

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Tuesday 12 June 2018

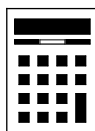
Morning

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.

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	

Advice

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



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

Answer **all** questions in the spaces provided

- 1 Circle the value of the digit 7 in 9.17

[1 mark]

$\frac{1}{70}$

$\frac{1}{7}$

$\frac{7}{10}$

$\frac{7}{100}$

The 9 is in the units column, the 1 is in the tenths column and the 7 is in the hundredths column

- 2 Solve $3x = 2$

Circle your answer.

[1 mark]

$x = -1$

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

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

$x = 6$

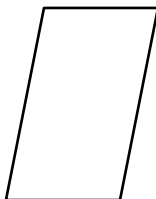
Dividing both sides by 3 solves for x

- 3 Which of these shapes has **no** lines of symmetry?

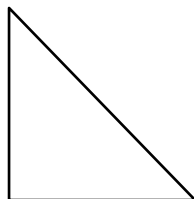
Circle the correct letter.

[1 mark]

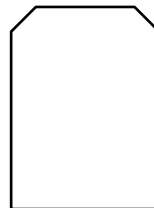
A



B



C



D



A line of symmetry is a line which cuts the shape in two so that both halves are a reflection of each other



- 4 Circle the shortest length.

[1 mark]

1200 cm

0.13 km

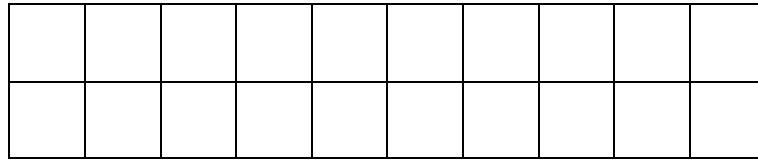
110 m

140 000 mm

Convert all of the lengths into metres. There are 100cm in a metre. There are 1000m in 1km. There are 1000mm in 1m

- 5 (a) Shade $\frac{2}{5}$ of this grid.

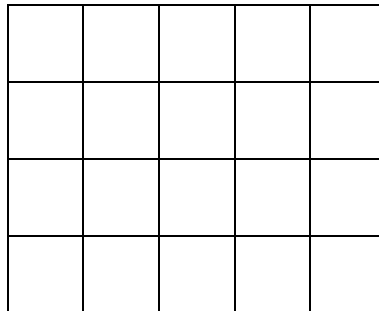
[1 mark]



Count how many squares there are and work out $\frac{2}{5}$ of this. Shade in this many squares. 'Of' means to multiply

- 5 (b) Shade 10% of this grid.

[1 mark]



Count how many squares there are and work out 10% of this. Shade in this many squares. 'Of' means to multiply



- 6** Saj wants to go to all 19 home games at a football club.
For each game, a ticket costs £28
A season ticket
costs £379
and
gives entry to all 19 home games.

In total, how much does Saj save by buying a season ticket?

[3 marks]

Work out how much it would cost to go to all 19 games without a season ticket. Subtracting the cost of the season ticket works out the difference and therefore how much was saved

Answer £ _____



- 7 Link the algebra to the correct description.
One has been done for you.

[3 marks]

$P = 3x + 4y$	Identity
$3x + 6 \equiv 3(x + 2)$	Equation
$3x + 2 = 14$	Formula
$3x + 2$	Inequality
$3x + 2 < 14$	Expression

The equation involves an equals sign. The inequality involves an inequality sign. The expression involves neither

Turn over for the next question

Turn over ►



8

Jim has six banknotes.

The value of each note is £5 or £10 or £20

He **can** make £20 with three notes.He **can** make £55 with four notes.He **cannot** make £25 with three notes.He **cannot** make £25 with four notes.

List the six notes.

[2 marks]

£ _____ £ _____ £ _____

£ _____ £ _____ £ _____

The only way of making £20 with three notes is using a £10 note and 2 £5 notes.
The only way of making £55 with four notes is using 2 £20 notes, a £10 note and a
£5 note. Using these two statements it should be possible to work out five of the
notes. For the last note, try another £5 note then if that makes it possible to make
the £25 with either three or four notes try another £10 note then if that makes it
possible to make the £25 with either three or four notes it must be another £20 note



9 A music app has a shuffle play function.
This means that songs are played in a random order **without repeat**.

9 (a) Ruth puts 10 songs on shuffle play.
One of them is her favourite song.
Write down the probability that her favourite song plays first.

