## COMPLETING THE SQUARE
**EQUIVALENT EXPRESSIONS**

**NO CALCULATOR**

Ref: G243.**3F1**

| | | | |
|---|---|---|---|
| **A1** Express $x^2 + 8x$ in the form $(x + a)^2 + b$ | **A2** Express $x^2 + 6x$ in the form $(x + a)^2 + b$ | **A3** Express $x^2 - 4x$ in the form $(x + a)^2 + b$ | **A4** Express $x^2 - 12x$ in the form $(x + a)^2 + b$ |
| **B1** Express $x^2 + 3x$ in the form $(x + p)^2 + q$ | **B2** Express $x^2 - 9x$ in the form $(x + p)^2 + q$ | **B3** Express $x^2 - 7x$ in the form $(x + p)^2 + q$ | **B4** Express $x^2 + 11x$ in the form $(x + p)^2 + q$ |
| **C1** Express $x^2 + 6x + 5$ in the form $(x + m)^2 + n$ | **C2** Express $x^2 - 6x + 5$ in the form $(x + m)^2 + n$ | **C3** Express $x^2 + 10x - 11$ in the form $(x + m)^2 + n$ | **C4** Express $x^2 - 4x + 20$ in the form $(x + m)^2 + n$ |
| **D1** Express $2x^2 + 8x$ in the form $a(x + b)^2 + c$ | **D2** Express $3x^2 - 9x$ in the form $a(x + b)^2 + c$ | **D3** Express $3x^2 + 12x - 6$ in the form $a(x + b)^2 + c$ | **D4** Express $2x^2 - 6x + 11$ in the form $a(x + b)^2 + c$ |

## COMPLETING THE SQUARE
### EQUIVALENT EXPRESSIONS

**NO CALCULATOR**

Ref: G243.**3F1**

---

**A1** Express $x^2 + 8x$
in the form $(x + a)^2 + b$

$$x^2 + 8x = (x + 4)^2 - 4^2$$
$$= (x + 4)^2 - 16$$

**A2** Express $x^2 + 6x$
in the form $(x + a)^2 + b$

$$x^2 + 6x = (x + 3)^2 - 3^2$$
$$= (x + 3)^2 - 9$$

**A3** Express $x^2 - 4x$
in the form $(x + a)^2 + b$

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

**A4** Express $x^2 - 12x$
in the form $(x + a)^2 + b$

$$x^2 - 12x = (x - 6)^2 - 6^2$$
$$= (x - 6)^2 - 36$$

---

**B1**

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

**B2**

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

**B3**

$$x^2 - 7x = \left(x - \frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2$$
$$= \left(x - \frac{7}{2}\right)^2 - \frac{49}{4}$$

**B4**

$$x^2 + 11x = \left(x + \frac{11}{2}\right)^2 - \left(\frac{11}{2}\right)^2$$
$$= \left(x + \frac{11}{2}\right)^2 - \frac{121}{4}$$

---

**C1** Express $x^2 + 6x + 5$
in the form $(x + m)^2 + n$

$$x^2 + 6x + 5 = (x + 3)^2 - 3^2 + 5$$
$$= (x + 3)^2 - 4$$

**C2** Express $x^2 - 6x + 5$
in the form $(x + m)^2 + n$

$$x^2 - 6x + 5 = (x - 3)^2 - 3^2 + 5$$
$$= (x - 3)^2 - 4$$

**C3** Express $x^2 + 10x - 11$
in the form $(x + m)^2 + n$

$$x^2 + 10x - 11 = (x + 5)^2 - 5^2 - 11$$
$$= (x + 5)^2 - 36$$

**C4** Express $x^2 - 4x + 20$
in the form $(x + m)^2 + n$

$$x^2 - 4x + 20 = (x - 2)^2 - 2^2 + 20$$
$$= (x - 2)^2 + 16$$

---

**D1** Express $2x^2 + 8x$
in the form $a(x + b)^2 + c$

$$2\left[x^2 + 4x\right] = 2\left[(x + 2)^2 - 2^2\right]$$
$$= 2\left[(x + 2)^2 - 4\right]$$
$$= 2(x + 2)^2 - 8$$

**D2**

$$3\left[x^2 - 3x\right] = 3\left[\left(x - \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2\right]$$
$$= 3\left[\left(x - \frac{3}{2}\right)^2 - \frac{9}{4}\right]$$
$$= 3\left(x - \frac{3}{2}\right)^2 - \frac{27}{4}$$

**D3** Express $3x^2 + 12x - 6$
in the form $a(x + b)^2 + c$

$$3\left[x^2 + 4x - 2\right] = 3\left[(x + 2)^2 - 2^2 - 2\right]$$
$$= 3\left[(x + 2)^2 - 6\right]$$
$$= 3(x + 2)^2 - 18$$

$$2\left[x^2 - 3x + \frac{11}{2}\right] = 2\left[\left(x - \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + \frac{11}{2}\right]$$
$$= 2\left[\left(x - \frac{3}{2}\right)^2 + \frac{13}{4}\right]$$
$$= 2\left(x - \frac{3}{2}\right)^2 + \frac{13}{2}$$

---