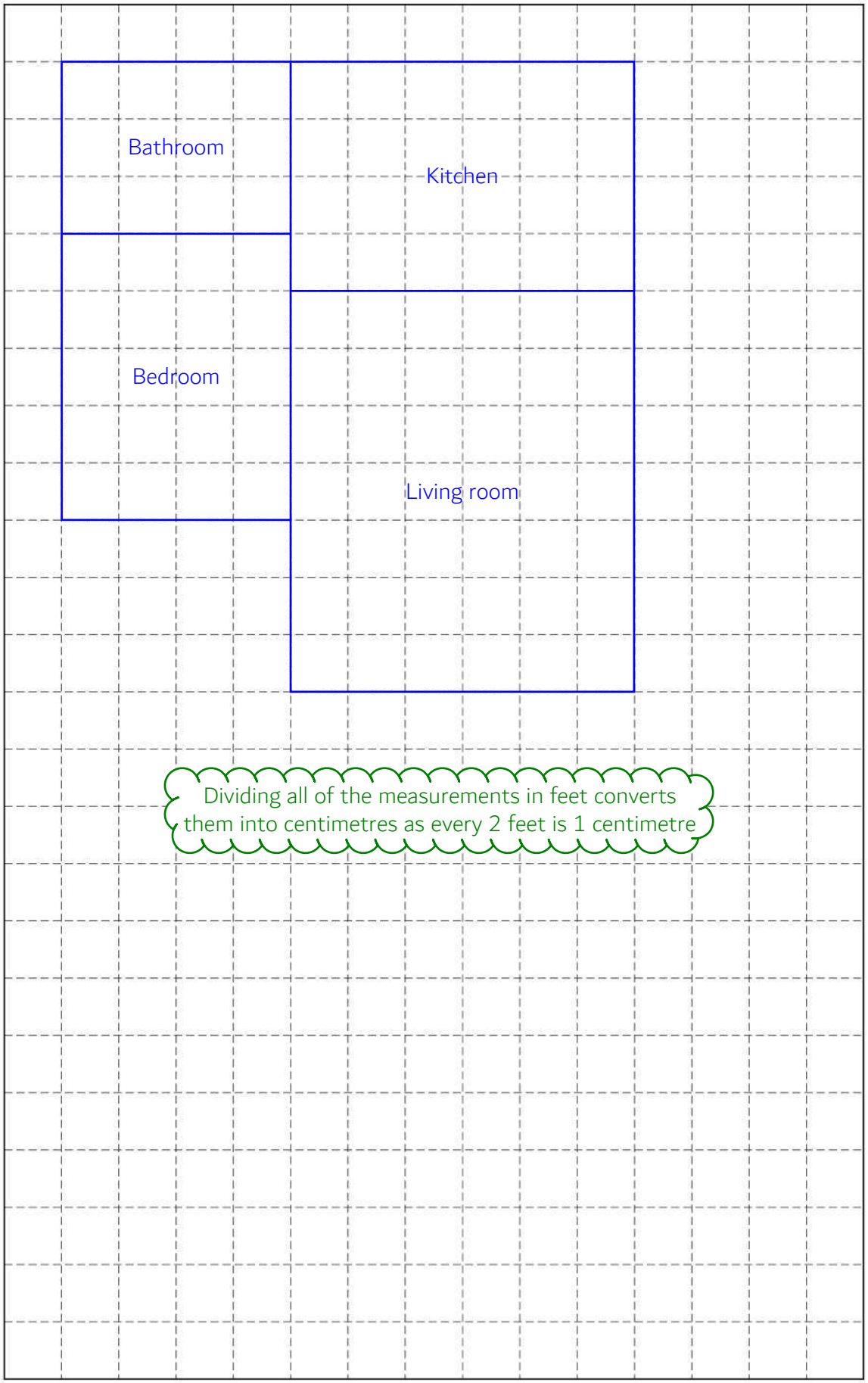
Not drawn accurately

On the grid on the opposite page, make an accurate scale drawing of the plan.
Label each room.

