INSTRUCTIONS TO CANDIDATES

• Answer ALL questions.
• This paper carries a total of 25 marks.
• Calculators and protractors are NOT ALLOWED.
1. a) Write 32% as a fraction in its simplest form.
   Ans: ________

   b) Work out \( \frac{2}{5} \times 1\frac{3}{7} \)
   Ans: ________

   c) Factorise completely: \( 27a^2 + 18a \)
   Ans: ________

   ----------------------------------------------- (3 marks)

2. In a mixed school, the ratio of male to female students is 5 : 8.
   There are 80 male students. How many female students are there?
   Ans: ________
   ----------------------------------------------- (2 marks)

3. During the last season a waterpolo team scored the following goals in its matches.
   
   | 9 | 6 | 7 | 11 | 8 | 13 | 9 | 9 | 10 |
   
   Find:
   a) the mode
   Ans: a) ________
   b) the median
   Ans: b) ________
   c) the range
   Ans: c) ________

   ----------------------------------------------- (3 marks)

4. Fill in the missing numbers.
   
   8  3  6  10  24  18  48

   ----------------------------------------------- (2 marks)
5. Calculate angle \( x \).

\[ \text{Ans: } x = \underline{\phantom{10}} \degree \]

\( \underline{\phantom{30}} \) (3 marks)

6. a) Draw the reflection of shape Y in the mirror line. Label it A.

b) Rotate shape Y \( 180^\circ \) clockwise about X. Label it B.

\( \underline{\phantom{50}} \) (2 marks)

7. a) A soft drink is sold in cylindrical cans of radius 3 cm and height 12 cm. Taking \( \pi = 3 \), find the volume of the can.

\[ \text{Ans: } \underline{\phantom{100}} \]

b) In a promotion, the company is offering “10% extra free” in a new can. What is the volume of the new can?

\[ \text{Ans: } \underline{\phantom{100}} \]

\( \underline{\phantom{40}} \) (4 marks)
8. a) Write True or False.
   
   i) $2 < 1$  
   Ans: ________
   
   ii) $\frac{1}{3} > 0.3$  
   Ans: ________

   b) Write the inequality for $x$, represented by the following number line.

   Ans: ________

   __________________________________________________________ (3 marks)

9. Work out the equation of the line below.

   Ans: $y = ________$

   __________________________________________________________ (3 marks)

END OF PAPER
1. a) Simplify \( \left( \frac{7^2 \times 7^4}{7^8} \right)^2 \). Give your answer in index form.

Ans: ________

b) Calculate, giving your answer in standard form.
\[
\frac{2.76 \times 10^3}{6.9 \times 10^{-2}}
\]

Ans: ________

(4 marks)

2. a) Expand and simplify: \( 5(x + y) + 2(x + z) \)

Ans: ________

b) Solve: \( 3p - 2 = 4 - 2(p - 2) \)

Ans: ________

(4 marks)
3. a) A model ship is drawn to scale of 1 : 2000. The model is 50 cm long.
   Work out the actual length in metres of the ship.

   Ans: ________

b) In January 2010, Sandra deposited money in a bank account at 3% simple interest. A year later she received €150 interest. What sum of money did Sandra deposit?

   Ans: ________

4. These designs are made by arranging counters in L-shapes.

   a) Draw Design 5.

   b) Complete this table.

<table>
<thead>
<tr>
<th>Design</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of counters</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   c) How many counters are there in Design 6?

   Ans: ________

   d) Write a formula for the nth term and find how many counters are needed to make Design 20.

   Ans: ________

   (6 marks)
5. XYZ is an isosceles triangle inscribed in a circle centre O of radius 10 cm. The perpendicular distance from O to YZ is 6 cm.

**Calculate:**

a) the **length** of YZ

![Diagram of XYZ isosceles triangle inscribed in a circle with O as centre and radius 10 cm, perpendicular distance from O to YZ is 6 cm.]

b) the **area** of ΔXYZ

Ans: a) ____________

Ans: b) ____________

___________________________________________ (4 marks)

6. a) Make \( p \) the subject of the formula: \( q = 5p - 8 \)

Ans: ____________

b) Expand and simplify: \((n + 1)(n - 1)\).

