Solving Quadratics by Completing the Square (H)

Starter

1. **(Review of last lesson)** Complete the square for these quadratic expressions:
   (a) $x^2 + 2x - 9$ (b) $x^2 - 8x + 3$

2. Using your answer to 1, solve the equations, giving your answers exactly:
   (a) $x^2 + 2x - 9 = 0$ (b) $x^2 - 8x + 3 = 0$

Notes

Once a quadratic expression is in completing-the-square form, we can solve it by rearranging using BIDMAS.

E.g. 1 Solve the equation $x^2 + 12x + 19 = 0$ by completing the square (and using BIDMAS).

Working:

$$x^2 + 12x + 19 = 0$$
$$(x + 6)^2 - 6^2 + 19 = 0 \quad \textit{Complete the square}$$
$$(x + 6)^2 - 17 = 0 \quad \textit{Now we can rearrange}$$
$$(x + 6)^2 = 17 \quad \textit{Addition/Subtraction before Indices}$$
$$x + 6 = \pm\sqrt{17} \quad \textit{Remember } \pm$$
$$x = -6 \pm \sqrt{17} \quad \textit{This is the answer exact form}$$
$$x = -1.877 \text{ or } x = -10.1 \text{ (3 s.f.)}$$

N.B. By completing the square, we can give the answer exactly using surds

E.g. 2 By completing the square, solve these equations. Give your answers as exact values (i.e. in surd form).
(a) $x^2 + 6x - 4 = 0$ (b) $x^2 + 8x + 5 = 0$ (c) $x^2 - 7x + 9 = 0$

Video: Completing the square (2nd video)

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p398 E12.4 Qu 10-20
A*-G class textbook:	p358 E12.2 Qu 10-20
9-1 homework book:	p398 E12.4 Qu 4-5
A*-G homework book:	p100 E12.2 Qu 4-5

Homework book answers (only available during a lockdown)