

- (b) Hence express $f(x)$ in terms of $g(x)$.
 (c) Hence express $h(x)$ in terms of $g(x)$ and describe fully in words the transformations which map the graph of $g(x)$ onto the graph of $h(x)$.

Advanced

- 1 Describe fully in words the transformation which maps the graph of $f(x)$ onto the graph of $g(x)$, if
- (a) $f(x) = \ln(x+1)$ and $g(x) = \ln x + 2$
 (b) $f(x) = e^{x-1}$ and $g(x) = e^x - 2$
- 2 (a) Express $3x + 2$ in the form $a(x-3) + b$, clearly stating the value of the constants a and b .
 (b) Express $\frac{3x+2}{x-3}$ in the form $c + \frac{d}{x-3}$.
 (c) Sketch the graph of $y = \frac{3x+2}{x-3}$.
 (d) Sketch the graph of $y = \frac{4x+5}{x+2}$.
- 3 The function $f(x) = 4x^2 - 24x + 52$.
- (a) Express $f(x)$ in completed square form.
 (b) Show that $0 < \frac{1}{4x^2 - 24x + 52} \leq a$, where a is to be found.
- 4 The function $f(x) = 5^{2x-1}$ can be mapped onto $g(x)$ by a combination of the transformations: an enlargement, parallel to the x -axis, scale factor 2 followed by an enlargement, parallel to the y -axis, scale factor $\frac{1}{5}$; and a translation $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$.
- (a) Express $g(x)$ in terms of $f(x)$.
 (b) Hence obtain, in its simplest form, the formula for $g(x)$.
- 5 (a) The curve $y = 1/x$ is reflected in the line $x = a$. Find its equation.
 (b) The curve $y = f(x)$ is rotated by 180° about $(a, 0)$. Show that the equation of the resulting curve is $y = -f(2a - x)$.
- 6 Describe the transformation that maps the graph of $f(x) = ax^2 + c$ onto that of $g(x) = a(x-b)^2 + c$. Sketch the graph of $f(x)$ when:
- (a) $a > 0, c > 0$ (b) $a > 0, c < 0$ (c) $a < 0, c > 0$
 (d) $a < 0, c < 0$