Use a scale of 1 cm represents 2 feet

[3 marks]

Scale: 1 cm represents 2 feet



Do not write outside the box

3

Turn over ►

Do not write outside the box

7 Here are two groups of numbers, A and B.

Group A

19	11
14	32
16	9

Group B

31	18
28	12

One number is moved from A to B.

The sum of the numbers in B is now 20 **more** than the sum of the numbers in A.

Which number is moved?

You **must** show your working.

[3 marks]

$19+11+14+32+16+9-x+20=31+18+28+12+x$

On the left side: adding up all the numbers in Group A. Subtracting x, which is the number that has been moved. This expresses the new sum of Group A. Adding 20 makes it equal to the new sum of the numbers in Group B as the sum of B is 20 more.

On the right side: adding up all the numbers in Group B. Adding x, which is the number that has been moved. This expresses the new sum of Group B

$32=2x$

The right side had the most x so adding x to both sides gets rid of the -x on the left and collects all the x terms on one side while keeping them positive. x + x = 2x. Subtracting all the other numbers from the right side gives 19 + 11 + 14 + 32 + 16 + 9 + 20 - 31 - 18 - 28 - 12 = 32 on the left side

Answer 16

Dividing both sides by 2 to get rid of the 2 on the right side gives 16 = x, so the number moved is 16

Do not write outside the box

8 Beth sells hot dogs at a market.

Each hot dog is a sausage in a bread roll.

Hot dogs
£3 each

The table shows her costs.

Fee paid to market	£240
Bread rolls	42p per pack of 6
Sausages	£2.50 per jar of 10
Other costs	£57

Beth sells the hot dogs for £3 each.

She sells 300 hot dogs.

Work out her total profit.

Subtracting the costs from the income gives the profit

[5 marks]

$300\times3-240-\frac{300}{6}\times0.42-\frac{300}{10}\times2.50-57$

Other costs

300 hot dogs for £3 each. This works out the income

Fee paid to market

Cost of the bread rolls. Dividing the 300 bread rolls needed by 6 which are in each pack gives the number of packs needed. Multiplying this by the cost of each pack

Cost of the sausages. Dividing the 300 sausages needed by 10 which are in each jar gives the number of jars needed. Multiplying this by the cost of each jar

Answer £ 507

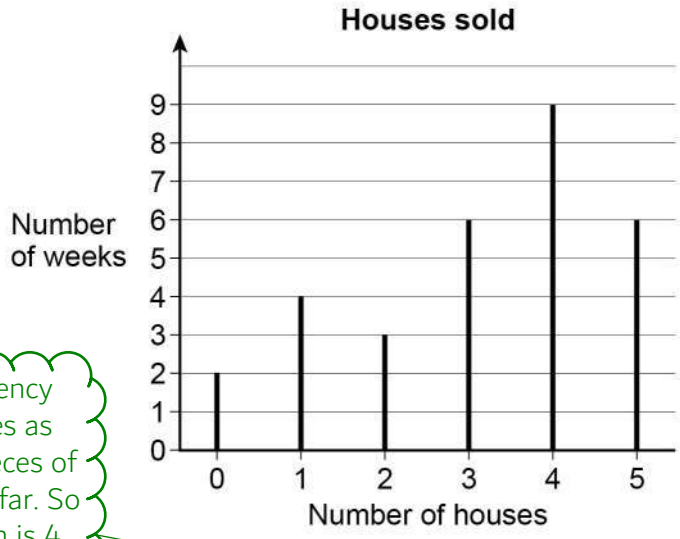
8

Turn over ►

Do not write outside the box

9 A company sells houses.

The line graph shows the number sold per week for 30 weeks.



Doing a cumulative frequency (adding up the frequencies as they go) tells how many pieces of data have been counted so far. So the 15th is 3 and the 16th is 4

2 6 9 15 24

9 (a) Work out the range of the number of houses sold per week.

[2 marks]

5 − 0

Range = largest - smallest. The largest number sold in a week were 5. The smallest number sold in a week were 0

Answer 5

9 (b) Work out the median number of houses sold per week.

