SCAN ME

Finding a Turning Point by Completing the Square

REVISE THIS TOPIC

1 The equation of a curve is $y = x^2 + 2x + 7$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x+1)^2 - 1 + 7$

$= (x+1)^2 + 6$

Answer (-1 , 6)

2 The equation of a curve is $y = x^2 + 6x + 13$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x+3)^2 - 9 + 13$

$= (x+3)^2 + 4$

Answer (-3 , 4)

3 The equation of a curve is $y = x^2 - 10x + 29$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x-5)^2 - 25 + 29$

$= (x-5)^2 + 4$

Answer (5 , 4)

9

4 The equation of a curve is $y = x^2 - 2x - 7$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x-1)^2 - 1 - 7$

$= (x-1)^2 - 8$

Answer (1 , -8)

5 The equation of a curve is $y = x^2 + 12x + 40$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x+6)^2 - 36 + 40$

$= (x+6)^2 + 4$

Answer (-6 , 4)

6 The equation of a curve is $y = x^2 - 3x + 4$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x - \frac{3}{2})^2 - \frac{9}{4} + 4$

$= (x - \frac{3}{2})^2 - \frac{9}{4} + \frac{16}{4}$

$= (x - \frac{3}{2})^2 + \frac{7}{4}$

Answer ($\frac{3}{2}$, $\frac{7}{4}$)

7 The equation of a curve is $y = x^2 - 5x - 9$

By completing the square, working out the coordinates of the turning point.

You **must** show your working. **[3 marks]**

$(x - \frac{5}{2})^2 - \frac{25}{4} - 9$

$= (x - \frac{5}{2})^2 - \frac{25}{4} - \frac{36}{4}$

$= (x - \frac{5}{2})^2 - \frac{61}{4}$

Answer ($\frac{5}{2}$, $-\frac{61}{4}$)

8 A curve with equation $y = x^2 + bx + c$ has a turning point at the point (4, -2)
Work out the value of b and c. **[3 marks]**

$(x-4)^2 - 2$
$= (x-4)(x-4) - 2$
$= x^2 - 4x - 4x + 16 - 2$
$= x^2 - 8x + 14$

$b = -8$ $c = 14$

9 A curve with equation $y = x^2 + bx + c$ has a turning point at the point (-4, 9)
Work out the value of b and c. **[3 marks]**

$(x+4)^2 + 9$
$= (x+4)(x+4) + 9$
$= x^2 + 4x + 4x + 16 + 9$
$= x^2 + 8x + 25$

$b = 8$ $c = 25$

10 A curve with equation $y = x^2 + bx + c$ has a turning point at the point (-3, -3)
Work out the value of b and c. **[3 marks]**

$(x+3)^2 - 3$
$= (x+3)(x+3) - 3$
$= x^2 + 3x + 3x + 9 - 3$
$= x^2 + 6x + 6$

$b = 6$ $c = 6$

21