

Solutions:

$$\begin{aligned}(1) \quad & x^2 - 16x \\ &= x^2 - 16x + \left(\frac{-16}{2}\right)^2 - \left(\frac{-16}{2}\right)^2 \\ &= x^2 - 16x + 64 - 64 \\ &= (x-8)^2 - 64\end{aligned}$$

$$\begin{aligned}(2) \quad & y^2 + 7y \\ &= y^2 + 7y + \left(\frac{7}{2}\right)^2 - \left(\frac{7}{2}\right)^2 \\ &= \left(y + \frac{7}{2}\right)^2 - \frac{49}{4}\end{aligned}$$

$$\begin{aligned}(3) \quad & x^2 - 6x + 1 \\ &= x^2 - 6x + \left(\frac{-6}{2}\right)^2 - \left(\frac{-6}{2}\right)^2 + 1 \\ &= x^2 - 6x + 9 - 9 + 1 \\ &= (x-3)^2 - 8\end{aligned}$$

$$\begin{aligned}(4) \quad & 2x^2 + 6x + 7 \\ &= 2\left(x^2 + 3x + \frac{7}{2}\right) \\ &= 2\left(x^2 + 3x + \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + \frac{7}{2}\right) \\ &= 2\left(\left(x + \frac{3}{2}\right)^2 + \frac{5}{4}\right) \quad (\text{OR write it as } 2\left(x + \frac{3}{2}\right)^2 + \frac{5}{2})\end{aligned}$$

$$\begin{aligned}(5) \quad & 3t^2 - 2t - 1 \\ &= 3\left(t^2 - \frac{2}{3}t - \frac{1}{3}\right) \\ &= 3\left(t^2 - \frac{2}{3}t + \left(-\frac{1}{3}\right)^2 - \left(-\frac{1}{3}\right)^2 - \frac{1}{3}\right) \\ &= 3\left(\left(t - \frac{1}{3}\right)^2 - \frac{4}{9}\right) \quad (\text{OR write it as } 3\left(t - \frac{1}{3}\right)^2 - \frac{4}{3})\end{aligned}$$