[2 marks]

$\frac{30+1}{2} = 15.5$

Using (n + 1)/2, where n is the number of pieces of data, tells us which value is the median. This will be halfway between the 15th and 16th

Answer 3.5

Halfway between 3 and 4 is 3.5

Do not write outside the box

9 (c) The company sells three houses.

The prices are £185 000, £239 000 and £136 000

The company earns 2% commission on each house.

In total, how much commission does the company earn on these three houses?

[3 marks]

0.02(185000+239000+136000)

2% as a decimal is 0.02 (this can be found by dividing 2 by 100).
Multiplying the total prices of the houses by 0.02 finds the 2% commission

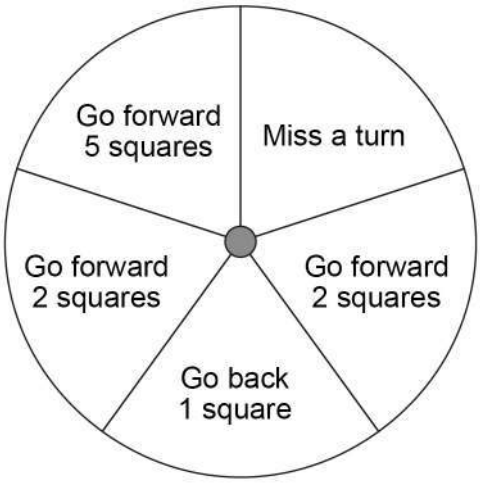
Answer £ 11200

Turn over for the next question

7

Do not write outside the box

10 In a game, a fair spinner has five equal sections as shown.



10 (a) Chloe spins the spinner.

Write down the probability that she gets 'Miss a turn'.

[1 mark]

Answer $\frac{1}{5}$

1 out of the 5 equal sections are 'Miss a turn'

10 (b) The spinner lands on 'Go back 1 square' three times in a row.

Jamal is next to spin.

Write down the probability that he gets 'Go back 1 square'.

[1 mark]

Answer $\frac{1}{5}$

1 out of the 5 equal sections are 'Go back 1 square'

Do not write outside the box

10 (c) In one game there are 85 spins.

How many of these spins are expected to be 'Go forward 2 squares'?

[2 marks]

$\frac{2}{5} \times 85$ ← 2 out of the 5 equal sections are 'Go forward 2 squares' so the probability of it being this is 2/5. We would expect 2/5 of the 85 spins to be it

Answer 34

11 Circle the cube number.

[1 mark]

9 10 000 333 (729)

Cube numbers are the result of cubing a number so therefore they can be cube rooted to get a whole number. $\sqrt[3]{729} = 9$

12 How many minutes is 225 seconds?

Circle your answer.

[1 mark]

$2\frac{5}{12}$ $2\frac{1}{4}$ $3\frac{1}{4}$ $3\frac{3}{4}$

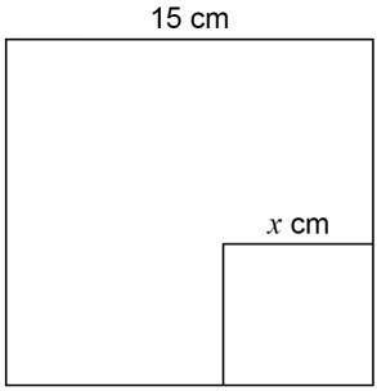
There are 60 seconds in a minute so dividing 225 by 60 converts it into minutes

6

Do not write outside the box

13 A small square has length x cm

A large square has length 15 cm



Not drawn accurately

The area of the small square is $\frac{1}{9}$ of the area of the large square.

Work out the value of x.

[3 marks]

$\sqrt{\frac{1}{9} \times 15^2}$

Area of square = length^2. So 15^5 works out the area of the large square. Finding 1/9 of this area gives the area of the small square. Square rooting this area gives the side length of the small square, x

Answer 5

Do not write outside the box

14 (a) The term-to-term rule of a sequence is

Add 8 and divide by 2

The first term of the sequence is –24

Work out the next two terms.

