

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 11 June 2019

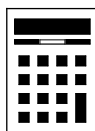
Morning

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	
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 2 in the answer to $5200 \div 10$

[1 mark]

$$5200 \div 10 = 520$$

2

20

200

2000

The 2 is in the tens place

- 2 Solve $x - 8 = 5$

Circle your answer.

[1 mark]

$x = -13$

$x = -3$

$x = 3$

$x = 13$

To solve, the equation needs to be rearranged to get x on its own. Do the opposite of subtracting 8 to both sides of the equation to get rid of the -8 on the left side

- 3 Circle the fraction that is equal to $2\frac{1}{4}$

[1 mark]

$\frac{7}{4}$

$\frac{9}{4}$

$\frac{21}{4}$

$\frac{25}{4}$

Type into the calculator. It will convert it into an improper fraction in its simplest form



4 Circle the expression which means x divided by y

[1 mark]

$$\frac{x}{y}$$

$$\frac{y}{x}$$

$$\frac{1}{xy}$$

$$\frac{1}{x+y}$$

Division can be written as a fraction. What we are dividing by becomes the denominator

5 Put these numbers in order from smallest to largest.

$$\frac{31}{40}$$

$$\frac{3}{4}$$

$$\frac{7}{10}$$

0.725

[2 marks]

Type into the calculator and press the SD button to convert into a decimal

To order the decimals, compare the units then the tenths then the hundredths and then the thousandths (if necessary)

Smallest _____

Largest _____



- 6** Josh downloads album A.
A has 11 tracks.
Each track on A costs the same.
The total cost of downloading A is £8.80
- Josh also downloads album B.
B has 14 tracks.

- 6 (a)** Work out the total cost of downloading B.
Assume each track costs the same as a track on A.

[3 marks]

First work out the cost of each track on A then
multiply this by the number of tracks on B

Answer £ _____



- 6 (b) In fact, compared to the cost of each track on A
the cost of 6 tracks on B is **more** by 5p each
the cost of 8 tracks on B is **less** by 5p each.

What does this tell you about your answer to part (a)?

Tick **one** box.

The total cost is **less** than my answer to part (a)

The total cost is **more** than my answer to part (a)

The total cost is **the same** as my answer to part (a)

Give a reason for your decision.

$$6 \times 5 - 8 \times 5 = -10$$

[2 marks]




Turn over for the next question

Turn over ►



- 7 The pictogram shows information about the houses in a street.
Each house has 3, 4 or 5 bedrooms.

Key:  represents 2 houses

3-bedroom houses	
4-bedroom houses	
5-bedroom houses	

In total, how many bedrooms do these houses have?

[3 marks]

$$4.5 \times 2 \times 3$$

There are 4.5 pictures for the 3-bedroom houses and each one represents 2 houses. Multiplying 4.5 by 2 works out how many houses have 3 bedrooms. Multiplying this by 3 works out how many bedrooms these houses have

Answer _____



- 8 Four positive whole numbers add up to 84
One of the numbers is a multiple of 17
The other three numbers are equal.
What are the four numbers?

[3 marks]

17 is the first multiple of 17. 17×2 works out the second and 17×3 works out the third. Subtracting each of these from 84 works out how much would be left over for the other three numbers. Dividing this by 3 works out what the three other numbers would be

Answer _____

Turn over for the next question

Turn over ►



- 9 Jim wants to buy 10 rolls of wallpaper.
He sees these prices.

Wallpaper	
Single roll	£12.50
Pack of 3 rolls	£34.50
Pack of 5 rolls	£58.75

What is the cheapest price for 10 rolls?

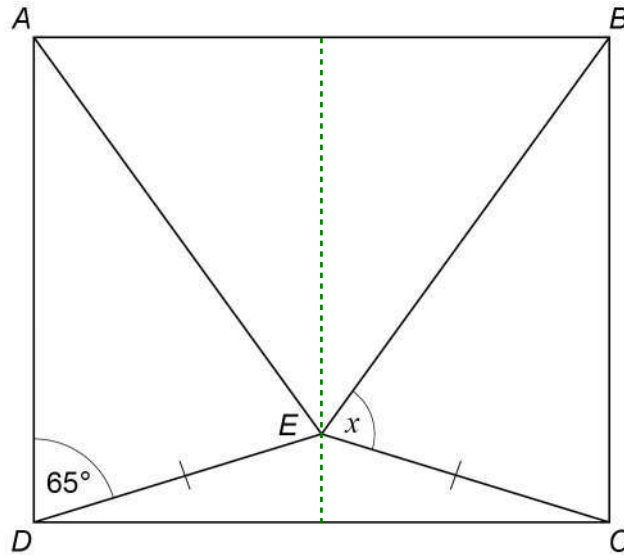
[4 marks]

