Solutions

2.1

- $\boldsymbol{x = 7}$ or $\boldsymbol{x = -7}$

2.2

- $(x + 2)(x + 5) = 0$
- $\boldsymbol{x = -2}$ or $\boldsymbol{x = -5}$

2.3

- common factor: $x(x - 5) = 0$
- $\boldsymbol{x = 0}$ or $\boldsymbol{x = 5}$

2.4

- $(x - 4)(x + 3) = 0$
- $\boldsymbol{x = 4}$ or $\boldsymbol{x = -3}$

2.5

- $ac = -24$; numbers -12 and 2: $3x^2 - 12x + 2x - 8 = 3x(x - 4) + 2(x - 4)$
- $(3x + 2)(x - 4) = 0$
- $\boldsymbol{x = -\frac{2}{3}}$ or $\boldsymbol{x = 4}$

3.1

- dividing by x loses the solution $x = 0$
- $x^2 - 6x = 0$, so $x(x - 6) = 0$: $\boldsymbol{x = 0}$ or $\boldsymbol{x = 6}$

3.2

- area: $x(x + 5) = 84$, so $x^2 + 5x - 84 = 0$
- $(x + 12)(x - 7) = 0$
- $x = 7$ or $x = -12$
- a width cannot be negative, so the width is **7 cm**

3.3

- $a = 1$, $b = 4$, $c = -7$: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{-4 \pm \sqrt{16 + 28}}{2} = \dfrac{-4 \pm \sqrt{44}}{2}$
- $\boldsymbol{x = 1.32}$ or $\boldsymbol{x = -5.32}$

3.4

- $x^2 - 8x + 3 = (x - 4)^2 - 16 + 3 = (x - 4)^2 - 13$
- $(x - 4)^2 = 13$, so $\boldsymbol{x = 4 \pm \sqrt{13}}$

3.5

- multiply every term by $x(x + 1)$: $4(x + 1) + 3x = 2x(x + 1)$
- $7x + 4 = 2x^2 + 2x$, so $2x^2 - 5x - 4 = 0$
- $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{5 \pm \sqrt{25 + 32}}{4} = \dfrac{5 \pm \sqrt{57}}{4}$
- $\boldsymbol{x = 3.14}$ or $\boldsymbol{x = -0.64}$ (2 d.p.)