[2 marks]

Press -24 then =
(Ans + 8)/2 = -8
(Ans + 8)/2 = 0

Answer -8 and 0

14 (b) The term-to-term rule of a different sequence is

Subtract 1 and multiply by 5

The third term of this sequence is 120

…….. …….. 120

Work out the first term.

[2 marks]

$\frac{120}{5} + 1 = 25$

$\frac{25}{5} + 1$

Doing the exact opposite in the opposite order twice to work out the second term then the first term

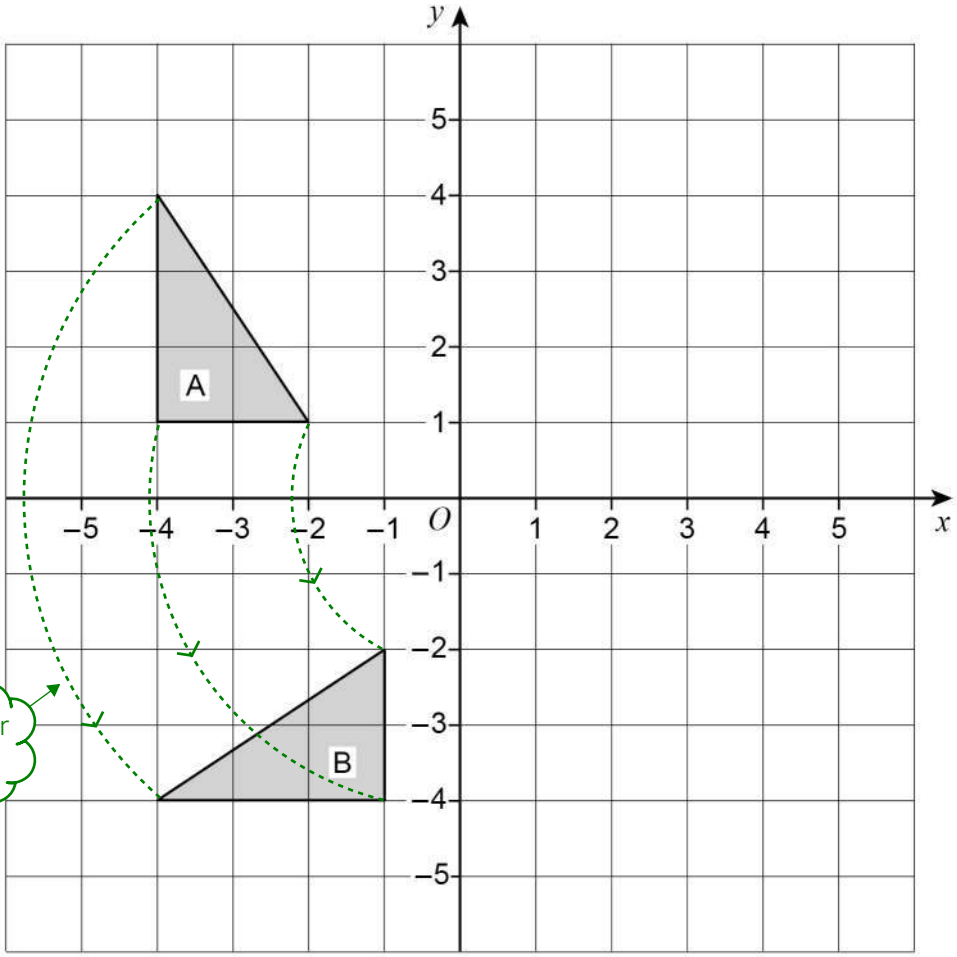
Answer 6

7

Do not write outside the box

15 Describe fully the **single** transformation that maps shape A to shape B.

[3 marks]



The centre of the circular motion is at (0 , 0)

Rotation 90 degrees anticlockwise around (0 , 0)

Do not write outside the box

16 Amal drives her car for work.

She claims 40p per mile from her employer.

Amal's car travels 52 miles for each gallon of petrol.

She pays £5.36 per gallon for petrol.

On one journey Amal drives 260 miles.

