**1** *Solve the following equations for $x$. Show* at least *one intermediate step for each.*

*a* $2x^2 + 3x = 5$

$$\begin{aligned} 2x^2 + 3x &= 5; \\ 2x^2 + 3x - 5 &= 0; \\ (2x + 5)(x - 1) &= 0; \\ 2x + 5 = 0 \text{ or } x - 1 &= 0; \\ 2x = -5 \text{ or } x &= 1; \\ x = -\frac{5}{2} \text{ or } x &= 1. \end{aligned}$$

*b* $(x - 3)(x + 5) = 9$

$$\begin{aligned} (x - 3)(x + 5) &= 9; \\ x^2 + 2x - 15 &= 9; \\ x^2 + 2x - 24 &= 0; \\ (x + 6)(x - 4) &= 0; \\ x + 6 = 0 \text{ or } x - 4 &= 0; \\ x = -6 \text{ or } x &= 4. \end{aligned}$$

**2** *The length of a rectangular room is 8 metres more than the width. The area of the room is 48 square metres. Solve an equation to find the length and width of the room. Show* at least *what equation you use to solve this problem, as well as your final answer in words.*

Let $w$ be the width of the room in metres, and let $l$ be the length of the room in metres. Then $l = w + 8$. Since the area, $lw$, is $48\,\mathrm{m}^2$,

$$\begin{aligned} (w + 8)w &= 48; \\ w^2 + 8w &= 48; \\ w^2 + 8w - 48 &= 0; \\ (w + 12)(w - 4) &= 0; \\ w + 12 = 0 \text{ or } w - 4 &= 0; \\ w = -12 \text{ or } w &= 4. \end{aligned}$$

Since the width of a room must be positive, $w = 4$; then $l = w + 8 = 4 + 8 = 12$. Therefore, the length of the room is 12 metres and the width is 4 metres.