

Completing square

Rewrite $x^2 + 6x$ as a square plus another term.

Sol. The coefficient of x is 6. Dividing 6 by 2 and squaring it gives 9.

$$\begin{aligned}x^2 + 6x &= (x^2 + 6x + 9) - 9 \\ &= (x + 3)^2 - 9\end{aligned}$$

Example 2. work out $x^2 + 6x - 2$.

$$\text{Sol. } x^2 + 6x - 2 = (x^2 + 6x + 9) - 9 - 2 = (x + 3)^2 - 11$$

Using completing square, solve the following equations.

1. $x^2 - 6x + 15 = (x-p)^2 + q$. Find p and q .
2. $x^2 + 6x - 5 = (x+p)^2 + q$. Find p and q .
3. $x^2 + 12x + 39 = (x+a)^2 + b$. Find a and b .
4. $x^2 + 8x + 21 = (x+a)^2 + b$. Find a and b .
5. $x^2 + px + 17 = (x-5)^2 + q$. Find p and q .
6. $x^2 + 6x - 11 = (x+a)^2 + b$. Find a and b .
7. Solve $x^2 - 6x - 3 = 0$, Answer will be in the form of $P \pm q\sqrt{3}$.
8. $x^2 + 8x - 3 = (x+a)^2 + b$. Find a and b . Solve it by 2 d.p.