Work out the cost of 10 single rolls. Then assume that Jim buys as many packs of 3 as possible (he may have to buy some single rolls to make it up to 10) and work out the cost of this. Then assume that Jim buys as many packs of 5 as possible and work out the cost of this. Compare the costs of the three options to work out the cheapest price

Answer £ _____



10

In rectangle $ABCD$ triangle ABE is equilateraltriangle CDE is isosceles, with $CE = DE$ Not drawn
accuratelyWork out the size of angle x .**[4 marks]**

Find angle EAB by using the fact that all angles in an equilateral triangle are the same and there are 180 degrees in total.

Find angle DAE by using the fact that the angle in a rectangle is a right angle.

Find angle AED by using the fact there are 180 degrees in total in a triangle.

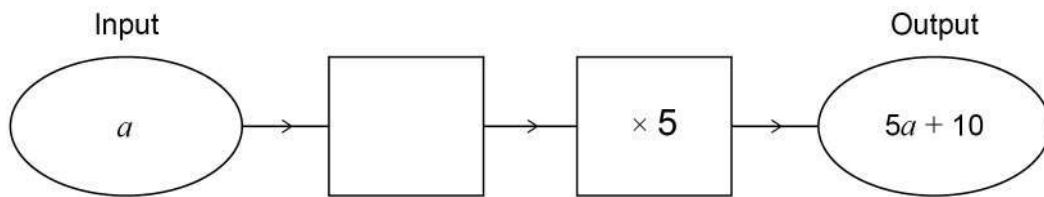
The whole shape is symmetrical as the rectangle, equilateral triangle and isosceles triangle all have a line of symmetry on this line. So x is the same as angle AED .

Answer _____ degrees

Turn over ►



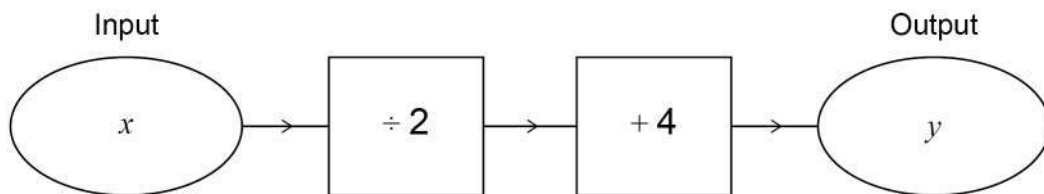
- 11 (a) Complete the number machine.



[1 mark]

Follow the machine backwards: do the opposite of multiplying by 5 to $5a + 10$ to work out what it was before it was multiplied by 5.

- 11 (b) Write down the output y in terms of x .



[1 mark]

Answer _____

Divide x by 2 then add 4



- 12** The first four triangular numbers are 1, 3, 6, 10
Circle the next triangular number.

[1 mark]

14

15

16

19

Start with 1. Add 2, then add 3, then add 4...

- 13** Write down **all** the prime numbers between 40 and 50

[2 marks]

Even numbers above 2 are not prime as they can be divided by 2 so 42, 44, 46 and 48 aren't prime.

Numbers in the times tables aren't prime as they can be divided.

As numbers between 40 and 50 are above the 3 times table, we need to check if the remaining numbers can be divided by 3 (no need to check if they can be divided by 4 as they would be even if they could). If they can't they must be prime

Answer _____

FACT B

Using the calculator to check if each number is prime: enter the number, press = then SHIFT then FACT. This expresses the number as a product of primes. If it comes back as itself, it must be prime as it can't be divided by any other primes

Turn over for the next question

Turn over ►



14

In this question use

$$1 \text{ cubic foot} = 6.23 \text{ gallons}$$

$$1 \text{ cubic foot} = 0.028 \text{ cubic metres}$$

Convert 3115 gallons into cubic metres.

