INSTRUCTIONS TO CANDIDATES

• Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
• Use black ink. HB pencil may be used for graphs and diagrams only.
• Answer all the questions.
• Read each question carefully. Make sure you know what you have to do before starting your answer.
• Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
• Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
• Do not write in the bar codes.

INFORMATION FOR CANDIDATES

• The number of marks is given in brackets [ ] at the end of each question or part question.
• Your quality of written communication is assessed in questions marked with an asterisk (*).
• The total number of marks for this paper is 60.
• This document consists of 16 pages. Any blank pages are indicated.

WARNING
No calculator can be used for this paper.
Area of trapezium = \( \frac{1}{2} (a + b)h \)

Volume of prism = (area of cross-section) \times \text{length}

In any triangle \( ABC \)

Sine rule \( \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \)

Cosine rule \( a^2 = b^2 + c^2 - 2bc \cos A \)

Area of triangle = \( \frac{1}{2} ab \sin C \)

Volume of sphere = \( \frac{4}{3} \pi r^3 \)
Surface area of sphere = \( 4\pi r^2 \)

Volume of cone = \( \frac{1}{3} \pi r^2 h \)
Curved surface area of cone = \( \pi rl \)

The Quadratic Equation
The solutions of \( ax^2 + bx + c = 0 \), where \( a \neq 0 \), are given by

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

PLEASE DO NOT WRITE ON THIS PAGE
1. Julie asked three of her friends to estimate how much of the time it rained during their holidays. Their holidays were all the same length of time.

   Eliot 40% of the time
   Harpreet $\frac{5}{12}$ of the time
   Megan $\frac{3}{8}$ of the time

Put these estimates in order, starting with the smallest.
You must show your method clearly.
2. This empty container is filled with water at a constant rate.

The graph of depth of water against time looks like this.

Four more empty containers are shown below. Each of these containers is filled with water at a constant rate.
Choose which of these containers matches each of the graphs.

(a) Depth
    \[ \text{Time} \]
    (a) Container................................. [1]

(b) Depth
    \[ \text{Time} \]
    (b) Container................................. [1]

(c) Depth
    \[ \text{Time} \]
    (c) Container................................. [1]
3. ABCD is a quadrilateral.
   BA is parallel to CDE.
   Angle $h$ is not equal to $126^\circ$.

(a) What is the mathematical name for quadrilateral ABCD?

(a) ........................................................... [1]

(b) Find the size of angle $f$.
    Give a geometrical reason for your answer.

    $f = \ldots \ldots ^\circ$ because.................................................................
    ........................................................................................................
    ........................................................................................................ [2]

(c) Angle $h$ is 4 times the size of angle $g$.
    Work out the size of angle $h$.

(c) ................................................................. $^\circ$ [3]
You are given that $411 \times 32 = 13152$.

Use this information to work out the answer to each of the following.

(a) $4110 \times 320$

(b) $4.11 \times 320$

(c) $13.152 \div 32$
5 (a) Describe the correlation shown in each of these scatter graphs. If appropriate, also describe the strength of the correlation.
(b) A student measures the reaction time for each of ten people of different ages. The results are given in this table.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>8</th>
<th>16</th>
<th>20</th>
<th>27</th>
<th>35</th>
<th>44</th>
<th>56</th>
<th>65</th>
<th>70</th>
<th>79</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction time (seconds)</td>
<td>0.44</td>
<td>0.34</td>
<td>0.28</td>
<td>0.28</td>
<td>0.27</td>
<td>0.30</td>
<td>0.28</td>
<td>0.34</td>
<td>0.38</td>
<td>0.40</td>
</tr>
</tbody>
</table>

The results are plotted on a scatter graph.

(i) Complete the scatter graph. The first six results have been plotted for you. [2]

(ii) Why is it not sensible to draw a line of best fit?

...........................................................................................................................................
........................................................................................................................................... [1]

(iii) Describe the relationship between age and reaction time shown by your graph.

...........................................................................................................................................
........................................................................................................................................... [1]
(a) Solve this inequality.

\[ 3y - 11 > 25 \]

(a) ........................................................... [2]

(b) Find all the integer values of \( w \) that satisfy this inequality.

\[ 9 < 3w < 20 \]

(b) ........................................................... [2]
7 Shape S is shown on the grid.

(a) Rotate shape S through $90^\circ$ clockwise about (2, 0). Label your image \textbf{R}. [3]

(b) Enlarge shape S with scale factor -2 and centre (0, 0). Label your image \textbf{E}. [2]
8* ABCD and PQRS are mathematically similar.

Calculate lengths $x$ and $y$. 

[5]
9 A line, $L$, has equation $y = 4x - 5$.

(a) Write down the gradient of line $L$.

(a) ........................................................... [1]

(b) What are the coordinates of the point where line $L$ crosses the $y$-axis?

(b) (..........................., ...........................) [1]

(c) Write down the equation of the line parallel to line $L$ that passes through $(0, 0)$.

(c) ........................................................... [2]

(d) Explain how you can tell that the line $y = \frac{-1}{5}x - 5$ is not perpendicular to line $L$.

.............................................................................................................................................. [1]

10 Solve, algebraically, these simultaneous equations.

\[
\begin{align*}
x + 3y &= 14 \\
2x + y &= 3
\end{align*}
\]

\[
\begin{align*}
x &= .......................................................... \\
y &= .......................................................... [3]
\]

Turn over
11 (a) Write \(\frac{5}{9}\) as a recurring decimal.

(a) ......................................................... [1]

(b) Marco used his calculator to divide a 2-digit number by a 2-digit number. His calculator showed this display.

```
2.030303030
```

What calculation did Marco do?

(b) ........................................................... [4]
The graphs of \( x + y = 6 \), \( y = 3x + 1 \) and \( x + 2y = 6 \) are shown below.

Use the graphs to solve these pairs of simultaneous equations.

(a) \[
\begin{align*}
y &= 3x + 1 \\
x + 2y &= 6
\end{align*}
\]

(b) \[
\begin{align*}
y &= 3x + 1 \\
2x + 2y &= 12
\end{align*}
\]
B0, B1, B2, …. , B10 are labels given to different sized sheets of paper. The lengths of the sheets are related as follows:

\[
\text{Length of B10} \times \sqrt{2} = \text{Length of B9}
\]

\[
\text{Length of B9} \times \sqrt{2} = \text{Length of B8}
\]

and so on from B10, the smallest size, up to B0 the largest size.

(a) The length of B7 paper is 125 mm.

(i) What is the exact length of B6 paper?

(a)(i) .................................................... mm [1]

(ii) What is the length of B5 paper?
Give your answer in its simplest form.

(ii) .................................................... mm [2]

(b) The length of B1 paper is 1000 mm.

Find the length of B2 paper.
Give your answer in the form \(k\sqrt{2}\), where \(k\) is an integer.

(b) .................................................... mm [3]

END OF QUESTION PAPER