Ans: ____________

c) Simplify \( \frac{2x(x - y)}{4x^2} \), giving your answer in its simplest form.

Ans: ____________

d) The equation \( x^2 + 3x = 20 \) has a solution between \( x = 3 \) and \( x = 4 \). Use trial and improvement to find the value of \( x \) correct to 1 decimal place. Show your working.

Ans: ____________

______________________________________________ (8 marks)
7. a) What transformation will map shape A on to shape B?

_____________________________

b) What transformation will map shape A on to shape C?

_____________________________

(4 marks)

8. a) The pie chart shows the proportions of the different colours on a circular disc of radius 20 cm.

i) Work out the area shaded in blue, giving your answer to 1 decimal place.

ii) A coin is tossed on the disc. What is the probability that the coin falls on the pink sector? Write your answer as a fraction simplified to its lowest term.

Ans: ______

b) Brenda rolls a fair dice 45 times, with the following results.

<table>
<thead>
<tr>
<th>Score</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

i) What is the mean score?

ii) From the above table determine the probability of getting the number 6.

Ans: ______

(8 marks)
9. A regular pentagon is inscribed in a circle centre O.

   a) Work out the value of \( \angle AOB \).

   Ans: 

   b) What type of triangle is AOB?

   Ans: 

   c) Calculate \( \angle ABC \).

   Ans: 

   d) Fill in the logo program that draws the regular pentagon shown of side 40 units.

   PD
   REPEAT ____ [ FD _____ RT _____]

   ________________________________

   (8 marks)

10. PQ is a diameter of the circle centre O. R is a point on the circumference of the circle and S is a point on PR produced and \( \angle ROQ = 120^\circ \).

   Giving reasons, calculate the following:

   a) \( \angle RPO = \)_____

   Reason ______________________________

   b) \( \angle SRO = \)_____

   Reason ______________________________

   ________________________________

   (4 marks)
11. DEF is a triangle in which DE is 21 cm long. EX is perpendicular to DF.

   Calculate:

   a) the **length** of EX, correct to 1 decimal place.

   b) the **length** of DF correct to 3 significant figures.

   Ans: a) _______
   Ans: b) _______

12. a) Complete the table for values of \( y = x^2 + 2x - 4 \).

   \[
   \begin{array}{c|ccccccc}
   x & -4 & -3 & -2 & -1 & 0 & 1 & 2 \\
   \hline
   x^2 & 16 & 4 & 0 & \hline
   2x & -8 & -4 & 0 & \hline
   -4 & -4 & -4 & -4 & \hline
   y & 4 & -4 & -4 & \hline
   \end{array}
   \]

   b) Use a scale of 2 cm = 1 unit on both axes to draw the graph \( y = x^2 + 2x - 4 \).

   c) Write the minimum value of \( y \).

   d) Use your graph to solve \( x^2 + 2x - 4 = 0 \).

   \( x = \) ______ , ______

   \______________________________________________________________________ (6 marks)

   \______________________________________________________________________ (7 marks)
13. David has some grey rods and some white rods.

\[ g \text{ stands for the length of a grey rod} \]
\[ w \text{ stands for the length of a white rod} \]

a) The total length of 2 grey rods and 3 white rods is 33 cm. Write an \textbf{equation} for this diagram.

\begin{equation}
\begin{array}{ccc}
g & g & w & w & w \\
\end{array}
\end{equation}

\textbf{Ans:} ____________

b) The total length of 4 grey rods and 2 white rods is 46 cm. Write an \textbf{equation} for this diagram.

\begin{equation}
\begin{array}{ccc}
g & g & g & g & w & w \\
\end{array}
\end{equation}

\textbf{Ans:} ____________

c) \textbf{Solve} your equations simultaneously to find the values of \( g \) and \( w \).

\textbf{Ans:} g = _______

w = _______

\textbf{End of Paper}