[3 marks]

There is a conversion between cubic feet and cubic metres so first the gallons need to be converted into cubic feet. Every 6.23 gallons is 1 cubic foot so working out how many lots of 6.23 the 3115 is therefore works out how many cubic feet it is. Next convert it into cubic metres by considering that every cubic foot is 0.028 cubic metres

Answer _____ m^3 

15 Circle the correct statement.

Convert $\frac{1}{3}$ into a percentage to see which one is true

[1 mark]

$$\frac{1}{3} \leq 30\%$$

Less than
or equal to

$$\frac{1}{3} = 30\%$$

Equal to

$$\frac{1}{3} < 30\%$$

Less than

$$\frac{1}{3} \neq 30\%$$

Not equal to

16 Which shape **must** have rotational symmetry?
Circle your answer.

[1 mark]

isosceles triangle

trapezium

kite

parallelogram

Rotational symmetry: can be rotated
within 360 degrees and look the same

Turn over for the next question



- 17** A shop sells ice creams.
Each ice cream has two scoops.



The possible flavours are vanilla (V), strawberry (S), chocolate (C) and mint (M).
The two scoops can be the same flavour or different flavours.

- 17 (a)** List **all** the possible options for the two scoops.

[2 marks]

Use systematic listing to ensure all possibilities are listed

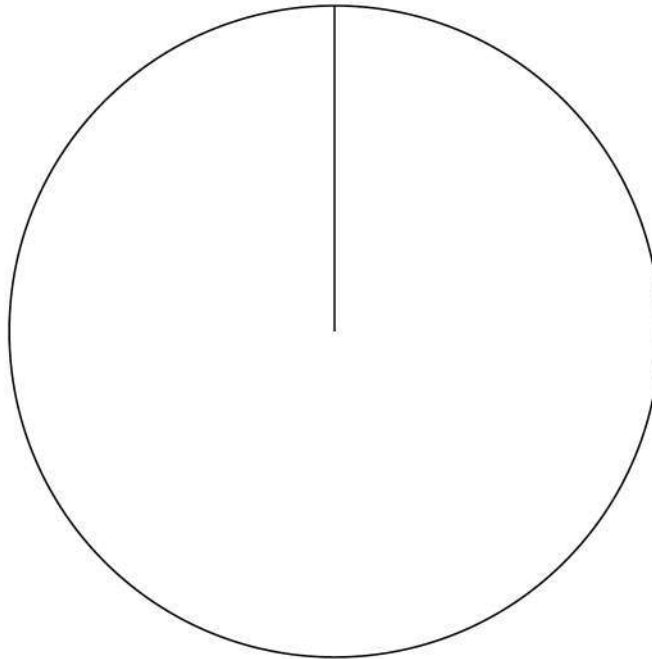


- 17 (b)** In one hour the shop sells 180 scoops of ice cream.
The number of scoops of each flavour is shown in the table.

Flavour	Vanilla	Strawberry	Chocolate	Mint
Number of scoops	45	75	50	10

Complete the pie chart to represent the data.

[4 marks]

