INSTRUCTIONS TO CANDIDATES:

Read all the questions carefully before you start answering.

- Answer all questions.
- This paper carries 75 marks.
- Calculators and mathematical instruments are allowed but all necessary working must be shown.

1. Work out an approximation for: \( \frac{1987 + 421}{27.38} \)

Answer: \( \ldots \)  
(3 marks)

2. Make \( q \) the subject of the formula: \( p = \frac{3q-r}{s} \)

Answer: \( q = \ldots \)  
(3 marks)
3. Martha buys a tracksuit for €70 after a 20% sale. Work out the price of the tracksuit before the sale.

Answer: €__________  
(3 marks)

4. In this question use the **method of trial and improvement** to find \( x \), correct to 1 decimal place.

\[
x^2 + x = 17
\]

<table>
<thead>
<tr>
<th>( x^2 + x )</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>let ( x = 2 )</td>
<td>4 + 2</td>
</tr>
</tbody>
</table>

Answer: \( x = _______ \)  
(3 marks)

5. Complete the following ‘Indices Pyramids’.
To work out a brick, **multiply** the two bricks underneath.

a) \[
\begin{array}{ccc}
\times^8 \\
\times^0 & \times^2 & \times^4 \\
\end{array}
\]

b) \[
\begin{array}{ccc}
a^{12} \\
a^5 & a \\
\end{array}
\]

(4 marks)
6. a) ‘FRUITY’ is a new drink made up of **apple** juice, **cranberry** juice and **strawberry** syrup in the ratio of **3 : 2 : 1**.
   Work out the amount of cranberry juice needed to make 240 **ml** of ‘FRUITY’.

   Answer: __________ **ml**

   b) John pours 27 **ml** of apple juice and 18 **ml** of cranberry juice.
   How much strawberry syrup does he need to make the new drink?

   Answer: __________ **ml**

   (4 marks)

7. Expand and simplify:

   a) \((x + 5)(x - 2)\)

   b) \((x + 4)^2\)

   Answer: ________________  

   Answer: ________________

   (4 marks)

8. a) Draw a **regular** pentagon PQRST inscribed in a circle of **radius 4 cm**.

   b) Fill in: The length of PQ is __________ **cm**.

   (4 marks)
9. Rachel and Audrey compared the marks they obtained in their maths tests. Audrey was absent for the last test. All tests were out of 25 marks.

<table>
<thead>
<tr>
<th></th>
<th>14</th>
<th>23</th>
<th>13</th>
<th>15</th>
<th>14</th>
<th>10</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rachel:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audrey:</td>
<td>19</td>
<td>20</td>
<td>13</td>
<td>18</td>
<td>17</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

a) Work out Rachel’s **mean** mark.

Ans: _______

b) Kim said, “The highest marks were obtained by Rachel. So her results are better than Audrey’s”. Explain why Kim’s argument may be wrong. Show any working.

_____________________________________________________________________
_____________________________________________________________________

(4 marks)

10. a) The $n^{\text{th}}$ term of a sequence is $2n - 1$. Write down the first three terms of the sequence.

Answer: __________

b) A board room has tables, each of which can sit 4 people. When put together, the tables can seat people as shown:

![Diagram of tables]

i) How many people can sit at 4 tables?

Answer: ______ people

ii) How many people could sit at $n$ tables?

Answer: ________ people

iii) How many tables are needed if 20 people attend a meeting in the board room?

Answer: ________ tables

(6 marks)
11. The diagram shows a rectangle ABCD in which, AB = 9 cm and AC = 11.5 cm.
Work out, giving your answers correct to 1 decimal place:

   a) the length of BC;

   Answer: __________ cm

   b) the area of rectangle ABCD.

   Answer: __________ cm²

(6 marks)

12. The diagrams show rectangle A and triangle B.

   a) Write down an expression, in terms of x, for the perimeter of rectangle A.

   Answer: __________

   b) Write down an expression, in terms of x, for the perimeter of triangle B.

   Answer: __________

   c) Both shapes have the same perimeter. Use your answers in a) and b) to calculate the value of x.

   Answer: __________ cm

   d) Hence work out the perimeter of rectangle A.

   Answer: __________ cm

(7 marks)
13. Mr. Borg drives from Hummel at a speed of 48 km/hr for 2½ hours. He then stops for half an hour to rest. Finally, he drives for another 30 km in 40 minutes to arrive at Kempa.

Work out:

a) the distance travelled before he stops for the rest;

Answer: __________ km

b) the distance between Hummel and Kempa

Answer: __________ km

c) the speed, in km/hr, at which he drives after the rest;

Answer: __________ km/hr

d) the average speed for the whole journey, correct to the nearest km/hr.

Answer: __________ km/hr

(8 marks)

14. The table below shows the land area and population of six continents.

<table>
<thead>
<tr>
<th>Continent</th>
<th>Land Area (km$^2$)</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>$4.44 \times 10^7$</td>
<td>$4.06 \times 10^9$</td>
</tr>
<tr>
<td>Africa</td>
<td>$3.02 \times 10^7$</td>
<td>$1.11 \times 10^9$</td>
</tr>
<tr>
<td>Australia</td>
<td>$7.69 \times 10^6$</td>
<td>$2.04 \times 10^8$</td>
</tr>
<tr>
<td>Europe</td>
<td>$1.04 \times 10^7$</td>
<td>$7.30 \times 10^8$</td>
</tr>
<tr>
<td>North America</td>
<td>$2.42 \times 10^7$</td>
<td>$5.23 \times 10^8$</td>
</tr>
<tr>
<td>South America</td>
<td>$1.78 \times 10^7$</td>
<td>$3.80 \times 10^8$</td>
</tr>
</tbody>
</table>

a) Write down Australia’s land area as an ordinary number.

Answer: ________________
b) Write down the names of the continents in order of their population, starting from the smallest.

________________, __________, __________, __________, __________.

c) Work out the difference, in population between Africa and Europe.

Answer: ________________

d) The population density is calculated using the formula:

\[ \text{population density} = \frac{\text{population}}{\text{area}} \]

Jack, Daniel and Scot work out the population density for Europe correct to 3 significant figures. Their working is shown below:

Jack’s working

\[
\text{p.d.} = \frac{\text{population}}{\text{area}} = \frac{7.30 \times 10^8}{1.04 \times 10^7} = 70.1923... = 70.192
\]

Daniel’s working

\[
\text{p.d.} = \frac{\text{population}}{\text{area}} = \frac{7.30 \times 10^8}{1.04 \times 10^7} = 70.1923... = 70.2
\]

Scot’s working

\[
\text{p.d.} = \frac{\text{population}}{\text{area}} = \frac{7.30 \times 10^8}{1.04 \times 10^7} = 70.1923... = 70.19
\]

Whose answer is correct? Give an explanation for your answer.

_____________________________________________________________________
_____________________________________________________________________

(7 marks)
15. The figure shows an irregular six sided polygon ABCDEF. Angles marked are in degrees.

a) What is the name of a six-sided polygon? Answer: ______________

b) Work out the sum of the interior angles in a six-sided polygon.

Answer: ____________°

c) Hence work out the value of $x$.

Answer: ____________°

d) Sides AB and DC are produced until they meet at P.
Work out the size of $\angle BPC$, giving reasons where necessary.

Answer: ____________°

(9 marks)