Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

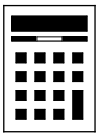
F

Foundation Tier Paper 3 Calculator

Tuesday 13 June 2017 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.
- 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	
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

1 Circle the lowest of these temperatures.

[1 mark]

–4.9°C 0°C –7°C 0.1°C

2 Circle the expression that is four times bigger than n.

[1 mark]

$n + 4$ $4n$ $\frac{n}{4}$ n^4

4 x n

3 Circle the fraction **greater** than $\frac{3}{10}$ = 0.3

[1 mark]

$\frac{1}{3}$ $\frac{3}{11}$ $\frac{4}{15}$ $\frac{29}{100}$

0.333... 0.272... 0.266... 0.29

4 Circle the value of 2^5

[1 mark]

10 25 (32) 64

5 (a) Simplify $a \times a \times a + b + b$

[2 marks]

Answer a^3+2b

5 (b) Simplify $5(x + 3) - x + 2$

[3 marks]

$5x+15-x+2$

Answer $4x+17$

Turn over for the next question

9

6 Twelve cards numbered 1 to 12 are put into six pairs.

Each pair has a total.

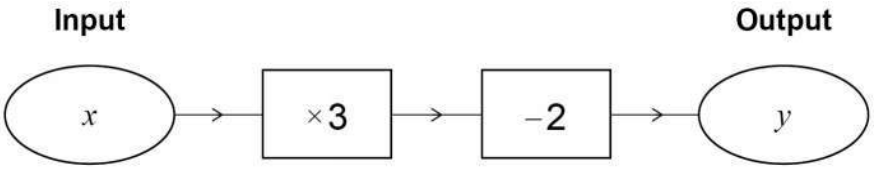
Complete the table to show the pairs and their totals.

[4 marks]

Cards	Total
1 and 2	3
6 and 3	9
4 and 7	11
9 and 5	14
11 and 8	19
12 and 10	22

Start with the highest as these are the hardest to make.

7 Here is a number machine.



7 (a) Work out the output when the input is 4

[1 mark]

4 X 3 − 2

Answer 10

7 (b) Work out the output when the input is –4

[1 mark]

−4 X 3 − 2

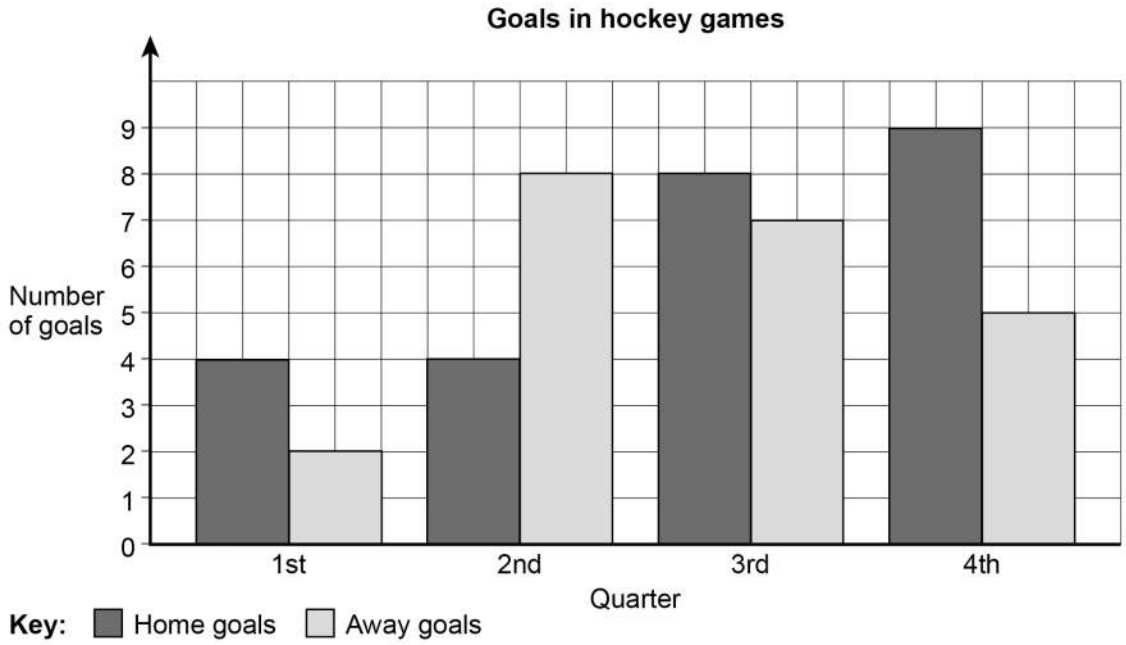
Answer −14

Turn over for the next question

6

8 Here is information about the goals scored in some hockey games.

Each game has four quarters.



