

Completing the Square

Using completing the square, express the following in the form $(x + a)^2 + b$

a) $x^2 - 4x + 15$

b) $n^2 - 2n - 15$

c) $c^2 + 20c - 40$

d) $q^2 + 12q + 32$

e) $m^2 - 4m - 5$

f) $x^2 - 8x + 6$

g) $k^2 + 7k + 6$

i) $y^2 - 3y + 10$

Completing the Square

Using completing the square, express the following in the form $(x + a)^2 + b$

a) $x^2 - 4x + 15$

$$\begin{aligned} & x^2 - 4x + 4 - 4 + 15 \\ &= (x - 2)^2 + 11 \end{aligned}$$

b) $n^2 - 2n - 15$

$$\begin{aligned} & n^2 - 2n + 1 - 1 - 15 \\ &= (n - 1)^2 - 16 \end{aligned}$$

c) $c^2 + 20c - 40$

$$\begin{aligned} & c^2 + 20c + 100 - 100 - 40 \\ &= (c + 10)^2 - 140 \end{aligned}$$

d) $q^2 + 12q + 32$

$$\begin{aligned} & q^2 + 12q + 36 - 36 + 32 \\ &= (q + 6)^2 - 4 \end{aligned}$$

e) $m^2 - 4m - 5$

$$\begin{aligned} & m^2 - 4m + 4 - 4 - 5 \\ &= (m - 2)^2 - 9 \end{aligned}$$

f) $x^2 - 8x + 6$

$$\begin{aligned} & x^2 - 8x + 16 - 16 + 6 \\ &= (x - 4)^2 - 10 \end{aligned}$$

g) $k^2 + 7k + 6$

$$\begin{aligned} & k^2 + 7k + \left(\frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2 + 6 \\ &= \left(k + \frac{7}{2}\right)^2 - \frac{25}{4} \end{aligned}$$

i) $y^2 - 3y + 10$

$$\begin{aligned} & y^2 - 3y + \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + 10 \\ &= \left(y - \frac{3}{2}\right)^2 + \frac{31}{4} \end{aligned}$$