Completing the Square (a ≠ 1)

Starter

1. **(Review of last lesson)** By completing the square, solve these equations:

(a) $x^2 + 4x + 1 = 0$ (b) $x^2 - 11x + 25 = 0$

Notes

Completing the square becomes more difficult when the coefficient of x^2 is not 1 e.g. $2x^2 - 8x + 3$.

Success Criteria — completing the square when the coefficient of x^2 is not 1

1. Take the coefficient of x^2 out as a factor of the term in x^2 and x — put in a square bracket
2. Complete the square for the terms in the square bracket
3. Expand the square brackets
4. Do the arithmetic

E.g. 1 Complete the square for the expression $2x^2 - 8x + 3$.

Working:

$$\begin{aligned} 2x^2 - 8x + 3 &\equiv 2\left[x^2 - 4x\right] + 3 && \textit{Take coefficient of } x^2 \textit{ out as a factor} \\ &\equiv 2\left[(x-2)^2 - 2^2\right] + 3 && \textit{Complete square for square bracket} \\ &\equiv 2\left[(x-2)^2 - 4\right] + 3 \\ &\equiv 2(x-2)^2 - 8 + 3 && \textit{Expand the square brackets} \\ &\equiv 2(x-2)^2 - 5 && \textit{Do the arithmetic} \end{aligned}$$

E.g. 2 Complete the square for: (a) $2x^2 - 12x + 5$ (b) $4x^2 + 8x - 11$

Video: Completing the square

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p398 E12.4 Qu 21-29
A*-G class textbook:	p358 E12.2 Qu 21-29
9-1 homework book:	p135 E12.4 Qu 6-10
A*-G homework book:	p100 E12.2 Qu 6-10

Summary

Completing the square when the coefficient of x^2 is not 1:

1. Take the coefficient of x^2 out as a factor of the term in x^2 and x — put in a square bracket.
2. Complete the square for the terms in the square bracket.
3. Expand the square brackets.
4. Do the arithmetic.

Homework book answers (only available during a lockdown)