8 (a) Which quarter was the mode for **away** goals?

Circle your answer.

[1 mark]

1st 2nd 3rd 4th

This had the highest of the light grey bars so has the highest frequency out of the away goals

8 (b) There were 10 games.

Work out the mean number of goals per game.

[2 marks]

$\frac{4+2+4+8+8+7+9+5}{10}$

Total goals / Number of games

Answer 4.7

8 (c) In total, how many **more** home goals were scored than away goals?

[2 marks]

$4+4+8+9=25$ Total number of home goals.

$2+8+7+5=22$ Total number of away goals.

$25-22$ Difference between home and away goals.

Answer 3

8 (d) Rob says,

"More home teams **must** have won because there were more home goals."

Is he correct?

Give a reason for your answer.

[1 mark]

No, lots of goals could have been scored in one game.

This would mean that fewer goals were scored in the other games so more might have been lost

6

9 (a) List **all** the factors of 30

1 x 30 = 30
2 x 15 = 30
3 x 10 = 10
5 x 6 = 30

[2 marks]

Answer 1, 30, 2, 15, 3, 10, 5, 6

9 (b) A factor of 30 is chosen at random.

What is the probability that it is a 2-digit number?

[1 mark]

3 out of 8 factors had two digits.

Answer $\frac{3}{8}$

10 Each shape below has an area of 24 cm^2

Complete the missing lengths.

[3 marks]

Area of rectangle = base x height
6 x 4 = 24

Rectangle

4 cm

Area of triangle = 1/2 x base x height

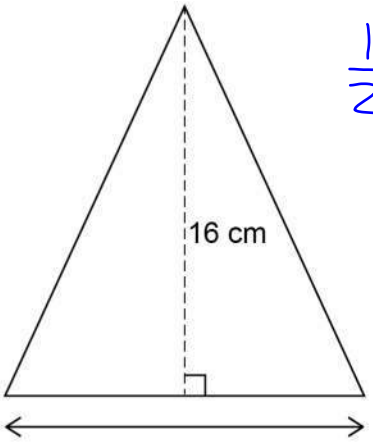
Not drawn accurately

$\frac{1}{2} b \times 16 = 24$

$b \times 16 = 48$

$b = \frac{48}{16}$

Triangle



3 cm

Turn over for the next question

6

11 A television channel shows 12 minutes of adverts in each half hour.

How many **minutes** of adverts does it show from 5 am to 11 pm?

[3 marks]

18 x 2 x 12

5am to 5pm is 12 hours. 5pm to 11pm is 6 hours. 18 hours in total. There are 2 half hours every hour so multiplying the number of hours by 2 works out how many half hours there are. For each half hour, there are 12 minutes of adverts so multiplying the number of half hours by 12 gives the total number of minutes of adverts

Answer 432 minutes

12 Put these probabilities in order, starting with the least likely.

44% $\frac{1}{4}$ 0.404 $\frac{4}{10}$

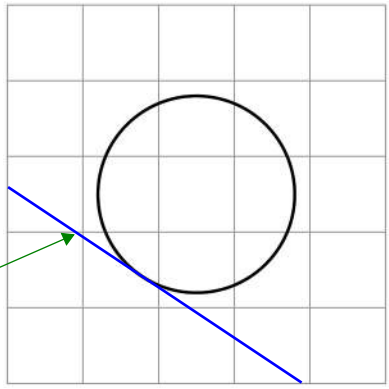
0.44 0.25 0.4

[2 marks]

Convert all into decimals to make it easier to compare. The smallest numbers are least likely.

Answer $\frac{1}{4}$, $\frac{4}{10}$, 0.404 , 44%

13 A circle is drawn on a centimetre grid.



Any straight line which just touches but doesn't cross the circle regardless of how long it is extended

13 (a) Draw a tangent to the circle.

[1 mark]

13 (b) Grace works out that the area of the circle is more than 9 cm^2

Why must this be wrong?

[1 mark]

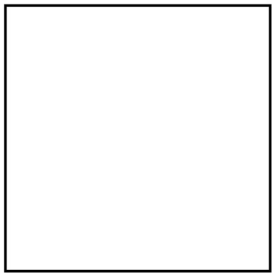
There are less than 9 whole Squares in the circle.