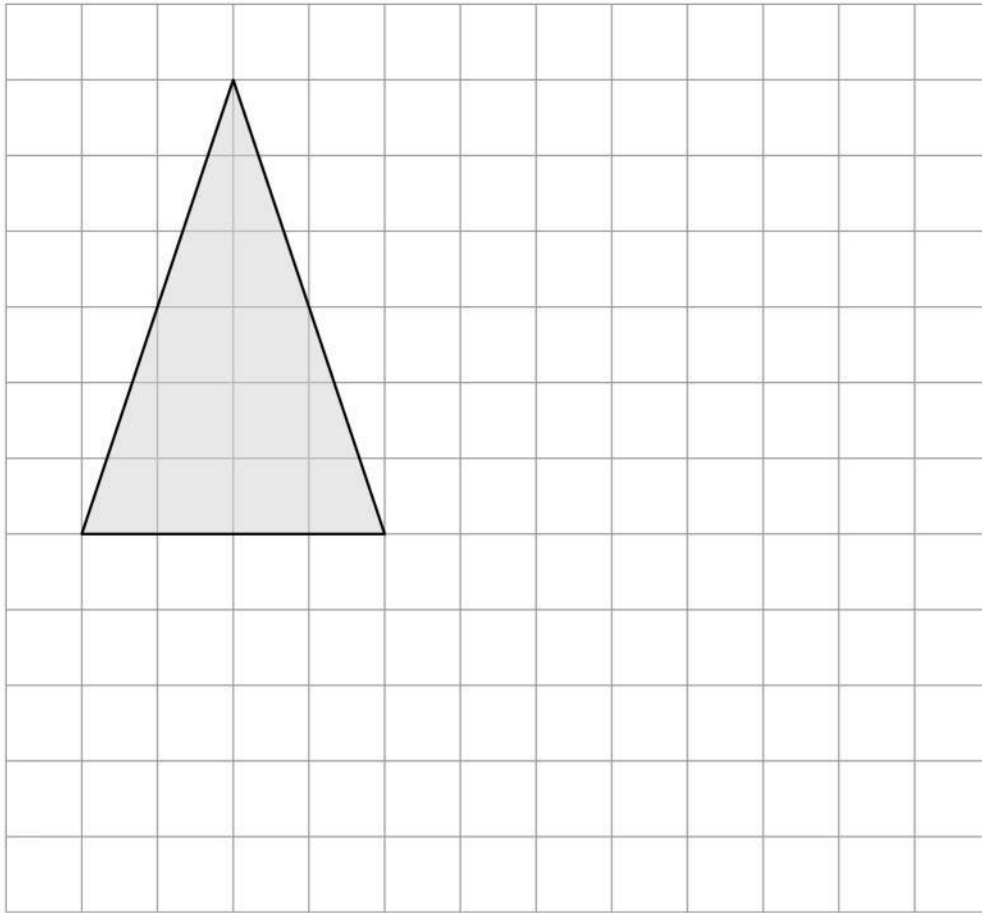


There are 360 degrees in total and this represents 180 scoops of ice cream.
Work out how many degrees represents 1 scoop. Then multiply each of the
number of scoops by this number to work out the number of degrees which
represents each flavour. Draw the angles on using a protractor



18

On the grid, draw an enlargement of the triangle with scale factor $\frac{1}{2}$

[2 marks]

Multiply the base and height of the triangle by $\frac{1}{2}$ to work out the new base and height



19 (a) Simplify fully $3a^2 + 7a + 3 - a^2 + 8a - 4$

[3 marks]

Collect the like terms. The terms can be added and subtracted in any order so $3a^2 - a^2$ can be done first

Answer _____

19 (b) Factorise fully $24y^2 - 20y$

[2 marks]

Put into brackets. Find the highest common factor of both terms and bring this outside. Leave the rest in a bracket after dividing the terms by the highest common factor

Answer _____

20 Solve $x^2 = 196$

[2 marks]

Do the opposite of squaring to both sides to get x on its own. There are two solutions of x

Answer _____



21

To the nearest pound, Jon has £9

To the nearest 50p, Ellie has £6.50

Work out the maximum possible total amount of money.

[3 marks]

To work out the upper bound for each person, add half of the resolution (what it goes up in, which is £1 for Jon and 50p for Ellie) but bear in mind the amounts of money can't quite be equal to the upper bounds as they would round up rather than down to £9 and £6.50

Answer £ _____



22 Here is a formula.

$$T = n^2 - \frac{12}{n}$$

22 (a) Work out T when $n = 5$

[1 mark]

Substitute 5 for n in the formula then type into the calculator

Answer _____

22 (b) Why is T **always** positive when n is negative?

[2 marks]

Consider if n^2 will be positive or negative. Consider if $-12/n$ will be positive or negative. Consider what both of these combined will be



23

In one hour a machine can make

600 nuts

or

720 bolts.

At 3 pm the machine starts working.

It makes 900 nuts and then changes to making bolts.

How many **bolts** will the machine make by 8 pm?

[4 marks]

Work out how many hours the machine works for. Subtract the number of hours it takes to make the 900 nuts. Multiply the number of hours left over by 720 to work out how many bolts are made

Answer _____



24 Two solids, J and K, have the same density.

Complete the table.

Include units in your answers.