[1 mark]

Answer _____

1 out of the 10 songs is her favourite

9 (b) Ted puts songs A, B and C on shuffle play.
List all the possible orders of songs A, B and C.
One has been done for you.

[2 marks]

A B C

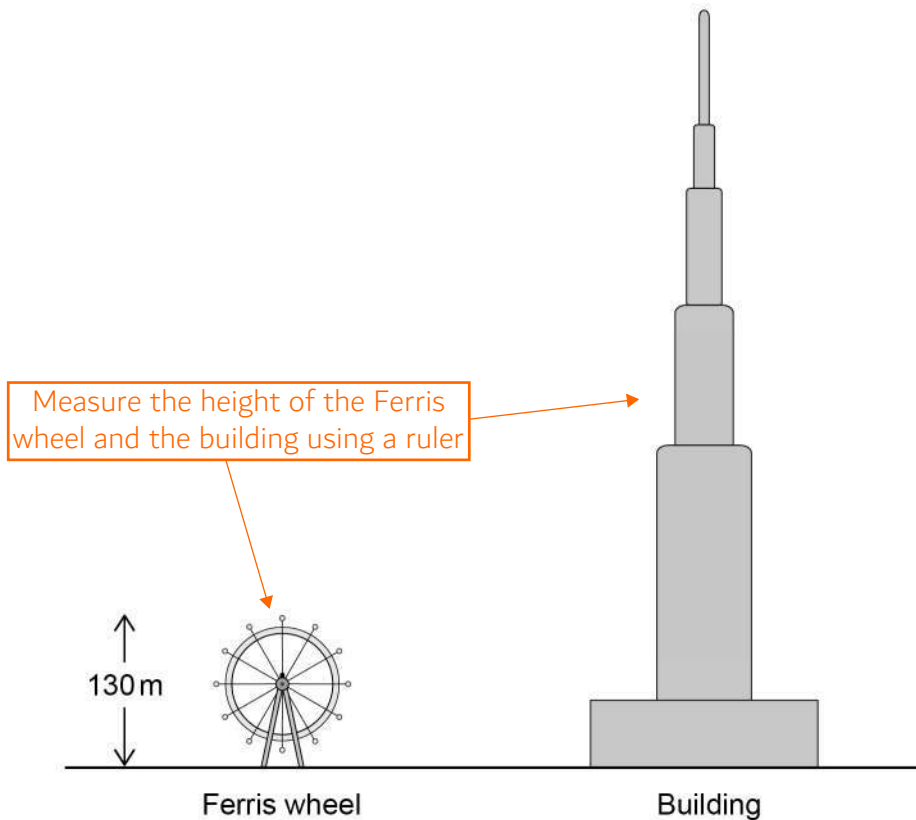
Use systematic listing to get all of the possibilities

Turn over for the next question



10

Here is a scale drawing.



The Ferris wheel has a height of 130 m

Work out the height of the building.

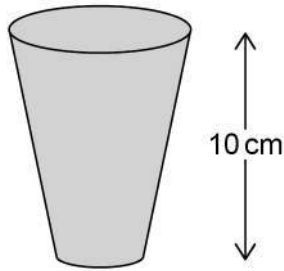
[3 marks]

Dividing the height of the building by the height of the Ferris wheel on the scale drawing works out how many times larger the building is. Multiplying this by the actual height of the Ferris wheel works out the actual height of the building

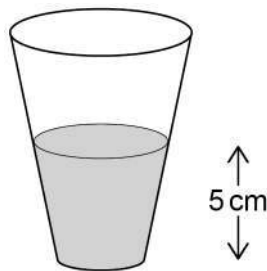
Answer _____ m



11 Jo has a full cup of coffee.



She drinks some of it.



