Solutions

2.1

(a) $f(4) = 2 \times 4 + 3 = \mathbf{11}$

(b) $f(-5) = 2 \times (-5) + 3 = \mathbf{-7}$

2.2

- $2x + 3 = 11$, so $2x = 8$
- $\boldsymbol{x = 4}$

2.3

- $fg(4)$: $g(4) = 16$, then $f(16) = 35$, so **35**
- $gf(4)$: $f(4) = 11$, then $g(11) = 121$, so **121**

2.4

- $y = 2x + 3$, so $x = \dfrac{y - 3}{2}$
- $\boldsymbol{f^{-1}(x) = \dfrac{x - 3}{2}}$

2.5

- $h(27) = \sqrt{27 - 2} = \sqrt{25} = \mathbf{5}$

3.1

- $fg(x) = f(3x) = 3x + 5$
- **No**: g is applied first, then 5 is added; $3x + 15$ is $gf(x)$

3.2

- $gf(x) = g(4x - 1) = (4x - 1)^2 + 2$
- $(4x - 1)^2 = 16x^2 - 8x + 1$
- $\boldsymbol{16x^2 - 8x + 3}$

3.3

- $y = \dfrac{x + 7}{2}$, so $2y = x + 7$ and $x = 2y - 7$
- $\boldsymbol{f^{-1}(x) = 2x - 7}$
- $f^{-1}(6) = 2 \times 6 - 7 = \mathbf{5}$

3.4

- $gf(x) = \dfrac{1}{3x - 2} = \dfrac{1}{4}$
- $3x - 2 = 4$
- $\boldsymbol{x = 2}$

3.5

- $fg(x) = f(x^2) = x^2 + 2$ and $gf(x) = g(x + 2) = (x + 2)^2 = x^2 + 4x + 4$
- $x^2 + 2 = x^2 + 4x + 4$: the x^2 terms cancel, leaving $4x = -2$
- $\boldsymbol{x = -\frac{1}{2}}$