YEAR 1 PURE Chapter 2 QUADRATICS

– SOLVING QUADRATICS

Factorising

$6x^2 + 13x - 5 = 0$

$ac = -30$, $b = 13$ $15, -2$

$6x^2 + 15x - 2x - 5 = 0$

$3x(2x+5) - 1(2x+5) = 0$

$(3x-1)(2x+5) = 0$

$x = \frac{1}{3}$ or $x = \frac{-5}{2}$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$6x^2 + 13x - 5 = 0$

$a = 6$ $b = 13$ $c = -5$

$x = \frac{1}{3}$ or $x = \frac{-5}{2}$

Completing the Square

$$x^2 + bx = \left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2$$

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

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

$2x^2 + 8x = 2(x^2 + 4x)$

$= 2\left[(x+2)^2 - 4\right]$

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

Completing the Square – solving

$$2x^2 + 8x = 0$$

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

$$2(x+2)^2 = 8$$

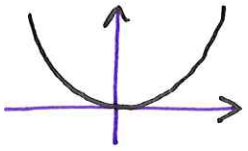
$$(x+2)^2 = 4$$

$$x+2 = \pm 2$$

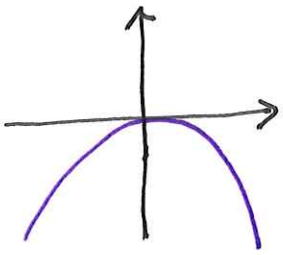
$$x = 0 \text{ or } -4$$

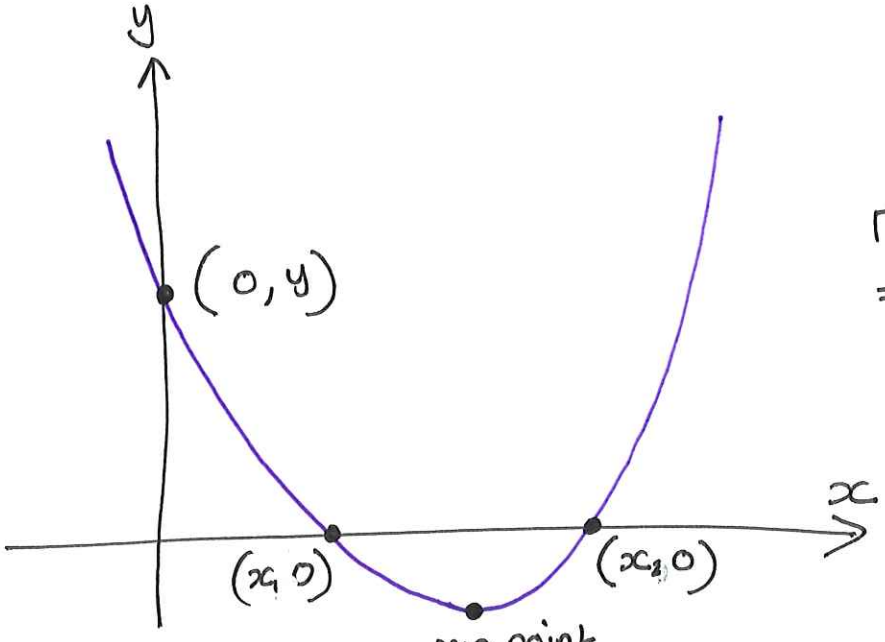
– QUADRATIC GRAPHS

$y = x^2$



$y = -x^2$





roots = $(x_1, 0)$ or $(x_2, 0)$

↳ complete the square

example $(x+2)^2 - 4$

$(-2, -4)$

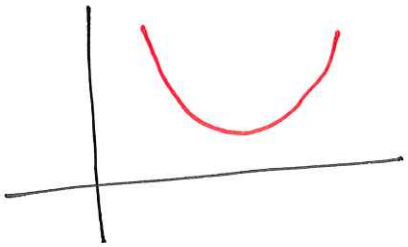
– The Discriminant

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant $b^2 - 4ac$

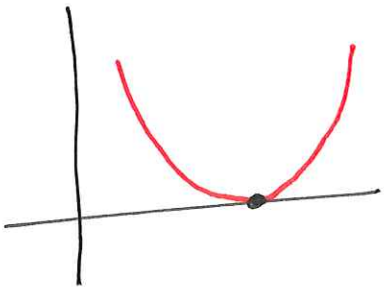
use to determine number of roots

No roots



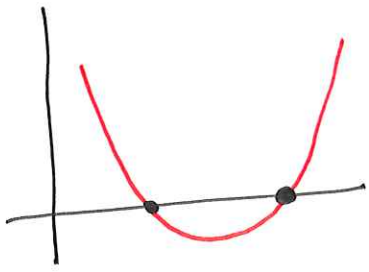
$b^2 - 4ac < 0$

one root



$b^2 - 4ac = 0$

two roots



$b^2 - 4ac > 0$

Example $x^2 + 4x + k = 0$ has two roots

$a = 1 \quad b = 4 \quad c = k$

$b^2 - 4ac > 0$

$4^2 - 4(1)(k) > 0$

$16 - 4k > 0$

$k < 4$