GCSE HIGHER · REVISION MAT 5

Completing the square and turning points

1 Write down the y-intercept and the roots of

$$y = (x - 1)(x - 6)$$

2 Write $x^2 - 12x + 40$ in the form $(x - a)^2 + b$.

3 Show that $x = 3$ is the line of symmetry of

$$y = x^2 - 6x + 2$$

4 The height of a ball is $h = 10t - t^2$ metres after t seconds.

Find its maximum height.

5 Show that $x^2 + 3x + 4 > 0$ for all x.

6 Solve $x^2 - 4x - 8 = 0$, giving answers in the form $a \pm b\sqrt{c}$.

7 Write $3x^2 + 6x + 1$ in the form $a(x + b)^2 + c$.

Write down the turning point.

8 The curve $y = x^2 - 2kx + 9$ touches the x-axis at exactly one point.

Find the possible values of k.

Mr&Mrs MATHS

ANSWERS · REVISION MAT 5

Completing the square and turning points

1 **(0, 6); roots 1 and 6**

2 **$(x - 6)^2 + 4$**

3 $(x - 3)^2 - 7$

Turning point at $x = 3$, so symmetric about $x = 3$.

4 $h = 25 - (t - 5)^2$

25 m (at $t = 5$)

5 $(x + 1.5)^2 - 2.25 + 4$

$= (x + 1.5)^2 + 1.75$

Always at least 1.75

6 $(x - 2)^2 = 12$

$x = 2 \pm \sqrt{12}$

$x = 2 \pm 2\sqrt{3}$

7 $3[(x + 1)^2 - 1] + 1$

$3(x + 1)^2 - 2$; turning point $(-1, -2)$

8 $(x - k)^2 + 9 - k^2$

Touches when $9 - k^2 = 0$

$k = 3$ or $k = -3$

Mr&Mrs MATHS