For this journey, how much **more** does she claim than she pays for petrol?

[4 marks]

$260 \times 0.40 - \frac{260}{52} \times 5.36$

40p is £0.40. Multiplying this by the 260 miles travelled gives the money claimed from her employer.

Every 52 miles travelled uses a gallon of petrol so dividing the 260 miles travelled by 52 gives the number of gallons used as it works out how many lots of the 52 go into 260. Multiplying this number of gallons by the £5.36 per gallon gives what she pays for the petrol.

Subtracting what she pays for the petrol from what she claims from her employer gives how much more she claimed than paid for petrol

Answer £ 77.20

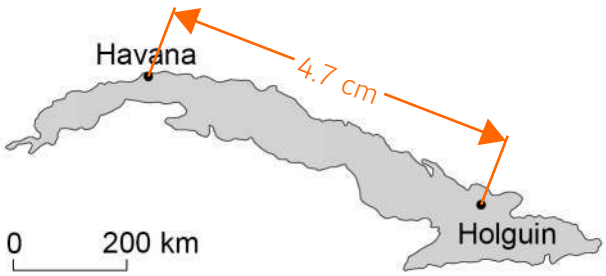
Turn over for the next question

7

Do not write outside the box

17 Here is a map of Cuba.

1.5 cm represents 200 km



Work out the actual distance from Havana to Holguin.

[3 marks]

$\frac{4.7}{1.5} \times 200$

Dividing the measured distance of 4.7cm by 1.5cm works out how many lots of 1.5cm it is, and therefore how many lots of the 200km it is

Answer 626.6 km

Do not write outside the box

18 Four friends all give each other presents.

The total cost of the presents is £83.40

Work out the mean cost of a present.

[3 marks]

$\frac{83.40}{4 \times 3}$

Mean = total/number. The total is £83.40. The number is 4 lots of 3 as there are 4 friends and they each give 3 presents

Answer £ 6.95

Turn over for the next question

6

Do not write outside the box

19 A forest has 6500 trees.

The trees are beech or maple.

number of beech : number of maple = 1.6 : 1

19 (a) What fraction of the trees are beech?

[2 marks]

$\frac{1.6}{1.6+1}$

Expressing the number of parts for beech as a fraction of the total number of parts in the ratio

Answer $\frac{8}{13}$

19 (b) Write number of beech : number of maple in the form $1 : n$

[1 mark]

Answer 1 : 0.625

Dividing 1.6 on the left side of the ratio by 1.6 gives 1 so the right side needs to be divided by 1.6 too. 1/1.6 = 0.625

Do not write outside the box

20 A shape is translated by the vector $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$

In which direction does the shape move?

Circle your answer.

[1 mark]

(up) down left right

The top number of the vector is the x direction. The bottom number of the vector is the y direction. As it moves 0 in the x direction it doesn't move left or right. As it is positive in the y direction it moves up

21 The length of a table is 110 cm to the nearest cm

Complete the error interval.

[2 marks]

109.5 cm ⩽ length < 110.5 cm

The resolution is 1cm. Halving this gives 0.5. Adding and subtracting 0.5 from 110 gives the upper and lower bound

Turn over for the next question

6

Do not write outside the box

22 $k = n^2 + 9n + 1$

Mo says,

"k will be a prime number for all integer values of n from 1 to 9"

Show that Mo is wrong.

You **must** show that your value of k is **not** prime.

[3 marks]

11, 23, 37, 53, 71, 91, 113, 137, 163

Use table mode by pressing menu then 3. Set f(x) = x^2 + 9x + 1. Ignore g(x). Start: 1. End: 9. Step: 1. This lists out all of the values of k needed

$91 = 7 \times 13$

This shows that 91 isn't prime as prime numbers only have two factors, themselves and 1

FACT B
0 , ,,

To check if a number is prime by using your calculator, enter the number, press equals, press SHIFT then press FACT (the button on the left). This expresses the number as a product of prime factors. If it comes back as itself, it must be prime

Do not write outside the box

23 At a café,

2 teas and 1 coffee cost £3.40

1 tea and 4 coffees cost £7.30

Work out the cost of 1 tea and the cost of 1 coffee.