[3 marks]

	J	K
Mass	48 g	78 g
Volume	8 cm ³	
Density		

d m v
 From the formula triangle:
 Density = mass/volume
 Volume = mass/density

To work out the units of density,
consider that g is divided by cm³

Turn over for the next question

Turn over ►



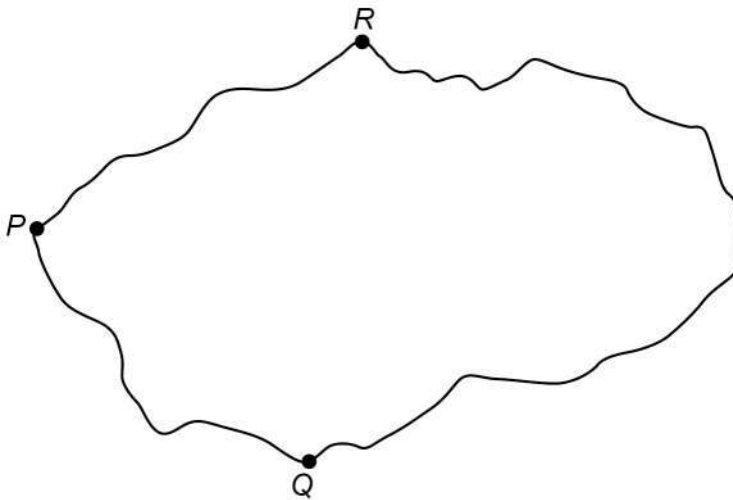
25

Towns P , Q and R are connected by roads PQ , PR and QR .

PR is 10 km longer than PQ .

QR is twice as long as PR .

The total length of the three roads is 170 km



Not drawn
accurately

Work out the length of PQ .

[4 marks]

Let x be PQ . Express PR and QR in terms of x . Express the total length of the three roads by adding them together. This makes an equation in terms of x which can be simplified, rearranged and solved

Answer _____ km



26

Mia wants to borrow £6000 and repay it, with interest, after two years.
She sees two offers for loans.

Offer 1
Compound interest
3% per year

Offer 2
Compound interest
First year 1%
Second year 5%

Mia says,

“I will pay back the same amount because the average of 1% and 5% is 3%”

Is she correct?

You **must** show your working.

[3 marks]

Work out how much needs to be paid back for both offers. If they are the same, she is correct.

$100\% + 3\% = 103\%$. Convert this into a decimal and multiply £6000 by it twice to increase £6000 by 3% twice. Do a similar method for Offer 2

Turn over for the next question



27

Here are two sets of numbers, A and B.

Set A

200	160
104	100

Set B

270	400	483
300	x	

mean of Set A : mean of Set B = 3 : 8

Work out the value of x .**[4 marks]**

Mean = total/number

Total = mean x number

Work out the mean of Set A. Use the ratio to work out the mean of Set B. Work out the total of the numbers in Set B then subtract the other numbers to leave x

Answer _____



28

A straight line

has gradient 4

and

passes through the point (5, 23)

Work out the equation of the line.

Give your answer in the form $y = mx + c$ **[3 marks]**

m is the gradient. c can be found by rearranging $y = mx + c$ to make c the subject and substituting in the gradient and the x and y coordinates from the point (5, 23)

Answer _____

Turn over for the next question**Turn over ►**

- 29 Two sides of a triangle have lengths 13 cm and 27 cm
Which of these is a **possible** length of the other side?
Circle your answer.

[1 mark]

~~13 cm~~

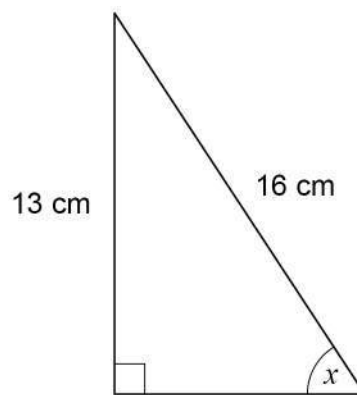
14 cm

27 cm

40 cm

It can't be 13cm as the two sides of 13cm combined are shorter than the 27cm. The two shorter sides combined need to be longer than the longest side to form a triangle

- 30 Here is a right-angled triangle.

Not drawn
accuratelyUse trigonometry to work out the size of angle x .

[2 marks]

S^O H C^A H T^O A

S: Sin of the angle
C: Cos of the angle
T: Tan of the angle
O: Opposite the angle
H: Hypotenuse (opposite the right angle)
A: Adjacent to the angle

Tick what we have. If there is two ticks on a formula triangle, it can be used. As we need to find an angle, an inverse trig function will be needed

Answer _____ degrees

END OF QUESTIONS