She says,

“Half of the coffee is still in the cup, because 5 cm is half of 10 cm”

Is she correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

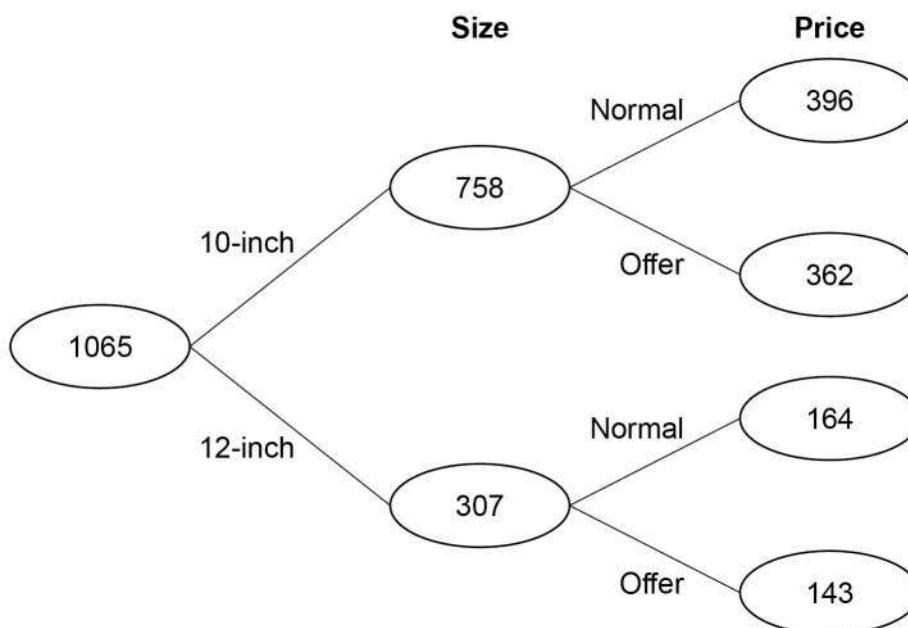
It is wider at the top



- 12** A takeaway sells 10-inch pizzas and 12-inch pizzas.
Here is some information about the numbers sold in two weeks.

Week 1

10-inch	512
12-inch	231
Total	743

Week 2

- 12 (a)** In each week a proportion of the pizzas sold were 10-inch.

In which week was this proportion greater?

Show working to support your answer.

[2 marks]

Express the fraction of the pizzas which were 10-inch for each week. If subtracting week 2 from week 1 gives a positive result week 1 must be a higher proportion

Answer _____



13 A car travels 3.5 miles in 5 minutes.

Work out the average speed in miles per hour.

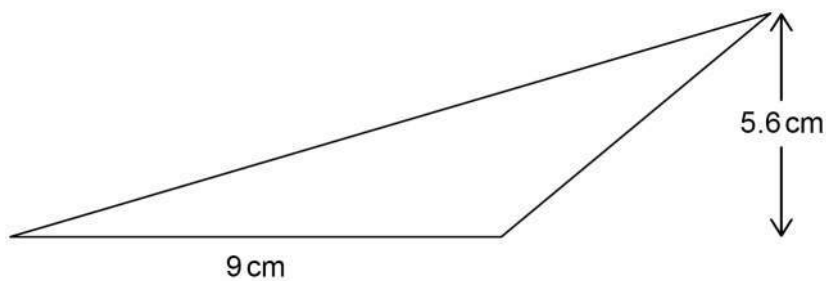
[3 marks]

The unit of miles per hour means the number of miles divided by the number of hours. Convert the minutes into hours using the fact there are 60 minutes in an hour

Answer _____ mph

14 A triangle has base 9 cm and perpendicular height 5.6 cm

Not drawn
accurately



Work out the area of the triangle.

[2 marks]

Area of triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

Answer _____ cm^2



- 15** Four positive whole numbers add up to 36
One of the numbers is a multiple of 7
The other three numbers are equal.

Work out the result when the four numbers are multiplied.