[4 marks]

$2t + C = 3.40$ ← 2 teas and 1 coffee cost £3.40. This is expressed as an equation

$2t + 8C = 14.60$ ← 1 tea and 4 coffees cost £7.30. This is multiplied by 2 to make an equation with the same number of t as the first equation

$7C = 11.20$ ← Solving the equations simultaneously. Subtracting the first equation from the second equation cancels out the t terms

$C = 1.60$ ← Dividing both sides by 7

$t = 7.30 - 4(1.60)$ ← 1 tea and 4 coffees cost £7.30. Substituting in the cost of a coffee and subtracting the 4 coffees to leave the price of 1 tea

Tea £0.90

Coffee £1.60

Turn over for the next question

7

Do not write outside the box

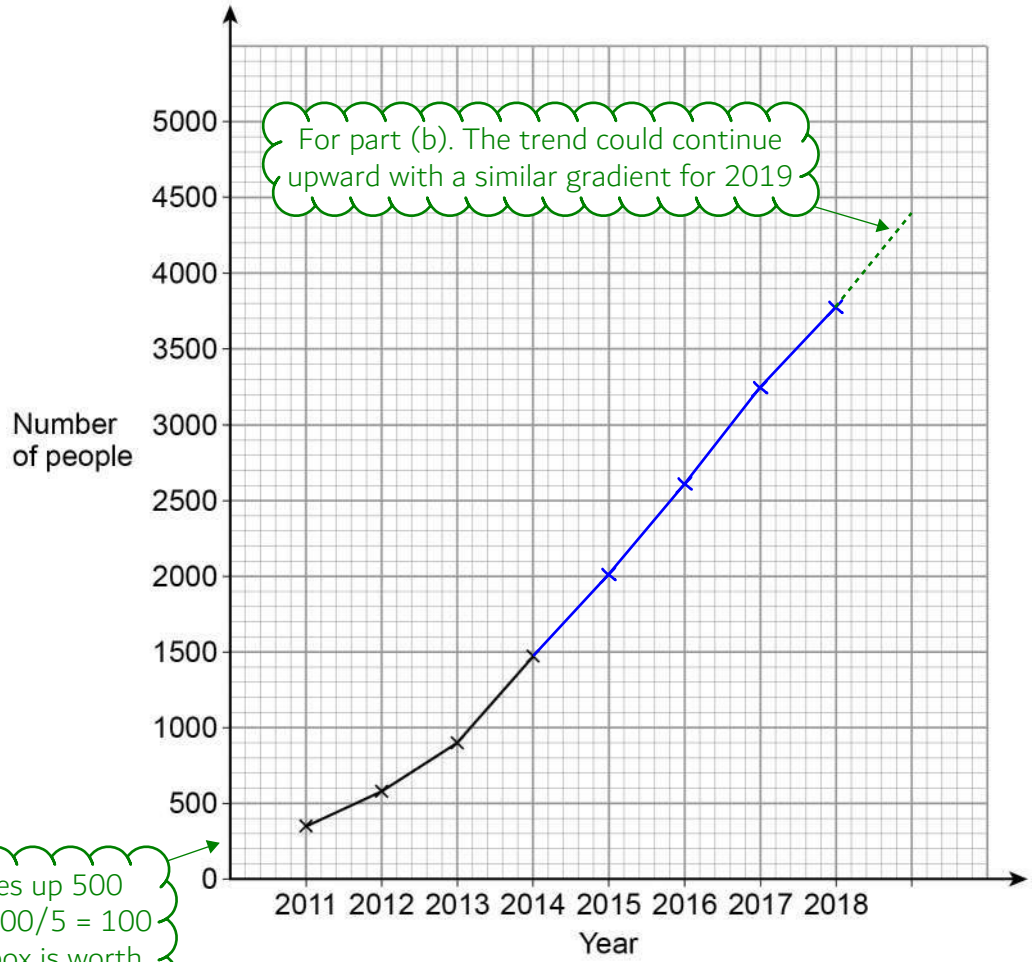
24 A music festival has taken place each year from 2011

The table shows the number of people who attended each year.

