INSTRUCTIONS TO CANDIDATES

• Answer all questions. There are 20 questions to answer.

• Each question carries 1 mark.

• Calculators, protractors and other mathematical instruments are not allowed.

• You are not required to show your working. However space for working is provided if you need it.
<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Space for Working</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A bag contains 2 kg of flour. A recipe uses 300 g of flour. Using only one bag of flour, how many times can the recipe be made?</td>
<td>__________ times</td>
</tr>
<tr>
<td>2</td>
<td>Write down the value of $n$, given that $2^n = 32$</td>
<td>$n = \underline{\quad}$</td>
</tr>
<tr>
<td>3</td>
<td>What is the size of the obtuse angle between the hands of a clock at half past ten?</td>
<td>__________°</td>
</tr>
<tr>
<td>4</td>
<td>VAT is charged at 18%. The cost of a sofa (without VAT) is €350. Work out the cost of the sofa including VAT.</td>
<td>€_________</td>
</tr>
<tr>
<td>5</td>
<td>Work out: $2 - \frac{2}{5}$</td>
<td>Answer:___________</td>
</tr>
<tr>
<td>6</td>
<td>Find $p$ and $q$ given that $200 = 2^p \times 5^q$</td>
<td>$p = \underline{\quad}$, $q = \underline{\quad}$</td>
</tr>
<tr>
<td>7</td>
<td>The circumference of a circle is equal to 24 cm. Underline the best estimate for the radius.</td>
<td>A. 4 cm   B. 6 cm   C. 8 cm   D. 12 cm</td>
</tr>
<tr>
<td>No.</td>
<td>Question</td>
<td>Space for Working</td>
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<tr>
<td>8</td>
<td>A sum of money is divided in the ratio 2 : 3 : 5. The smallest share is €24. What is the sum of money?</td>
<td>€__________</td>
</tr>
<tr>
<td>9</td>
<td>Find the <strong>total area</strong> of the two rectangles.</td>
<td>Area = __________ cm²</td>
</tr>
<tr>
<td>10</td>
<td>A euro is approximately equal to £0.80. How much do I get for €250?</td>
<td>£__________</td>
</tr>
<tr>
<td>11</td>
<td>A car travels at an average speed of 60 km/h for 3½ hours. How far does it travel?</td>
<td>________ km</td>
</tr>
<tr>
<td>12</td>
<td>Given that ( f(x) = 2x - 5 ), work out the value of ( x ) if ( f(x) = 8 ).</td>
<td>( x = ________ )</td>
</tr>
<tr>
<td>13</td>
<td><strong>Underline</strong> the point that passes through the line whose equation is ( y = 3x - 2 ).</td>
<td>A(−2, −4) B(2, 4) C(2, −4) D(−2, 4)</td>
</tr>
<tr>
<td>14</td>
<td>Work out the value of ((0.4)^2 \times 1000). Give your answer in <strong>standard form</strong>.</td>
<td>Answer:__________</td>
</tr>
<tr>
<td>No.</td>
<td>Question</td>
<td>Space for Working</td>
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<td>-----</td>
<td>--------------------------------------------------------------------------</td>
<td>-------------------</td>
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<tr>
<td>15</td>
<td>Four boys had to solve the equation ( x^3 - x + 6 = 0 ). Underline the correct answer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. ( x = -1 )  B. ( x = 1 )  C. ( x = 2 )  D. ( x = -2 )</td>
<td></td>
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<tr>
<td>16</td>
<td>Underline the number which is equal to ( \frac{1}{4} ).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 4%  B. 0.4  C. 40%  D. ( 4^{-1} )</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Underline the number of positive factors of 12.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. 4  B. 5  C. 6  D. 7</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>The perimeter of a rectangular field is 40 m. The length is three times the width. Work out the area of the field.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area = [ \text{__________ m}^2 ]</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Work out the gradient of a line that passes through (6, -2) and (1, 8).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gradient = [ \text{__________} ]</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>The bearing of B from A is 130°. Work out the bearing of A from B.</td>
<td></td>
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<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
</tbody>
</table>
1 Pawlu bought a car in January 2009 for €15 600. The price of the car decreased by 8% in 2009 and by 12% in 2010. Work out the price of the car on 31 December 2010. Give your answer correct to the nearest euro.

€__________

(3 marks)

2 Karmenu uses a spreadsheet to work out the simple interest.
   (a) Write the formula which Karmenu types in
   
   (i) cell B4 =______________
   
   (ii) cell B5 =______________

   (b) What output will Karmenu get in cell B5?

   €______________

(4 marks)
3 The formula $V = \frac{\pi r^2 h}{3}$ is used to find the volume of a cone.

(a) Work out the volume of a cone when $r = 3.2$ cm and $h = 5.7$ cm. (Give your answer correct to 3 significant figures.)

Volume = __________ cm$^3$

(b) Make $r$ the subject of the formula.