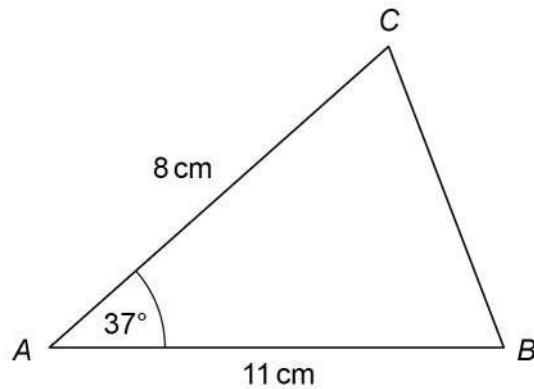
[3 marks]

Subtract multiples of 7, starting with the smallest, from 36 to work out what the total of the other three numbers would be. Dividing this by 3 works out what each of the other three numbers would be. Keep doing this until there is a whole number result. One of the numbers must be the multiple of 7 and the other three will be the result. Multiply them together

Answer _____



16

A sketch of triangle ABC is shown.Not drawn
accuratelyIn the space below, complete an accurate drawing of triangle ABC .**[2 marks]**

A horizontal line segment with endpoints labeled A and B .

Using a protractor, measure a 37° angle at point A
and draw a line 8 cm long at that angle from point A .
Then join up the end of the line and point B



- 17 Simplify $7x - (3x - 2x)$
Circle your answer.

[1 mark]

$7x - 1$

$2x$

$6x$

$8x$

Resolve the brackets first: $3x - 2x = \dots$

- 18 A competition
took place in 1983
takes place every six years.

Circle the year in which it will also take place.

[1 mark]

2083

2036

2049

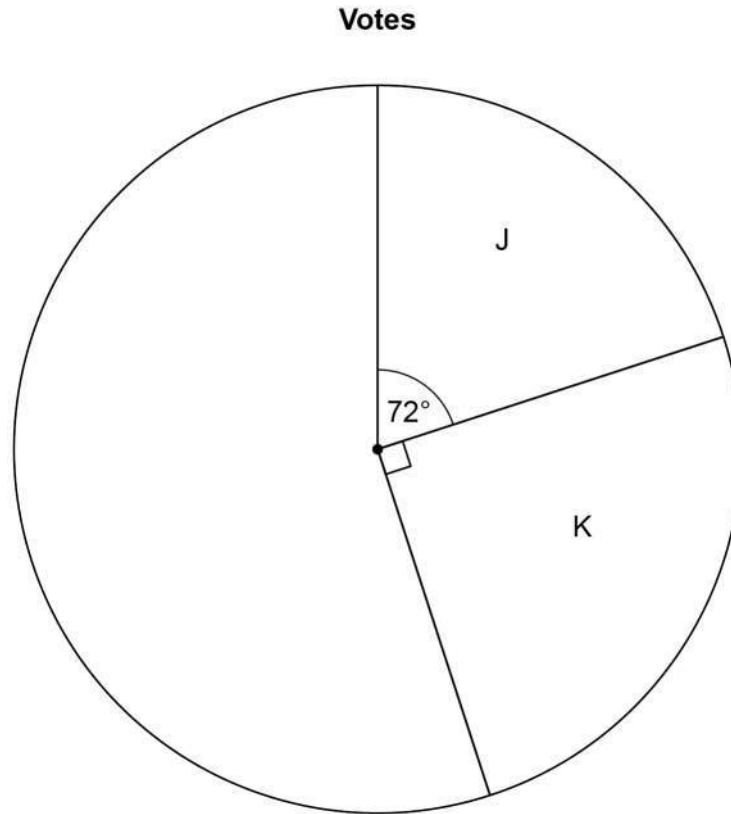
2023

Enter 1983 into the calculator and press =. Then press ANS + 6
and keep pressing equals until one of the years above appears

Turn over for the next question



- 19** In an election there were four candidates, J, K, L and M.
Fran is drawing a pie chart to show the results.
The sectors for J and K have been drawn.



- 19 (a)** Twice as many people voted for L as voted for M.
Complete the pie chart.

[3 marks]

Subtracting the angles for J and K from 360 works out the remaining degrees for L and M. The ratio of L to M is 2 : 1. There are 3 parts in total in this ratio so dividing by 3 works out what 1 part is worth, which represents the angle of M



19 (b) Altogether, 16 200 people voted.

How many voted for J?

[2 marks]

72 out of the 360 degrees were for J. Work out this fraction of the total number of voters

Answer _____

20 The probability that A is the outcome of an experiment is 0.2

Circle the probability that A is **not** the outcome.

[1 mark]

0 0.2 0.5 0.8

It is certain to either get A as the outcome or not A as the outcome. Therefore both probabilities must add to 1

21 Rearrange $e = 2f$ to make f the subject.

Circle your answer.

