1 Functions

1 For the function $f(x) = 2x - 5$ find:

a) f(2) **b)** f(0) **c)** f(–3)

2 For the function $g(x) = (2x - 2)^2$ find:

a) g(0) **b)** g(0.5) **c)** g(–2)

3 For the function $h{:}x \rightarrow x^2 - 2x$ find:

a) h(2) **b)** h(–2) **c)** h(0)

4 For the function $f{:}x \rightarrow 5 - 3x$ find:

a) f(3) **b)** f(–3) **c)** f(1)

5 For the function $g(x) = \sqrt{2x + 1}$ find:

a) g(0) **b)** g(4) **c)** g(12)

Remember that the √ symbol means the positive square root of a number.

6 For the function $f(x) = x^2 - 2$
Draw a mapping diagram when the inputs are:

a) the numbers in the set {1, 2, 3} **b)** the numbers in the set {–1, –2, –3}.

7 Find the range of the following functions:

a) $f(x) = 2x + 1$ Domain $\{0, 1, 2\}$

b) $g(x) = 3x^2 - 1$ Domain $\{2, 4, 6\}$

c) $h(x) = \frac{2x-1}{5}$ Domain $\{1, 3, 6\}$

d) $f(x) = 4x$ Domain $\mathbb{Z}^+$

The symbol $\mathbb{Z}$ means the set of all integers, and $\mathbb{Z}^+$ means the set of positive integers.

e) $f{:}x \to x^2 - 5$ Domain $\mathbb{Z}$

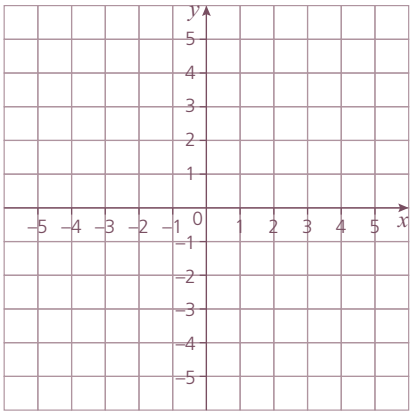
8 What values must be excluded from the domain of the following functions and why must they be excluded?

a) $f(x) = \sqrt{2x-1}$

b) $f(x) = \frac{3}{x^2}$

c) $f(x) = \frac{2x-1}{x+1}$

9 a) On the axes provided, plot the graph of $y = f(x)$, where $f(x) = x^2 - 4$, for $0 \leq x \leq 4$.



b) Add the line $y = x$ to your graph.

c) Given that $f^{-1}(x) = \sqrt{x+4}$, calculate the values of:

(i) $f^{-1}(-4)$ **(ii)** $f^{-1}(-3)$ **(iii)** $f^{-1}(0)$ **(iv)** $f^{-1}(5)$

d) Use these to add the graph of $y = f^{-1}(x)$ to the graph you drew in part **a)**.

e) What you notice?

10 Given that $f(x) = 2x - 3$; $g(x) = x^2$ and $h(x) = 3x - 2$ find the following:

a) fg(3)

b) gf(3)

c) fh(2)

d) hf(2)

e) fgh(0)

f) hgf(0)

g) fgh(x)

h) hgf(x)

11 Given $f(x) = 2x + 1$ and $g(x) = \sqrt{3x+1}$ find:

a) $fg(5)$

b) $gf(5)$

c) $fg(0)$

d) $gf(0)$

12 Given $f(x) = x + 3$, $g(x) = x^2 - 3$ and $h(x) = \frac{1}{x+3}$ for $x \neq -3$, find:

a) $fg(x)$

b) $gf(x)$

c) $fh(x)$

d) $hf(x)$

e) $hfg(x)$

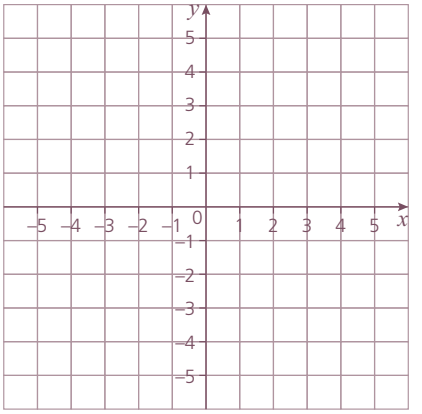
f) $hgf(x)$

13 a) Find the inverse for the following functions:

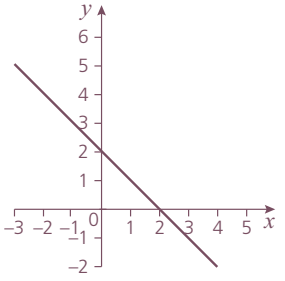
(i) $f(x) = 2x - 3$

(ii) $f(x) = x^2 - 4$ for $x \geqslant 0$

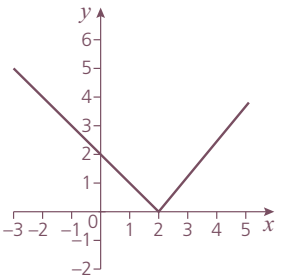
b) On the axes below, plot the graphs of $y = f(x)$ and $y = f^{-1}(x)$.



14 The first graph shows the line $y = 2 - x$ and the other graphs are related to this. Write down their equations.



a)



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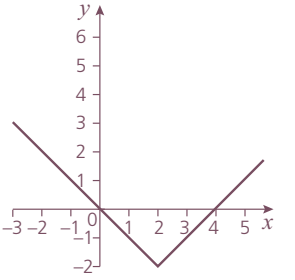
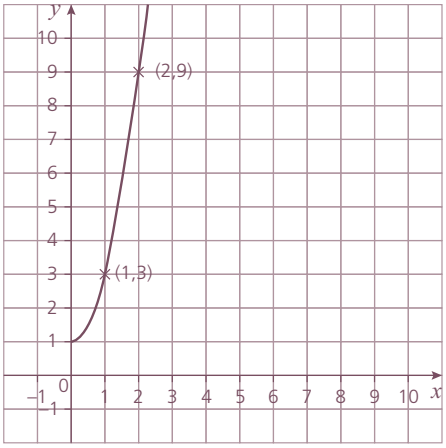


15 The graph below shows part of a quadratic curve, defined for values of $x \geqslant 0$.

a) Determine the equation of the curve.

b) Sketch the inverse of the curve on the same axes and give its equation.



16 Draw the following graphs.

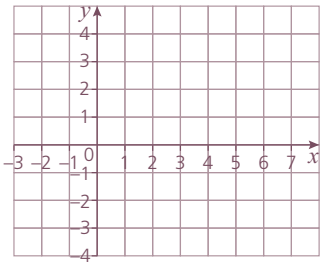
a) $y = x - 2$

b) $y = |x - 2|$

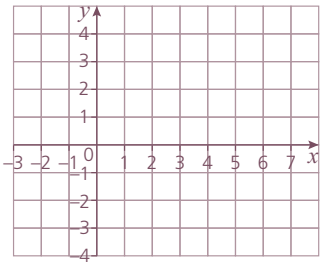
c) $y = -|x - 2|$

d) $y = 2 - |x - 2|$

a)



c)



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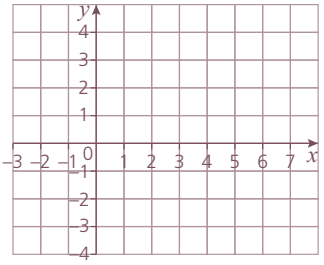

d)