Year	2011	2012	2013	2014	2015	2016	2017	2018
Number of people	350	583	906	1471	2023	2612	3251	3780

The festival organisers draw a time series graph to represent the data.

The first four years have been plotted.



For part (b). The trend could continue upward with a similar gradient for 2019

The scale goes up 500 over 5 boxes. 500/5 = 100 so each little box is worth 100 in the y direction

Values plotted for 2015, 2016, 2017 and 2018 then joined up with a series of straight lines

Do not write outside the box

24 (a) Complete the graph.

[2 marks]

24 (b) Use the graph to estimate the number of people who will attend the festival in 2019

[2 marks]

Answer 4400

Turn over for the next question

4

Do not write outside the box

25 Doug owes an amount of £600

He wants to pay back this amount in five months.

He says,

"Each month, I will pay back 20% of the amount I still owe."

Show working to check if his method is correct.

[3 marks]

$600 \times 0.8^5 = 196.608$

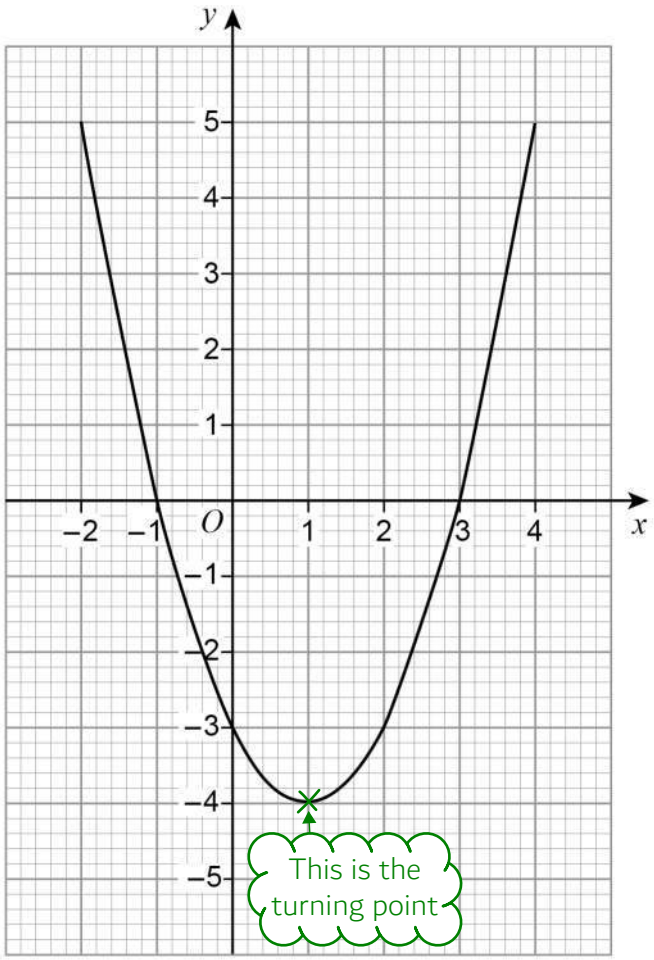
100% - 20% = 80%, so paying back 20% leaves 80% of the amount he owes. 80% as a decimal is 0.8 so multiplying by this reduces the amount by 20%. Multiplying by 0.8 5 times reduces it by 20% 5 times. Multiplying by 0.8 5 times is the same as multiplying by 0.8^5

No

The method is wrong as there is still about £196.61 left to pay

Do not write outside the box

26 Here is a quadratic graph.



Circle the x-coordinate of the turning point of the graph.