[1 mark]

$$f = 2e$$

$$f = \frac{2}{e}$$

$$f = e - 2$$

$$f = \frac{e}{2}$$

Dividing both sides by 2 makes f the subject

Turn over for the next question



22 Here is a rule for a sequence.

After the first two terms, each term is half the sum of the previous two terms

22 (a) Here is a sequence that follows this rule.

2 10 6

Show that the 6th term is the first one that is **not** a whole number.

[3 marks]

The previous two terms to the fourth term were 10 and 6. Adding these together works out the sum then dividing by 2 works out half of the sum



22 (b) A different sequence follows the same rule.

The 1st term is 4

The 3rd term is 9.5

4 9.5

Work out the 2nd term.

[3 marks]

Let x be the second term. Adding 4 and x then dividing by 2 expresses half of the sum of the two previous terms to the third term. This must be equal to 9.5 as this is the third term. Rearrange the equation to make x the subject to find x , the second term

Answer _____

Turn over for the next question



23

In a group of 20 people

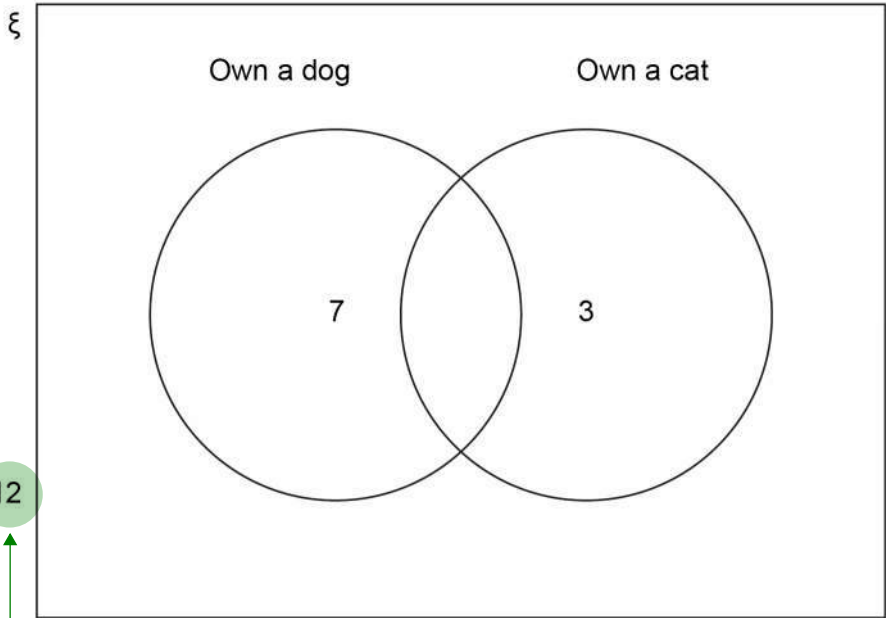
7 own a dog

3 own a cat

12 do not own a dog or a cat.

Try adding up how many people are represented by the diagram

Aidan shows this information on a Venn diagram.



12

There is something wrong with this

Make **two** criticisms of his Venn diagram.

[2 marks]

Criticism 1 _____

Criticism 2 _____



24

 a is a common factor of 72 and 120 b is a common multiple of 6 and 9Work out the highest possible value of $\frac{a}{b}$ **[4 marks]**

Express the highest common factor of 72 and 120 over the lowest common multiple of 6 and 9. The HCF of 72 and 120 is found by expressing them both as a product of prime factors then multiplying together the lowest power of each prime in both. The LCM of 6 and 9 is found by counting up in 9s until a multiple of 6 is reached

FACT B

To express a number as a product of prime factors, enter the number, press =, SHIFT then FACT (the button on the left)

