GCSE MATHEMATICS
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.

Advice
• In all calculations, show clearly how you work out your answer.
Answer all questions in the spaces provided

1. Circle the value of the digit 7 in 9.17

   \[
   \begin{array}{cccc}
   \frac{1}{70} & \frac{1}{7} & \frac{7}{10} & \frac{7}{100}
   \end{array}
   \]

   [1 mark]

2. Solve \( 3x = 2 \)
   Circle your answer.

   \[
   x = -1 \quad x = \frac{2}{3} \quad x = \frac{3}{2} \quad x = 6
   \]

   [1 mark]

3. Which of these shapes has no lines of symmetry?
   Circle the correct letter.

   [1 mark]
4. Circle the shortest length. [1 mark]

1200 cm  0.13 km  110 m  140 000 mm

5. (a) Shade $\frac{2}{5}$ of this grid. [1 mark]

5. (b) Shade 10% of this grid. [1 mark]
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]

Answer £________________________
7. Link the algebra to the correct description. One has been done for you.

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

[3 marks]

Turn over for the next question
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]
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 __________________________________________

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

**Turn over for the next question**
Here is a scale drawing.

The Ferris wheel has a height of 130 m

Work out the height of the building.

[3 marks]

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

**Week 1**

<table>
<thead>
<tr>
<th>Size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-inch</td>
<td>512</td>
</tr>
<tr>
<td>12-inch</td>
<td>231</td>
</tr>
<tr>
<td>Total</td>
<td>743</td>
</tr>
</tbody>
</table>

**Week 2**

<table>
<thead>
<tr>
<th>Size</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>396</td>
</tr>
<tr>
<td>Offer</td>
<td>362</td>
</tr>
</tbody>
</table>

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]

Answer ____________________________________________
The table shows the profit or loss the takeaway makes on each pizza.

<table>
<thead>
<tr>
<th></th>
<th>Normal price</th>
<th>Offer price</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-inch</td>
<td>£3.74 profit</td>
<td>51p loss</td>
</tr>
<tr>
<td>12-inch</td>
<td>£5.29 profit</td>
<td>4p loss</td>
</tr>
</tbody>
</table>

In week 1 the total profit was £1895.55
At the end of week 1 the takeaway spent £175 on adverts.

Was the increase in profit in week 2 more than the cost of the adverts?
You must show your working.

[4 marks]

Answer

---
13. A car travels 3.5 miles in 5 minutes.
Work out the average speed in miles per hour.

Answer \( \text{mph} \)

14. A triangle has base 9 cm and perpendicular height 5.6 cm
Not drawn accurately

Work out the area of the triangle.

Answer \( \text{cm}^2 \)
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]

Answer _____________________________
A sketch of triangle $ABC$ is shown.

In the space below, complete an accurate drawing of triangle $ABC$. [2 marks]
17 Simplify \(7x - (3x - 2x)\)
Circle your answer. [1 mark]

\[
7x - 1 \quad 2x \quad 6x \quad 8x
\]

18 A competition took place in 1983
takes place every six years.
Circle the year in which it will also take place.

\[
2083 \quad 2036 \quad 2049 \quad 2023
\]
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]
19 (b) Altogether, 16 200 people voted.

How many voted for J? [2 marks]

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

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

Circle your answer. [1 mark]

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

Turn over for the next question
Here is a rule for a sequence.

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

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

The 1st term is 4
The 3rd term is 9.5

\[
4 \quad \ldots \quad 9.5
\]

Work out the 2nd term. [3 marks]

Answer: 

Turn over for the next question
In a group of 20 people
- 7 own a dog
- 3 own a cat
- 12 do not own a dog or a cat.

Aidan shows this information on a Venn diagram.

Make two criticisms of his Venn diagram.

Criticism 1

Criticism 2
24. \(a\) is a common factor of 72 and 120
\(b\) is a common multiple of 6 and 9

Work out the highest possible value of \(\frac{a}{b}\)

[4 marks]
A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

A            B

Not drawn accurately

Work out the values of $x$, $h$ and $w$.

\begin{align*}
x &= \text{degrees} \\
h &= \text{cm} \\
w &= \text{cm}
\end{align*}
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

Answer: £_________________________
27 (a) Show that the lines $y = 3x + 7$ and $2y - 6x = 8$ are parallel. Do not use a graphical method. [3 marks]

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

Work out the original cost.

[3 marks]

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]

Answer ____________________________
30 \[ \mathbf{a} = \begin{pmatrix} 6 \\ -10 \end{pmatrix}, \quad \mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}, \quad \mathbf{c} = \begin{pmatrix} -4 \\ 7 \end{pmatrix} \]

30 (a) Work out \( \mathbf{a} + \mathbf{b} + \mathbf{c} \) [2 marks]

Answer \( \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \)

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