Class slides

Completing Square:

$$Ex: \quad 2x^2 + 8x - 5$$

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

$$\rightarrow \quad 2\left[\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2\right] - 5$$

$$2\left[\left(x + \frac{4}{2}\right)^2 - \left(\frac{4}{2}\right)^2\right] - 5$$

$$2\left[(x + 2)^2 - 4\right] - 5$$

$$2(x + 2)^2 - 8 - 5$$

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

EX 2.

$$x^2 + 10x - 24 = 0$$

$$\rightarrow \left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 - 24$$

$$\left(x + \frac{10}{2}\right)^2 - \left(\frac{10}{2}\right)^2 - 24$$

Ans

$$(x+5)^2 - 25 - 24 = 0$$

$$\sqrt{(x+5)^2} = \sqrt{49}$$

$$x + 5 = +7 \qquad\qquad x + 5 = -7$$

Q3

Complete the square for

(i) $x^2 + 8x - 4$

(ii) $2x^2 + 12x - 5$

Q5. (iii) $5x^2 - 3x + 2$

$$2(x^2 + 6x) - 5$$

$$2\left[(x+3)^2 - 9\right] - 5$$

$$5\left(x^2 - \frac{3}{5}x\right) + 2$$

$$5\left[\left(x - \frac{3}{10}\right)^2 - \left(\frac{3}{10}\right)^2\right] + 2$$

$$\frac{5}{1}\left(x - \frac{3}{10}\right)^2 - \frac{9}{20} + 2$$

Q3

Write the quadratic function $y = x^2 + 8x - 9$ in the form $y = a(x + b)^2 + c$ where a, b and c are integers to be found.

$$\underline{x^2 + 8x} - 9$$

$$\left(x + \frac{8}{2}\right)^2 - \left(\frac{8}{2}\right)^2 - 9$$

$$(x + 4)^2 - 16 - 9$$

$$(x + 4)^2 - 25$$

$$9(x + b)^2 + c$$

$$a = 1, \quad b = 4, \quad c = -25$$

Q6

Write the quadratic function $y = -6x^2 + 8x - 5$ in the form $y = a - b(x + c)^2$ where a, b and c are constants to be found.

$$-6x^2 + 8x - 5$$

$$-6\left(x^2 - \frac{8}{6}x\right) - 5$$

$$-6\left[\left(x - \frac{8}{\frac{6}{2}}\right)^2 - \left(\frac{8}{\frac{6}{2}}\right)^2\right] - 5$$

$$-6\left[\left(x - \frac{2}{3}\right)^2 - \left(\frac{2}{3}\right)^2\right] - 5$$

$$-6\left[\left(x - \frac{2}{3}\right)^2 - \frac{4}{9}\right] - 5$$

$$-6\left(x - \frac{2}{3}\right)^2 + \frac{8}{3} - 5$$

$$-6\left(x - \frac{2}{3}\right)^2 - \frac{7}{3}$$

$$a - b(x + c)^2$$

$$-\frac{7}{3} - 6\left(x - \frac{2}{3}\right)^2$$

$$a = -\frac{7}{3} \qquad b = 6 \qquad c = -\frac{2}{3}$$

1) R

Notes

Solving a quadratic equation by completing the square

- Completing the square will work for any quadratic
- Make sure you know how to complete the square
- Remember this will help with questions involving turning points too

COMPLETING THE SQUARE

e.g. $x^2 + 10x - 24 = 0$

$(x+5)^2 - 49 = 0$

$(x+5)^2 = 49$

$x+5 = \pm 7$

$x = 7 - 5$ OR $x = -7 - 5$

$x = 2$ OR $x = -12$

COMPLETE THE SQUARE:

"$p = \dfrac{b}{2}$", "$q = c - p^2$"

REMEMBER BOTH POSITIVE AND NEGATIVE SQUARE ROOTS