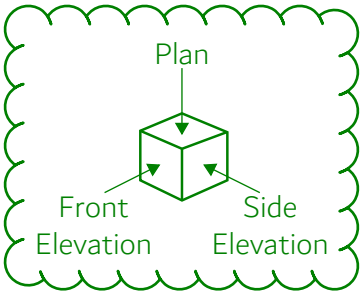
Turn over for the next question

7

14 (a) The front elevation, side elevation and plan of a solid are all the same, as shown.

Plan: a 2D representation as viewed from above.
Elevations: 2D representations as viewed from the sides.



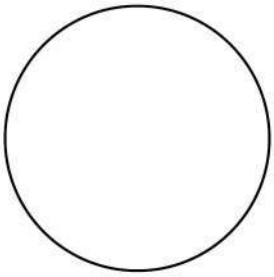


Write down the name of the solid.

[1 mark]

Answer Cube

14 (b) The front elevation, side elevation and plan of a solid are all the same, as shown.



Spheres look like a circle from all directions.

Write down the name of the solid.

[1 mark]

Answer Sphere

15 Show that there are **exactly** five 3-digit cube numbers.

[3 marks]

$4^3 = 64$

$5^3 = 125$

$6^3 = 216$

$7^3 = 343$

$8^3 = 512$

$9^3 = 729$

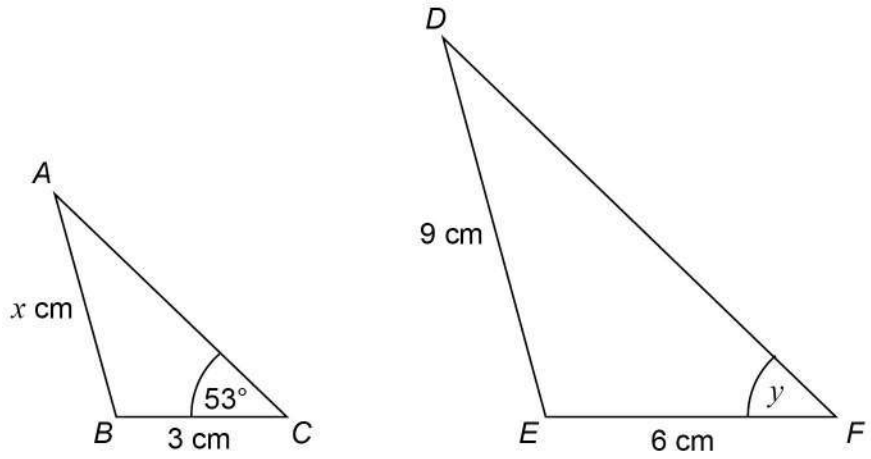
$10^3 = 1000$

Turn over for the next question

5

16 Triangles *ABC* and *DEF* are similar.

Not drawn accurately



16 (a) Work out the value of x.

[2 marks]

$\frac{6}{3} = 2$

This works out the scale factor between the triangles.

DE is the corresponding side to *AB*. All sides are 1/2 the size on *ABC*.

$\frac{9}{2}$

Answer _____

16 (b) Write down the size of angle y.

The angles in similar shapes are the same.

[1 mark]

Answer 53 degrees

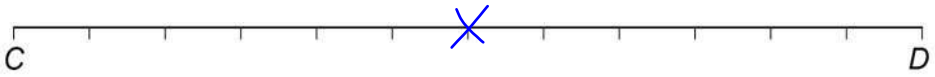
17 *CD* and *PQ* are lines of length 12 cm

17 (a) *CE* : *CD* = 1 : 2

Mark point *E* on the line with a cross.

CD is twice as far as *CE*. So *CE* must be half of the distance *CD*.

[1 mark]

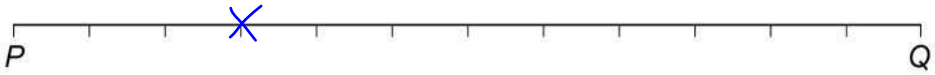


17 (b) *PR* : *RQ* = 1 : 3

Mark point *R* on the line with a cross.

PR is 1 part, *RQ* is 3 parts so *PQ* must be 4 parts. *R* must be 1/4 of the way along the line.

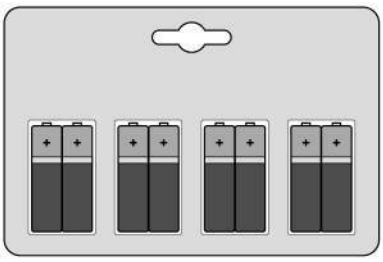
[1 mark]



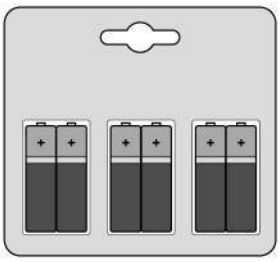
Turn over for the next question

5

18 A shop sells two brands of battery.



Brand A
Pack of 8
Price £3.60



Brand B
Pack of 6
Price £2.94

One brand A battery powers a toy for 5 hours.

