

### S3 MATHEMATICS

1. Draw the graph of  $y = x^2 - 6x + 7$  for  $-1 \leq x \leq 7$ . Using the same scale and axes, draw the graph of  $y = x + 1$ .

Use your graphs to answer the questions below.

- i) State the line of symmetry of the function  $y = x^2 - 6x + 7$ .
- ii) Give the coordinates of the turning point of the function  $y = x^2 - 6x + 7$  and hence state its minimum value.
- iii) For what range of values of  $x$  is  $x^2 - 6x + 7 \leq x + 1$
- iv) The two points of intersection of the two graphs satisfy a certain quadratic equation. Obtain that equation and its solution.
- v) What lines would you draw to solve the equations (a)  $x^2 - 6x + 7 = 0$  (b)  $x^2 - 5x + 4 = 0$

2. Draw the graph of  $y = 6 - x - x^2$  from  $x = -5$  to  $x = 4$  using scales; 2cm to 1 unit on  $x$  - axis and 1cm to 1 unit on  $y$ -axis. Using the same axes draw the graph of  $y = 3 - 3x$ .

Use your graphs to answer the questions below;

- i) Find the maximum value of  $6 - x - x^2$  and the corresponding value of  $x$ .
- ii) Find the range of  $x$  for which  $6 - x - x^2$  has values greater than 4.
- iii) For what range of values of  $x$  is  $6 - x - x^2 > -3x + 3$
- iv) The two points of intersection of the two graphs satisfy a certain quadratic equation. Obtain that equation and its solution.
- v) What lines would you draw to solve equations

a)  $x^2 + x - 6 = 0$

b)  $x^2 + 2x - 8 = 0$

3(a) Given that  $\left(a + \frac{1}{a}\right)^2 = 14$ , find the value of  $a^2 + \frac{1}{a^2}$

b) Express  $x^2 + 5x + 6$  in the form of  $(x + p)^2 + q$ , hence solve  $x^2 + 5x + 6 = 0$

c) i) If the area of a rectangle is  $(x^2 + 7x + 10)cm^2$ . What is the possible perimeter of this rectangle.

ii) Given that the perimeter of this rectangle is 36cm, determine the dimensions of this rectangle.