# G4 *Functions* Activities

## Activities

G4.1 Symmetry About the Line $y = x$

Notes and Solutions (1 page)

# ACTIVITY G4.1 *Symmetry About the Line* $y = x$

Here are three functions that are 1 : 1 mappings on the domain given:

A : $f : x \to 2x$ (all $x$)

B : $g : x \to x - 4$ (all $x$)

C : $h : x \to x^2$ ($x \geq 0$)

1. For each of these functions, find their inverse function.

2. Draw coordinate axes for $-5 \leq x \leq 5$, $-5 \leq y \leq 5$ and sketch the three functions, $f$, $g$ and $h$ above.

3. Also, on the same graph, sketch the inverse functions, $f^{-1}$, $g^{-1}$ and $h^{-1}$.

4. Draw (using a heavy line) the line $y = x$ on your graph.

5. What is the relationship between $f$, $f^{-1}$ and the line $y = x$?

6. Confirm your answer to question 5 above, by also looking at $g$, $g^{-1}$ and the line $y = x$ and similarly for $h$, $h^{-1}$ and the line $y = x$.

7. State your conjecture that relates to functions, their inverses and the line $y = x$. Verify this result by taking a new example for $f$ (e.g. $f(x) = \dfrac{1}{1 - x}$, $x \neq 1$).

# ACTIVITY G4.1 *Notes and Solutions*

*Notes and solutions given only where appropriate.*

**G4.1** 1. $f^{-1}(x) = \frac{1}{2}x$; $g^{-1}(x) = x + 4$; $h^{-1}(x) = +\sqrt{x}$ $(x \geq 0)$

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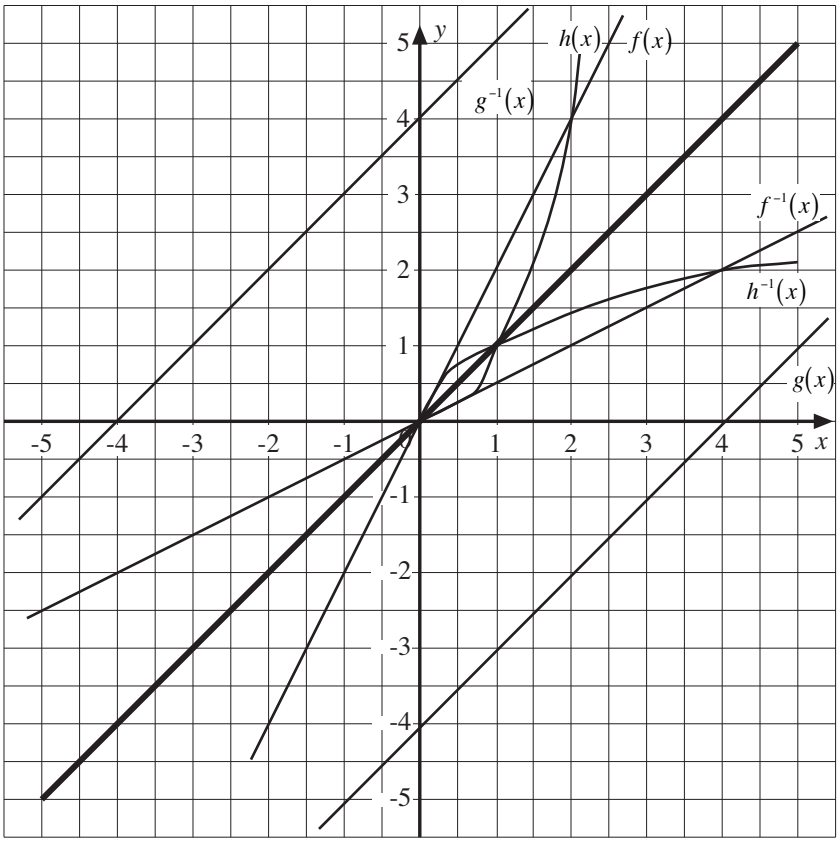


5. $f^{-1}$ is the reflection of $f$ in $y = x$.

7. In general, for any 1 : 1 mapping, $f(x)$ and $f^{-1}(x)$ are reflections of each other in the $y = x$ line.