



Completing the Square



← REVISE THIS TOPIC

1 Express $x^2 + 6x + 11$ in the form $(x + a)^2 + b$ [2 marks]

$$(x + 3)^2 - 9 + 11$$

Answer $(x + 3)^2 + 2$

2 Express $x^2 + 8x + 30$ in the form $(x + a)^2 + b$ [2 marks]

$$(x + 4)^2 - 16 + 30$$

Answer $(x + 4)^2 + 14$

3 Express $x^2 + 4x + 1$ in the form $(x + a)^2 - b$ [2 marks]

$$(x + 2)^2 - 4 + 1$$

Answer $(x + 2)^2 - 3$





4 Express $x^2 - 10x + 12$ in the form $(x - a)^2 - b$ [2 marks]

$$(x - 5)^2 - 25 + 12$$

Answer $(x - 5)^2 - 13$

5 Express $x^2 - 2x + 13$ in the form $(x - a)^2 + b$ [2 marks]

$$(x - 1)^2 - 1 + 13$$

Answer $(x - 1)^2 + 12$

6 Express $x^2 - 12x - 16$ in the form $(x - a)^2 + b$ [2 marks]

$$(x - 6)^2 - 36 - 16$$

Answer $(x - 6)^2 - 52$

7 Express $x^2 - 20x$ in the form $(x - a)^2 - b$ [2 marks]

$$(x - 10)^2 - 100$$

Answer $(x - 10)^2 - 100$





8 Express $x^2 + 3x + 5$ in the form $(x + a)^2 + b$ [3 marks]

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

$$\left(x + \frac{3}{2}\right)^2 - \frac{9}{4} + \frac{20}{4}$$

Answer $\left(x + \frac{3}{2}\right)^2 + \frac{11}{4}$

9 Express $x^2 - 5x + 7$ in the form $(x - a)^2 + b$ [3 marks]

$$\left(x - \frac{5}{2}\right)^2 - \frac{25}{4} + 7$$

$$\left(x - \frac{5}{2}\right)^2 - \frac{25}{4} + \frac{28}{4}$$

Answer $\left(x - \frac{5}{2}\right)^2 + \frac{3}{4}$

10 Express $x^2 + 9x + 3$ in the form $(x + a)^2 - b$ [3 marks]

$$\left(x + \frac{9}{2}\right)^2 - \frac{81}{4} + 3$$

$$\left(x + \frac{9}{2}\right)^2 - \frac{81}{4} + \frac{12}{4}$$

Answer $\left(x + \frac{9}{2}\right)^2 - \frac{69}{4}$

11 Express $x^2 - x - 2.75$ in the form $(x - a)^2 - b$ [3 marks]

$$\left(x - \frac{1}{2}\right)^2 - \frac{1}{4} - 2\frac{3}{4}$$

Answer $\left(x - \frac{1}{2}\right)^2 - 3$



12 Here is an identity

$$x^2 + px + 32 \equiv (x + 5)^2 - q$$

Work out the values of p and q .

[3 marks]

$$x^2 + \underbrace{px}_{10x} + \underbrace{32}_{25 - q} \equiv x^2 + \underbrace{10x}_{25} + \underbrace{25 - q}_{-q}$$

$$px = 10x$$

$$p = 10$$

$$32 = 25 - q$$

$$q = 25 - 32$$

$$q = -7$$

$$p = \underline{10}$$

$$q = \underline{-7}$$

13 Here is an identity

$$x^2 - 8x + p \equiv (x + q)^2 - 4$$

Work out the values of p and q .

[3 marks]

$$x^2 - \underbrace{8x}_{2qx} + \underbrace{p}_{q^2 - 4} \equiv x^2 + \underbrace{2qx}_{-8} + \underbrace{q^2 - 4}_{-4}$$

$$-8x = 2qx$$

$$-8 = 2q$$

$$q = -4$$

$$p = q^2 - 4$$

$$p = (-4)^2 - 4$$

$$p = 16 - 4$$

$$p = \underline{12}$$

$$q = \underline{-4}$$

