INSTRUCTIONS TO CANDIDATES:

Read all the questions carefully before you start answering.

- Answer all questions.
- This paper carries 80 marks.
- Calculators and mathematical instruments are allowed but all necessary working must be shown.

1. a) Express 154 and 165 as a product of their prime factors.

b) Hence or otherwise find (i) the LCM and (ii) the HCF of 154 and 165.

(5 marks)
2. The table below shows the number of English speaking persons in a number of countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of English speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>$1.52 \times 10^7$</td>
</tr>
<tr>
<td>Canada</td>
<td>$1.77 \times 10^7$</td>
</tr>
<tr>
<td>Jamaica</td>
<td>$2.4 \times 10^6$</td>
</tr>
<tr>
<td>New Zealand</td>
<td>$3.2 \times 10^6$</td>
</tr>
<tr>
<td>USA</td>
<td>$2.25 \times 10^6$</td>
</tr>
<tr>
<td>UK</td>
<td>$5.68 \times 10^7$</td>
</tr>
<tr>
<td>Guyana</td>
<td>$4.8 \times 10^5$</td>
</tr>
</tbody>
</table>

a) Which of these countries has the largest number of English speakers? _____________

b) Which country had an English speaking population of almost half a million? ___________

c) What is the difference in the number of English speakers between USA and UK? (Give your answer in standard form).

________________

d) List the countries in order, start with the country having the least number of English speakers.

______________________________________________________________________________

(6 marks)

______________________________________________________________________________

3. The population of a town grows by 13% in one year and by 16% in the next year. What is the overall percentage increase?

Ans: __________

(3 marks)
4. Convert:
   
a) $2500 \text{ cm} = \underline{\quad} \text{ km}.

b) $536 \text{ cm}^2 = \underline{\quad} \text{ m}^2$

c) $35 \text{ m}^3 = \underline{\quad} \text{ cm}^3$

   (3 marks)

5. a) 
   \[
   (2x + 1) \quad (x - 4)
   \]

   i) Write down an expression for the area of the rectangle.

   Ans: \underline{\quad}

   ii) Given that $x = 10 \text{ cm}$, find the area of the rectangle.

   Ans: \underline{\quad}

   b) Factorise fully
   i) $3x^2 - 6x$

   Ans: \underline{\quad}

   ii) $9x^2 - 16y^2$

   Ans: \underline{\quad}

   iii) $3p^2 + 12p - 36$

   Ans: \underline{\quad}

   (9 marks)
6. The price of a house increases 15% each year. The value of a house in 2015 was €150,000.
   a) What was the value of the house in 2014 correct to the nearest €1000
      Ans: _______________
   b) What will the value of the house be in 2016?
      (Do NOT round your answer).
      Ans: _______________
      (6 marks)
____________________________________________________________________________
7. Mariah is standing 9 m away from a tower. She is 1.5 m tall and the angle of elevation of
   the top of the tower from Mariah’s eyes is 38°.
   a) Mark the angle of elevation on the diagram.

   b) Find the height of the tower correct to 3 significant figures.
      Ans: ________________ m

   c) Mariah gets closer to the tower. What happens to the angle of elevation?
      (5 marks)
8. A pool has the cross-section in the form of a trapezium

   a) Find the area of cross-section.

   Ans: _______________ m²

   b) The length of the pool is 15 m. Work out the volume of the pool.

   Ans: _______________ m³

   c) How many litres of water are needed to fill the pool?

   Ans: _______________ litres

   (6 marks)

9. Make $x$ the subject of the formula:

   a) $x(a - b) = 3$

   Ans: _______________

   b) $x^2y = a$

   Ans: _______________

   c) $\sqrt{bx} = c$

   Ans: _______________

   d) $ax + t = rt + bx$

   Ans: _______________ (8 marks)
10. Mr Millionaire inherited €720,000,000. He is going to invest:

★ half of the sum of money at 5% p.a. simple interest for five years

★ the remaining half of the sum of money at 2% p.a. compound interest for 5 years

Find the total interest gained after 5 years.

Ans: __________________________

(6 marks)

11. Mark starts from point A. He walks a distance of 5 km West and then 13 km South to point B.

a) Continue the rough sketch to show Mark’s journey.

b) Mark walks back from B to A. Calculate the distance AB correct to 1d.p.

Ans: _________ km

(8 marks)

c) Find the bearing of B from A. Give your answer to the nearest degree.

Ans: _______

(8 marks)
12. The formula for the area of a trapezium can be written as \( A = \frac{(a + b)h}{2} \)

a) Make \( a \) the subject of the formula.

Ans: _________________

b) Find the value of \( a \) given that the area is 25 cm\(^2\), the height is 5 cm and the length \( b \) is 3 cm.

Ans: ______________ cm

(6 marks)

13. a) Complete the table for \( y = 2x + 5 \) for the values of \( x \) from \(-3\) to 3.

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

b) Plot the graph of \( y = 2x + 5 \) using a suitable scale.

c) Use the graph to find:
   i) the value of \( x \) when \( y = 6 \) __________ Ans
   ii) the value of \( y \) when \( x = 0.2 \) __________ Ans

d) Which one of the following lines is parallel to the graph with equation \( y = 2x + 5 \)?
   A) \( 2x + 2y = \frac{1}{2} \)  
   B) \( y + 2x = 8 \) 
   C) \( y - 2x = 7 \)  

(9 marks)