One brand B battery powers the same toy for $5\frac{1}{2}$ hours.

Which brand is better value?

You **must** show your working.

[5 marks]

$8 \times 5 = 40$

$\frac{360}{40} = 9$

$6 \times 5\frac{1}{2} = 33$

$\frac{294}{33} = 8.90$

A pack of Brand A has 40 hours of power. This works out as 9p per hour.

A pack of Brand B has 33 hours of power. This works out as just less than 9p per hour.

Brand B is slightly cheaper per hour of power.

Answer B

19 The value of x can be 2 or 5

The value of y can be 3 or 12

19 (a) List the possible values of xy

2 x 3
2 x 12
5 x 3
5 x 12

[2 marks]

Answer 6, 24, 15, 60

19 (b) Work out the **least** possible value of $\frac{x-y}{x}$

You **must** show your working.

[2 marks]

$\frac{2-12}{2}$

Both the x in the numerator and denominator are the same. x - y needs to be as low as possible. As it is negative, we want to divide by as little as possible.

Answer -5

Turn over for the next question

9

20 An exam has two papers.

Anil scores

33 out of 60 on paper 1

and

75 out of 100 on paper 2

Work out his percentage score for the exam.

[3 marks]

$33 + 75 = 108$ ← Total marks scored.

$60 + 100 = 160$ ← Total marks on the papers.

$\frac{108}{160} \times 100$ ← Expressed as a fraction then converted into a percentage.

Answer 67.5 %

21 Purple paint is made by mixing red paint and blue paint in the ratio 5 : 2

Yan has 30 litres of red paint and 9 litres of blue paint.

What is the **maximum** amount of purple paint he can make?

[3 marks]

$5p = 30$ $p = 6$ $2p = 12$

Assuming that all the red paint is used (represented by 5 parts in the ratio), then 12L of blue paint would be needed and there isn't this much.

$2q = 9$ $q = 4.5$ $5q = 22.5$

$9 + 22.5$

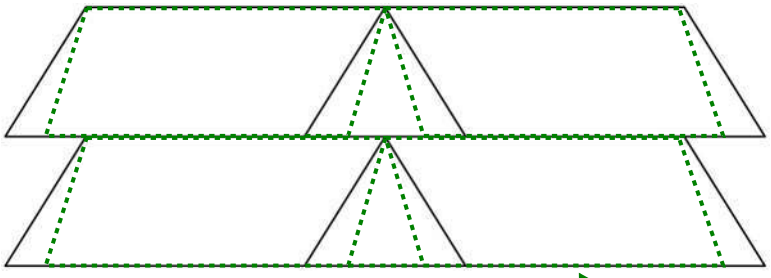
Assuming that all the blue paint is used (represented by 2 parts in the ratio), then 22.5L of red paint would be needed. Adding this to the 9L gives us the total volume of the purple paint.

Answer 31.5 litres

Turn over for the next question

6

22 This shape is made from two triangles and four congruent parallelograms.



Not drawn accurately

For each statement, tick the correct box.

The parallelograms could be like this. The triangles aren't equilateral. But they could be equilateral as they are in the original diagram.

22 (a) The triangles are equilateral.

[1 mark]

☐	Must be true
☑	Could be true
☐	Must be false

22 (b) The triangles are congruent.

[1 mark]

☑	Must be true
☐	Could be true
☐	Must be false

All three sides in both triangles must be the same as they are shared with the parallelograms. Regardless of how the parallelograms are drawn, the triangles will be identical so must be congruent.

23 (a) The length of a pipe is 6 metres to the nearest metre.

Complete the error interval for the length of the pipe.

[2 marks]

The resolution is 1m as it is to the nearest metre. Halving this then adding and subtracting this from 6 gives the upper and lower bound. 6 + 1/2 = 6.5. 6 - 1/2 = 5.5

Answer 5.5 m ⩽ length < 6.5 m

23 (b) The length of a different pipe is 4 metres to the nearest metre.

Olly says,

"The total length of the two pipes is 11 metres to the nearest metre."

Give an example to show that he could be correct.

