

## SECTION A

*Answer all the questions in this section.*

1. Given that  $\frac{\sqrt{6}}{\sqrt{3} + \sqrt{2}} = \frac{y}{\sqrt{3}}$ , express  $y$  in the form  $a + b\sqrt{c}$  where  $a$ ,  $b$  and  $c$  are integers. (05 marks)
  
2. Two independent events  $A$  and  $B$  are such that  $P(A) = 0.25$  and  $P(A \cup B) = 0.56$ . Find:
  - (a)  $P(B)$  (03 marks)
  - (b)  $P(A \cap B)$  (02 marks)
  
3. The position vectors of three points  $P$ ,  $Q$  and  $R$  are  $-7\mathbf{i}$ ,  $7\mathbf{j}$  and  $\mathbf{i} + 6\mathbf{j}$  respectively.
  - (a) Determine:
    - (i)  $PQ$
    - (ii)  $QR$(03 marks)
  - (b) Use the results in (a) to show that  $PQ$  is perpendicular to  $QR$ . (02 marks)
  
4. In a certain school, senior four students organised for a Geography study tour. 20 % of the students did not make it for the tour. Determine the probability that in a group of five students at most two did not make it for the tour. (05 marks)
  
5. The gradient of the curve  $y = 3x^2 + 2x + 1$  at a point  $P(x, y)$  is 14. Find the coordinates of  $P$ . (05 marks)
  
6. The table below shows the prices in Shillings (Shs) per unit of commodities  $A$  and  $B$  in the years 2021 and 2022.

| COMMODITY | PRICE (Shs) |       |
|-----------|-------------|-------|
|           | 2021        | 2022  |
| $A$       | 25000       | 28000 |
| $B$       | 18000       | 24000 |

Using 2021 as the base year, calculate the simple aggregate price index for the commodities in 2022. (05 marks)