[1 mark]

−4 −1 (1) 3

Turn over for the next question

4

Do not write outside the box

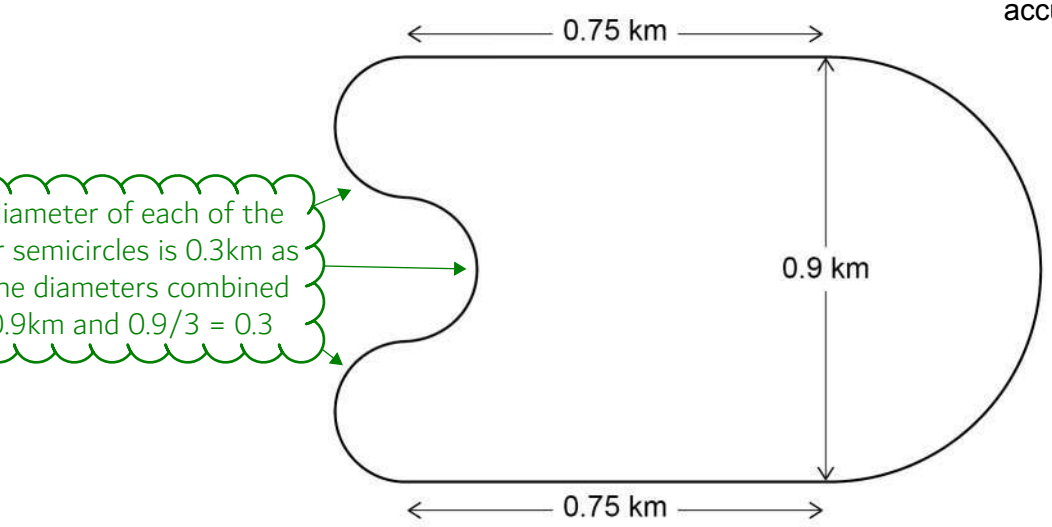
27 A motor racing circuit consists of

two parallel straight sections, each of length 0.75 km

a semicircle of diameter 0.9 km

three equal, smaller semicircles.

Not drawn accurately



The diameter of each of the smaller semicircles is 0.3km as 3 of the diameters combined are 0.9km and 0.9/3 = 0.3

The length of a motor race must be greater than 305 km

What is the lowest number of **full** laps needed at this circuit?

You **must** show your working.

[5 marks]

$$\frac{305}{0.75\times2+\frac{1}{2}\times\pi\times0.9+\frac{1}{2}\times\pi\times0.3\times3}=70.5$$

Dividing the 305km by the distance of one full lap gives the number of laps needed

Two parallel straight sections, each of length 0.75km

A semicircle of diameter 0.9km

Three equal, smaller semicircles

Circumference = π x diameter
As they are semicircles, the circumference is halved to find the curved length

70.5 is rounded up to 71 as the question asks for full laps and 70 laps isn't enough

Answer 71

Do not write outside the box

28 Solve $8 > 3 - \frac{1}{2}x$

[2 marks]

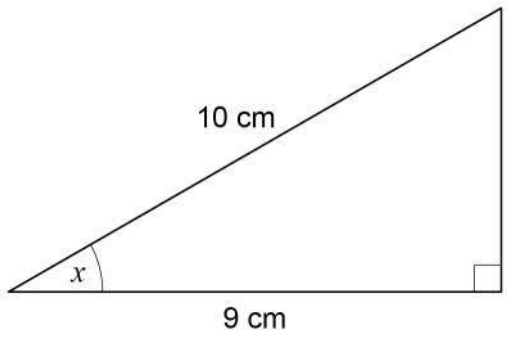
$\frac{8-3}{-\frac{1}{2}} < x$

Rearranged to make x the subject by subtracting 3 then dividing by -1/2. When dividing by a negative, the inequality needs to flip

Answer $x > -10$

29 Use trigonometry to work out the size of angle x.

[2 marks]



Not drawn accurately

$SOH\,CAH\,TOA$

Listing SOH CAH TOA as formula triangles then ticking what we have. A is ticked as 9cm is the adjacent and H is ticked as 10cm is the hypotenuse

$x = \cos^{-1}\left(\frac{9}{10}\right)$

From the formula triangle, cos(x) = adjacent/hypotenuse. Rearranging this and substituting in the adjacent and hypotenuse

Answer 25.8 degrees

END OF QUESTIONS

9