Functions 2

1) Let $g(x)=3x-2$, $h(x)=\dfrac{5x}{x-4}$, $x\neq 4$.

(a) Find an expression for $(h\circ g)(x)$. Simplify your answer.

(b) Solve the equation $(h\circ g)(x)=0$.

2) The functions $f(x)$ and $g(x)$ are defined by $f(x)=\mathrm{e}^x$ and $g(x)=\ln(1+2x)$.

(a) Write down $f^{-1}(x)$.

(b) (i) Find $(f\circ g)(x)$.

(ii) Find $(f\circ g)^{-1}(x)$.

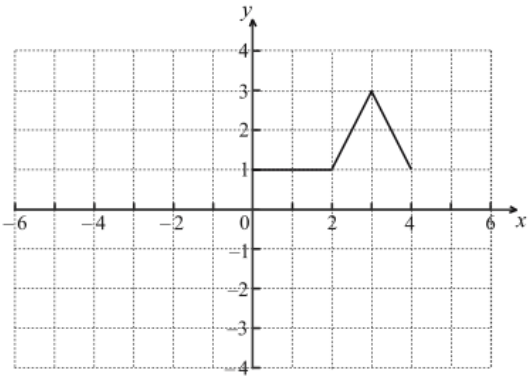
3) Let $f(x)=\sqrt{x+4}$, $x\geq -4$ and $g(x)=x^2$, $x\in\mathbb{R}$.

(a) Find $(g\circ f)(3)$.

(b) Find $f^{-1}(x)$.

(c) Write down the domain of f^{-1}.

4) Consider the graph of f shown below.



(a) On the **same** grid sketch the graph of $y = f(-x)$. *[2 marks]*

The following four diagrams show **images** of f under different transformations.

Diagram A

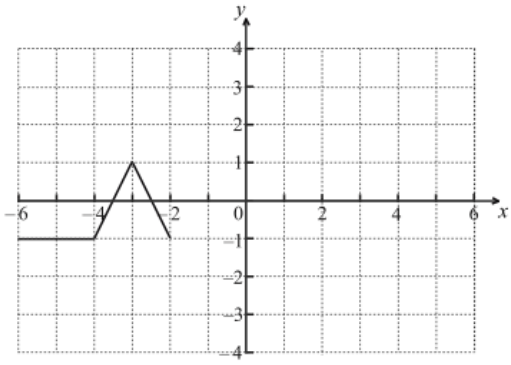


Diagram B

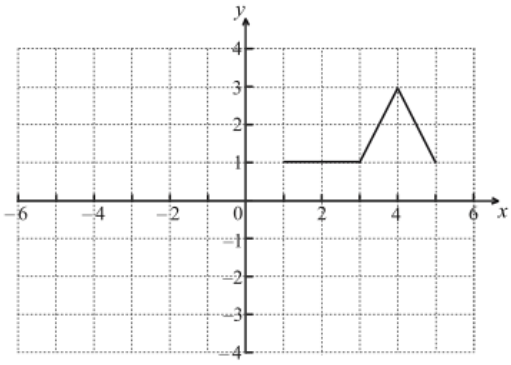


Diagram C

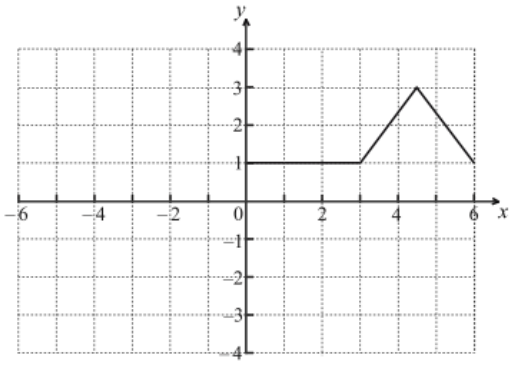
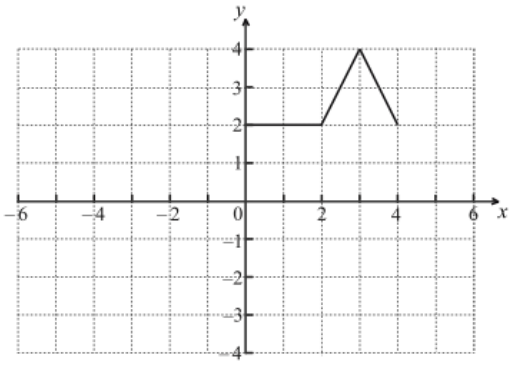


Diagram D



(b) Complete the following table. *[2 marks]*

Description of transformation	**Diagram letter**
Horizontal stretch with scale factor 1.5	
Maps f to $f(x)+1$	

(c) Give a full geometric description of the transformation that gives the image in Diagram A. *[2 marks]*

5) Let $f(x) = 2x^3 + 3$ and $g(x) = e^{3x} - 2$.

(a) (i) Find $g(0)$.

(ii) Find $(f \circ g)(0)$. *[5 marks]*

(b) Find $f^{-1}(x)$. *[3 marks]*