$r = __________$

(4 marks)

4 The equation of a straight line, $L$, is $4x = 2y + 3$.

(a) Write down the gradient and the $y$-intercept of this straight line.

gradient = __________

$y$-intercept = __________

(b) The line passes through the point $A(2, b)$. Write down the value of $b$.

$b = __________$

(c) Another straight line is parallel to $L$ and passes through the point $B(0, -5)$. Write down the equation of this straight line.

Equation of line: ________________

(5 marks)
5  (a) Which one of these three triangles is not similar to the other two? Explain.

_________________________________________________________________
_________________________________________________________________

(b) The sides of a triangle have length 5 cm, 6 cm and 8 cm. The longest side of a similar triangle is 12 cm. Work out the length of the other two sides of this triangle.

__________ cm

__________ cm

(6 marks)
AB is a chord of a circle with centre O. OM is drawn perpendicular to AB.

(a) Prove that M is the midpoint of AB.

(b) C is a point on the circumference of the circle. OA = 6.2 cm and AB = 9.6 cm. Work out the size of \(\angle AOB\) and \(\angle ACB\) correct to 1 decimal place.

\[\angle AOB = \text{__________}^\circ\]

\[\angle ACB = \text{__________}^\circ\]

(8 marks)
7 In an electrical circuit, the resistance, \( R \) ohms, is \textbf{inversely proportional} to the \textbf{square} of the current, \( I \) amps.

(a) Write a \textbf{formula} that shows the relationship between \( R \) and \( I \). (Use \( k \) for the constant of proportion.)

\[
R = \frac{k}{I^2}
\]

When the resistance is 4 ohms, the current flowing is 6 amps. Work out:

(b) the \textbf{resistance} when the current is 10 amps

\[
\text{Resistance} = \frac{k}{10^2} = \frac{k}{100} \text{ ohms}
\]

(c) the \textbf{current} when the resistance is 16 ohms

\[
\text{Current} = \sqrt{\frac{k}{16}} \text{ amps}
\]

(6 marks)
8 (a) Without drawing the graphs, work out the coordinates of the point(s) of intersection of the parabola $y = x^2 + x - 2$ and the straight line $y = 5x - 6$.

\[ (__, __) \]

(b) Which of the following describes the relationship between the two graphs? Explain.
The graph of \( y = x^3 - 2x^2 - 4x \) is given below.

(a) Use this graph to solve the equation

\[ x^3 - 2x^2 = 4x \]

\[ x = \boxed{\phantom{0000}} \]

(b) By drawing a straight line graph solve the equation \( x^3 - 2x^2 - 6x + 1 = 0 \)

\[ x = \boxed{\phantom{0000}} \]

(6 marks)
10  (a)  Write down the value of \( n \), given that \( \frac{32}{\sqrt{2}} = 2^n \)

\( n = \underline{\hspace{1cm}} \)

(b)  Solve the equations.

(i) \( 5^x = \frac{1}{125} \)

\( x = \underline{\hspace{1cm}} \)

(ii) \( 3^{3x+2} = 9^{x+5} \)

\( x = \underline{\hspace{1cm}} \)

(6 marks)

11  (a)  Solve: \( \frac{2x}{3} - \frac{3x+2}{4} = \frac{7}{12} \)

\( x = \underline{\hspace{1cm}} \)

(b)  Simplify: \( \frac{2}{x+2} - \frac{x-4}{x^2-4} \)

(8 marks)
12 The functions \( f, g \) and \( h \) are defined by
\[
f : x \rightarrow 2x + 1 \quad g : x \rightarrow 3x^2 \quad h : x \rightarrow \frac{2x+3}{x-1}, x \neq 1
\]

(a) Find the **value** of \( g(-4) \).
\[
g(-4) = \text{__________}
\]

(b) **Solve** the equation \( f(x) = g(x) \).
\[
x = \text{__________}
\]

(c) Find \( h^{-1}(x) \).
\[
h^{-1}(x) = \text{__________}
\]

(d) **Simplify**: \((x^2 - 2x) h^{-1}(x)\).

\[\text{________________} \]

(8 marks)
13 The box plot for the times taken by a group of boys to run 100 metres is shown below.

```
11 12 13 14 15 16 17
Time (seconds)
```

(a) Fill in.

fastest time = __________ seconds

median time = __________ seconds

(b) What percentage of the boys ran the 100 metres in less than 12.8 seconds?

__________% 

(c) Work out the interquartile range.

interquartile range = __________ seconds
After a month training with an athletics coach, the boys obtained the following times (in seconds).

<table>
<thead>
<tr>
<th>Fastest time</th>
<th>Lower quartile</th>
<th>Median</th>
<th>Upper Quartile</th>
<th>Slowest time</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.4</td>
<td>12.2</td>
<td>13.0</td>
<td>14.8</td>
<td>16.8</td>
</tr>
</tbody>
</table>

(d) Using the same scale and axes, draw another box plot to show this data.

(e) Do you think that the training was effective in improving the boys’ time? Give reasons for your answer.

_________________________________________________________________
_________________________________________________________________

(10 marks)