[2 marks]

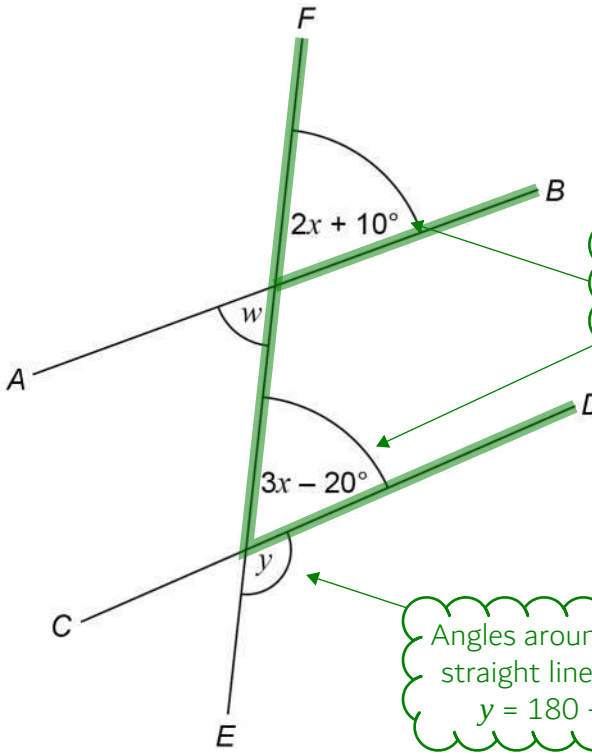
6.4 + 4.4 = 10.8

This rounds to 11.

The first pipe can be higher than 6 but has to be less than 6.5. This pipe can be higher than 4 but has to be less than 4.5.

6

24 *AB*, *CD* and *EF* are straight lines.



Not drawn accurately

Corresponding angles: must be equal.

Angles around a point on a straight line sum to 180°. $y = 180 - (3x - 20)$

24 (a) Ava assumes that *AB* and *CD* are parallel.

What answer should she get for the size of angle y?

[4 marks]

$2x + 10 = 3x - 20$

$30 = x$

Subtracting $2x$ from both sides to get all the x terms on the same side. Adding 20 to both sides to get the x terms on their own.

$3 \times 30 - 20 = 70$

$180 - 70$

Substituting 30 for x in $3x$ - 20 then subtracting it from 180 as it lies on a straight line with y

Answer 110 degrees

24 (b) In fact,

AB and *CD* are **not** parallel

angle w is 60°

What effect does this have on the size of angle y?

Tick a box.

☑ y is bigger ← y is now 125, which is bigger than 110

☐ y is the same

☐ y is smaller

Show working to support your answer.

[3 marks]

$2x + 10 = 60$ ← Opposite angles are equal so w must equal $2x + 10$

$2x = 50$

$x = 25$ ← Subtracting 10 from both sides to get the x terms on their own. Then dividing both sides by 2 to find x.

$3 \times 25 - 20 = 55$

$180 - 55 = 125$ ← Substituting 25 for x in $3x - 20$ then subtracting it from 180 as it lies on a straight line with y

Turn over for the next question

7

25 There are 720 boys and 700 girls in a school.

The probability that a boy chosen at random studies French is $\frac{2}{3}$

The probability that a girl chosen at random studies French is $\frac{3}{5}$

25 (a) Work out the number of students in the school who study French.

[3 marks]

$\frac{2}{3} \times 720 + \frac{3}{5} \times 700$

2/3 of the 720 boys and 3/5 of the 700 girls.

Answer 900

25 (b) Work out the probability that a student chosen at random from the whole school does **not** study French.

[2 marks]

$720 + 700 = 1420$ — Total number of students in the school.

$1420 - 900 = 520$

520 students do not study French.

Answer $\frac{520}{1420}$

520 out of 1420 students do not study French.

26 Circle the expression equivalent to $x^2 - 4x - 12$

[1 mark]

$(x - 4)(x - 8)$ $(x + 3)(x - 4)$ $(x - 12)(x + 1)$ $(x + 2)(x - 6)$

Only this one expands to give the original expression.

27 How are the whole number solutions to A and B different?

A Solve $3 \leqslant 3x < 18$

B Solve $3 < 3x \leqslant 18$

All whole numbers which are greater than or equal to 1 but less than 6.

[2 marks]

A: $1 \leqslant x < 6$ 1, 2, 3, 4, 5

B: $1 < x \leqslant 6$ 2, 3, 4, 5, 6

Dividing $3x$ by 3 gets x so we have to divide all sides by 3. 3/3 = 1 and 18/3 = 6

All whole numbers which are greater than 1 but less than or equal to 6.

END OF QUESTIONS

8