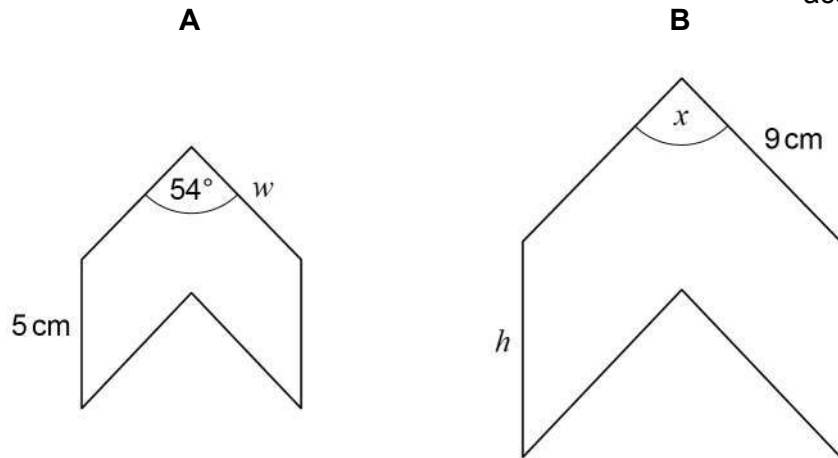
Answer _____

Turn over for the next question

25

A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

Not drawn
accuratelyWork out the values of x , h and w .**[3 marks]**

The angles in similar shapes are the same. Multiplying by the scale factor works out the bigger version of the same side. Dividing by the scale factor works out the smaller version of the same side

$$x = \underline{\hspace{10em}} \text{ degrees}$$

$$h = \underline{\hspace{10em}} \text{ cm}$$

$$w = \underline{\hspace{10em}} \text{ cm}$$



26 Investment A Save £150 per month for 2 years.
2.5% interest is added to the total amount saved.

Investment B Invest £3500
Compound interest is added at 3% per year.

After 2 years, how much **more** is investment B worth than investment A?

[4 marks]

Subtracting the worth of investment A from the worth of investment B works out the difference and therefore how much more investment B is worth than investment A. To increase by $x\%$, multiply by $(100 + x)/100$. Multiply by this twice (or raise it to the power of 2) to increase by $x\%$ twice. There are 12 months in a year so multiplying the amount saved per month in investment B by this works out how much is saved in 1 year

Answer £ _____

Turn over for the next question



27 (a) Show that the lines $y = 3x + 7$ and $2y - 6x = 8$ are parallel.

Do **not** use a graphical method.

[3 marks]

Parallel lines have the same gradient. Rearrange both equations into the form $y = mx + c$, where m is the gradient

27 (b) Is the point $(-5, -6)$ above, below or on the line $y = 3x + 7$?

Tick **one** box.

Above

Below

On the line

You **must** show your working.

Do **not** use a graphical method.

[2 marks]

Substitute the x coordinate of the point into the equation to find what y should be on the line. Compare -6 to the value it should be



28 The cost of a ticket increases by 10% to £19.25

Work out the original cost.

[3 marks]

If it is increased by 10%, it is now at 110% of the original value.
Dividing by 110 works out 1% of the original value. Multiplying
by 100 works out 100%, the full amount, of the original value

Answer £ _____

Turn over for the next question



29 The n th term of a sequence is $12n - 5$

Work out the numbers in the sequence that
have two digits
and
are **not** prime.

[3 marks]

Using table mode by pressing MENU then 3. $f(x) = 12x - 5$. Ignore $g(x)$. Start: 1. End: 30. Step: 1

This lists out the sequence up to the 30th term.
Write down the ones which have two digits

FACT B



Enter each number, press = then SHIFT then FACT (the button on the left)

This expresses each number as a product of prime
factors. If it comes back as itself it must be prime

Answer _____



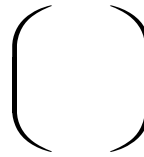
$$30 \quad \mathbf{a} = \begin{pmatrix} 6 \\ -10 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix} \quad \mathbf{c} = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$$

30 (a) Work out $\mathbf{a} + \mathbf{b} + \mathbf{c}$

[2 marks]

Add together the x components and y components separately. Column vectors are in the form $\begin{pmatrix} x \\ y \end{pmatrix}$

Answer



30 (b) Show that $\mathbf{a} + 2\mathbf{c} = k\mathbf{b}$, where k is an integer.

[2 marks]

Work out the x components and y components separately. $z\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} zx \\ zy \end{pmatrix}$. After working out $\mathbf{a} + 2\mathbf{c}$ as a column vector, k is how many lots of vector \mathbf{b} it is

END OF QUESTIONS

