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>
</table>
| 1   | Work out:  
      100 – 26 × 3 |        |
| 2   | A stamp costs 20 cent. How many stamps can I buy for €2.50? | _______ stamps |
| 3   | In a mathematics test Karl got 16 out of 20 questions correct. Write Karl’s mark as a percentage. | _______ % |
| 4   | At a film show 25% of the audience is men and one third is women. The remainder of the audience is children. What fraction of the audience are children? | _______ |
| 5   | Work out the area of the shaded region, in terms of π. | Area = ______π |
| 6   | A fair dice was thrown 5 times. Each time a six appeared on the top face. The dice is thrown again. The probability of another six appearing is  
A. equal to one sixth  
B. more than one sixth  
C. less than one sixth |
<table>
<thead>
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<tbody>
<tr>
<td>7</td>
<td>Evaluate: ((3.247 + 6.753)^3)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The area of a square is equal to the area of a rectangle with sides of 9 cm and 4 cm. Work out the perimeter of the square.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Work out (\left(\frac{3}{4} - \frac{2}{3}\right) \times 24)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Which is the <strong>smallest number</strong> that leaves a remainder of 1 when divided by 4 and a remainder of 1 when divided by 5?</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>The <strong>mean</strong> of the numbers 14, 19 and (x) is 13. Work out the value of (x).</td>
<td>(x = )</td>
</tr>
<tr>
<td>12</td>
<td>Write down the three <strong>prime numbers</strong> between 40 and 50.</td>
<td>(), (), ()</td>
</tr>
<tr>
<td>13</td>
<td>The opposite angles of a <strong>cyclic quadrilateral</strong> are in the ratio of 1 : 4. Work out the size of the <strong>smallest angle</strong>.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Mario fills his car with 30 litres of petrol at €1.40 per litre. Work out the change from €50.</td>
<td>(\text{Change} = \€)</td>
</tr>
</tbody>
</table>

Evaluate: \((3.247 + 6.753)^3\)\n
The area of a square is equal to the area of a rectangle with sides of 9 cm and 4 cm. Work out the perimeter of the square. \[\text{cm}\]

Work out \(\left(\frac{3}{4} - \frac{2}{3}\right) \times 24\)\n
Which is the **smallest number** that leaves a remainder of 1 when divided by 4 and a remainder of 1 when divided by 5?\n
The **mean** of the numbers 14, 19 and \(x\) is 13. Work out the value of \(x\). \(x = \)\n
Write down the three **prime numbers** between 40 and 50. \(\), \(\), \(\)

The opposite angles of a **cyclic quadrilateral** are in the ratio of 1 : 4. Work out the size of the **smallest angle**. \[\text{o}\]

Mario fills his car with 30 litres of petrol at €1.40 per litre. Work out the change from €50. \(\text{Change} = \€\)
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</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Underline the correct answer for the area of the square.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Square Diagram" /></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A. $\sqrt{5}$ cm²  B. $\sqrt{13}$ cm²  C. 25 cm²  D. 13 cm²</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>A number of cards are coloured either red or blue. There are 6 blue cards. The probability of choosing a red card is $\frac{4}{5}$. How many cards are there in all?</td>
<td>__________ cards</td>
</tr>
<tr>
<td>17</td>
<td>A bag holds 400 grams of flour. How many bags can be filled from 5 kg of flour?</td>
<td>__________ bags</td>
</tr>
<tr>
<td>18</td>
<td>Evaluate: $\frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{4}{5} + \frac{3}{4} + \frac{2}{3}$</td>
<td>__________</td>
</tr>
<tr>
<td>19</td>
<td>Write down the smallest number.  $20%$, $\frac{9}{50}$, 0.201 $\times$ 10²</td>
<td>__________</td>
</tr>
<tr>
<td>20</td>
<td>Work out: $16^{\frac{3}{2}}$</td>
<td>__________</td>
</tr>
</tbody>
</table>
The table below shows the radii of three planets.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Radius (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>$2.43 \times 10^3$</td>
</tr>
<tr>
<td>Earth</td>
<td>6380</td>
</tr>
<tr>
<td>Jupiter</td>
<td>$71.4 \times 10^3$</td>
</tr>
</tbody>
</table>

(a) Write down the name of the smallest planet.

(b) Fill in:

The radius of Jupiter is about _________ times the radius of Mercury.

(c) Work out the circumference of the earth, correct to the nearest 1000 km.

Circumference = _________ km

4 marks
2 (a) Claire said that the line $2y = 3x - 4$ cuts the $y$-axis at $(0, -2)$. Is Claire correct? Explain.

because

(b) Paul said that the longer a line is, the bigger is its gradient. Is Paul correct? Explain.

because

(c) The coordinates of four points are: A(1, −1), B(−1, 1), C(1, 1), D(−1, −1)
Which point lies on the straight line $y = 3x - 2$? Show your working.


4 marks

3 A dice is thrown 60 times. The table below shows the number of times each number was thrown.

<table>
<thead>
<tr>
<th>Number Thrown</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>15</td>
<td>x</td>
</tr>
</tbody>
</table>

(a) Work out the value of $x$.

$x = \phantom{000000}$

(b) Work out the mean number thrown.

Mean = \phantom{000000}

(c) This dice is thrown 300 times. How many times would you expect a 1 to come up?

