

## Workout

Question 1: Write the following expressions in the form  $(x + a)^2 + b$

(a)  $x^2 + 8x + 1$

(b)  $x^2 + 10x + 3$

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

(d)  $x^2 - 6x - 10$

(e)  $x^2 - 4x - 13$

(f)  $x^2 - 12x + 3$

(g)  $x^2 + 14x + 3$

(h)  $x^2 - 2x - 15$

(i)  $x^2 + 4x - 11$

(j)  $x^2 + x - 8$

(k)  $x^2 + 3x + 1$

(l)  $x^2 - 7x - 2$

(m)  $x^2 - 9x - 1$

(n)  $x^2 + 11x + 3$

(o)  $x^2 - 100x - 25$

Question 2: Solve the following equations (use completing the square).

(a)  $x^2 + 4x + 1 = 0$

(b)  $x^2 + 8x - 10 = 0$

(c)  $x^2 + 14x - 4 = 0$

(d)  $x^2 - 8x - 2 = 0$

(e)  $x^2 - 10x + 10 = 0$

(f)  $x^2 + 18x + 7 = 0$

(g)  $x^2 + 12x + 3 = 19$

(h)  $x^2 = 2x + 10$

(i)  $x^2 - 7x - 3 = 0$

(j)  $x^2 + x - 7 = 0$

(k)  $x^2 + 3x + 8 = 0$

(l)  $2x^2 - 10x - 30 = x^2 - 4x$

Question 3: Write the following expressions in the form  $a(x + b)^2 + c$

(a)  $2x^2 + 8x + 2$

(b)  $2x^2 + 12x - 3$

(c)  $3x^2 - 12x + 2$

(d)  $4x^2 + 12x - 5$

(e)  $2x^2 - 3x - 5$

(f)  $5x^2 - 20x + 30$

Question 4: Solve the following equations (use completing the square).

(a)  $3x^2 + 12x + 3 = 0$

(b)  $2x^2 + 16x - 20 = 0$

(c)  $3x^2 - 6x + 1 = 0$

(d)  $5x^2 + 10x - 9 = 0$

(e)  $2x^2 - 5x - 3 = 0$

(f)  $2x^2 - 7x + 1 = 0$

## Apply

Question 1: Write  $(x + 3)^2 - 4$  in the form  $x^2 + bx + c$

Question 2: Write  $(x - 2)^2 - 9$  in the form  $x^2 + bx + c$

Question 3: Write  $(x - 7)^2 + 11$  in the form  $x^2 + bx + c$

Question 4: Use completing the square to find the minimum point for each graph below

(a)  $y = x^2 + 10x + 12$

(b)  $y = x^2 + 4x + 1$

(c)  $y = x^2 + 6x + 8$

(d)  $y = x^2 - 2x + 3$

(e)  $y = x^2 - 6x - 3$

(f)  $y = x^2 - x - 4$

(g)  $y = x^2 + 9x + 1$

(h)  $y = x^2 - 6x - 2$

(i)  $y = x^2 + 22x + 100$

Question 5: By using completing the square to solve  $ax^2 + bx + c = 0$ , prove the quadratic formula.

Question 6: Can you spot any mistakes?

$$\begin{aligned} \text{Solve } x^2 + 10x + 2 &= 0 \\ (x + 5)^2 - 10 + 2 &= 0 \\ (x + 5)^2 - 12 &= 0 \\ (x + 5)^2 &= 12 \\ x + 5 &= \sqrt{12} \\ x &= -5 + \sqrt{12} \end{aligned}$$