

COMPLETING THE SQUARE

ANSWERS

Q1

①

$$x^2 - 8x + 1$$

$$(x - 4)^2 - 16 + 1$$

$$(x - 4)^2 - 15$$

Turning points are

$$(4, -15)$$

Q2

②

$$x^2 + 10x + 5$$

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

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

Turning points: $(-5, -20)$

Q3

③ $x^2 + 4x + 2$

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

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

Turning Point: $(-2, -2)$

Q4

④ $x^2 - 4x - 1$

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

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

Turning point: $(2, -5)$

Q5

$$\begin{aligned} \textcircled{5} \quad & x^2 + 10x + 3 \\ & (x+5)^2 - 25 + 3 \\ & (x+5)^2 - 22 \\ & (-5, -22) \end{aligned}$$

Q6

$$\begin{aligned} \textcircled{6} \quad & x^2 + 12x - 6 \\ & (x+6)^2 - 36 - 6 \\ & (x+6)^2 - 42 \\ & (-6, -42) \end{aligned}$$

Q7

$$\begin{aligned} \textcircled{7} \quad & x^2 + 3x - 9 \\ & \left(x + \frac{3}{2}\right)^2 - \frac{9}{4} - 9 \\ & \left(x + \frac{3}{2}\right)^2 - \frac{9}{4} - \frac{36}{4} \\ & \left(x + \frac{3}{2}\right)^2 - \frac{45}{4} \\ & \left(-\frac{3}{2}, -\frac{45}{4}\right) \end{aligned}$$

Q8

$$\begin{aligned} \textcircled{8} \quad & x^2 - x + 10 \\ & \left(x - \frac{1}{2}\right)^2 - \frac{1}{4} + 10 \\ & \left(x - \frac{1}{2}\right)^2 - \frac{1}{4} + \frac{40}{4} \\ & \left(x - \frac{1}{2}\right)^2 + \frac{39}{4} \\ & \left(\frac{1}{2}, \frac{39}{4}\right) \end{aligned}$$

Q9

$$\begin{aligned} & \textcircled{9} \quad 2n^2 - 12n + 25 \\ & \quad 2(n^2 - 6n + 12.5) \\ & \quad 2[(n-3)^2 - 9 + 12.5] \\ & \quad 2[(n-3)^2 + 3.5] \\ & \quad 2(n-3)^2 + 7 \\ & \quad (3, 7) \end{aligned}$$

Q10

$$\begin{aligned} & \textcircled{10} \quad 2n^2 + 16n + 28 \\ & \quad 2[n^2 + 8n + 14] \\ & \quad 2[(n+4)^2 - 16 + 14] \\ & \quad 2[(n+4)^2 - 2] \\ & \quad 2(n+4)^2 - 4 \\ & \quad (-4, -4) \end{aligned}$$

Q11

①

$$3n^2 - 6n + 9$$

$$3(n^2 - 2n + 3)$$

$$3[(n-1)^2 - 1 + 3]$$

$$3[(n-1)^2 + 2]$$

$$3(n-1)^2 + 6$$

$$(1, 6)$$

Q12

(12)

$$3x^2 - 30x + 66$$

$$3(x^2 - 10x + 22)$$

$$3((x-5)^2 - 25 + 22)$$

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

$$3(x-5)^2 - 9$$

$$(5, -9)$$

(13) $x^2 + 10x - 5$

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

$$(x+5)^2 - 20 = 0$$

$$x+5 = \pm \sqrt{20}$$

$$x = -5 \pm \sqrt{20}$$

OR

$$x = -5 \pm 2\sqrt{5}$$

$$x = -5 + 2\sqrt{5}$$

$$\text{OR } x = -5 - 2\sqrt{5}$$