\phantom{00000} times

6 marks
4 After one year the price of a car was €12 760. After two years the price of the car was €11 228.80.

(a) Work out the rate by which the car depreciates each year.

Rate = _________%

(b) Work out the price of the car when it was bought.

Price = €_________

5 ABCD is a parallelogram. AP and CQ are drawn perpendicular to BD.

(a) Prove that triangle ABP is congruent to triangle CDQ.

(b) Fill in:

∠BAP = ∠ __________
Anita was asked to make \( m \) the subject of the formula \( mk = 11 - 3m \).

Her work is shown below.

\[
\begin{align*}
\text{Line 1: } & \quad mk + 3m = 11 \\
\text{Line 2: } & \quad m(k + 3) = 11 \\
\text{Line 3: } & \quad m = 11(k + 3)
\end{align*}
\]

There is a mistake in Anita’s work.

(a) In which line does the mistake lie? What is Anita’s mistake?

________________________________________________________________
________________________________________________________________

(b) Write down the correct answer.

\[ m = \phantom{11} \]

(c) Work out the value of \( m \) when \( k = 19 \).

\[ m = \phantom{11} \]
7 (a) Complete the pattern below.

\[
1 + 3 = 4 = 2^2 \\
1 + 3 + 5 = 9 = 3^2 \\
1 + 3 + 5 + 7 = \ldots = \ldots
\]

(b) Work out the sum of the first 50 odd numbers. \_

(c) Work out:

\[
11 + 13 + 15 + 17 + \ldots + 99
\]

\[
11 + 13 + 15 + 17 + \ldots + 99 = \ldots
\]

5 marks

8 In the table below \( w \) is directly proportional to the square root of \( h \).

<table>
<thead>
<tr>
<th>( h )</th>
<th>( \sqrt{\frac{1}{4}} )</th>
<th>4</th>
<th>9</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>( w )</td>
<td>\phantom{0}</td>
<td>\phantom{0}</td>
<td>\phantom{0}</td>
<td>\phantom{0}</td>
</tr>
</tbody>
</table>

(a) Write a formula for \( w \) in terms of \( h \), using \( k \) for the constant of proportion.

\[
w = \ldots
\]

(b) Work out the value of \( k \).

\[
k = \ldots
\]

(c) Complete the table.

6 marks
A function is defined by \( f(x) = \frac{2}{1+x} \)

(a) Explain why \( f(x) \) is defined for all values of \( x \) but not for \( x = -1 \).

(b) Complete the following table.

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(i) If \( y = f(x) \) and \( x \geq 0 \), explain why \( y \) is inversely proportional to \( x \).

(ii) Work out \( f^{-1}(x) \).

\[ f^{-1}(x) = \text{__________} \]

(iii) Hence solve the equation \( f^{-1}(x) = 3 \).

\[ x = \text{__________} \]
10 (a) Factorise: \( z^2 - 2z - 3 \)

(b) Use your answer to part (a) to solve the equation \( x^2 - \frac{3}{x^2} = 2 \). Give your answer correct to 2 decimal places.

\[
x = \underline{\; \; \; \;} \quad \text{or} \quad \underline{\; \; \; \;}
\]

(c) The sum of two numbers, \( x \) and \( y \), is 2. The sum of their squares is 34.

(i) Form two equations in \( x \) and \( y \).

Equation 1: \( \underline{\; \; \; \;} \)

Equation 2: \( \underline{\; \; \; \;} \)

(ii) Solve these two equations to find the value of the two numbers.

\[
x = \underline{\; \; \; \;} \quad \text{or} \quad \underline{\; \; \; \;}, \quad y = \underline{\; \; \; \;} \quad \text{or} \quad \underline{\; \; \; \;}
\]

8 marks
11 (a) In triangle ABC, \( \angle ABC = 90^\circ \) and \( AB : BC = 2 : 5 \).

(i) Work out the size of \( \angle ACB \), correct to 1 decimal place.

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

(ii) In triangle PQR, \( \angle PQR = 90^\circ \) and \( PQ : QR = 1 : 2.5 \).

Explain why the angles of triangle ABC and PQR are equal.

________________________________________________________________________

________________________________________________________________________

(b) A photograph was enlarged so that its area is now twice as big as it was. The dimensions of the original photograph were 15 cm by 10.5 cm. Work out the dimensions of the enlarged photograph, correct to the nearest mm.

Length = __________ cm

Width = __________ cm

8 marks
In a survey, a number of students were asked how many hours they slept during one week. The cumulative frequency graph below shows the results.

(a) Use the cumulative frequency graph:
(i) to find how many students slept between 50 and 55 hours. __________
(ii) to complete the box plot for the hours of sleep.

(b) A group of pensioners were also asked how many hours they slept during one week. The results are shown in the second box plot.

(i) What percentage of the pensioners slept less than 55 hours in one week?

__________________%

(ii) “The students sleep longer than the pensioners.” Do you agree? Explain.

____________________________________________________________

7 marks
13 (a) Factorise \( x^2 - 16 \).

(b) Write down which of A, B or C, is the graph of \( y = x^2 - 16 \). Give reasons for your answer.

(c) Below is a sketch of the graph of \( y = p - qx - x^2 \). Work out the values of \( p \) and \( q \).

\[ p = \text{__________,} \quad q = \text{__________} \]

END OF PAPER