Solutions

Each answer shows the steps, then the **result**.

2.1

- $g(3) = 9$; $f(9) = 2(9) - 5 = 13$

2.2

- a translation **down** by 4

2.3

- let $y = 2x - 5$, so $x = \dfrac{y+5}{2}$, giving $f^{-1}(x) = \dfrac{x+5}{2}$

2.4

- a reflection in the y-axis

3.1 A

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

3.2

(a)

- $x^2 - 6x + 5 = (x-3)^2 - 4$; for $x \geqslant 3$, range is $f(x) \geqslant -4$

(b)

- $y = (x-3)^2 - 4 \Rightarrow x = 3 + \sqrt{x+4}$
- $f^{-1}(x) = 3 + \sqrt{x+4}$; domain $x \geqslant -4$

3.3

- translation left by 1 ($x \to x+1$); then a stretch in the y-direction, scale factor 2

3.4

(a)

- $gf(x) = g(2x+1) = \dfrac{1}{(2x+1)-1}$
- $gf(x) = \dfrac{1}{2x}$

(b)

- $\dfrac{1}{2x} = 2x + 1$, so $1 = 4x^2 + 2x$, giving $4x^2 + 2x - 1 = 0$
- by the quadratic formula, $x = \dfrac{-2 \pm \sqrt{4+16}}{8}$
- this gives $x = \dfrac{-1 \pm \sqrt{5}}{4}$

3.5

- replace x with $x - 2$ and subtract 3
- the new curve is $y = (x-2)^2 - 3$