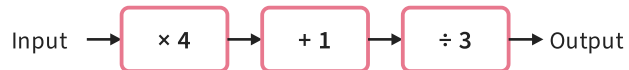


1 Function machines

Here is a function machine.

- a) Write the output as an expression when the input is x .
b) Find the input when the output is 7.



a) $\frac{4x + 1}{3}$

b) $7 \times 3 = 21, 21 - 1 = 20, 20 \div 4$

input = 5

2 Function machines

$f(x) = 2x^2 - 5$

- a) Work out $f(-3)$.
b) Solve $f(x) = 3x$.

a) $2 \times 9 - 5 = 13$

b) $2x^2 - 3x - 5 = 0, (2x - 5)(x + 1) = 0$

$x = 2.5$ or $x = -1$

3 Inverse functions

$f(x) = \frac{x+4}{3}$

- a) Find $f^{-1}(x)$.
b) Find the value of x when $f^{-1}(x) = 14$.

a) $f^{-1}(x) = 3x - 4$

b) $3x - 4 = 14, 3x = 18$

$x = 6$

4 Inverse functions

$f(x) = x^3 + 2$

- a) Find $f^{-1}(x)$.
b) Work out $f^{-1}(29)$.

a) $y - 2 = x^3, f^{-1}(x) = \sqrt[3]{x - 2}$

b) $\sqrt[3]{27} = 3$

Functions revision mat answers

5 Inverse functions

$f(x) = \frac{3x}{x+4}$

- a) Find $f^{-1}(x)$.
b) Use your answer to find the input that gives $f(x) = 2$.

a) $yx + 4y = 3x, x(3 - y) = 4y$

$f^{-1}(x) = \frac{4x}{3 - x}$

b) $f^{-1}(2) = 8$

6 Composite functions

$f(x) = x^2 - 1$ and $g(x) = 2x + 3$

- a) Work out $gf(3)$.
b) Find $fg(x)$. Simplify your answer.

a) $f(3) = 8, g(8) = 19$

b) $(2x + 3)^2 - 1$

$= 4x^2 + 12x + 8$

7 Composite functions

$f(x) = 3x + 2$ and $g(x) = x^2$

- a) Solve $fg(x) = 29$.
b) Solve $gf(x) = 25$.

a) $3x^2 + 2 = 29, x^2 = 9, x = \pm 3$

b) $(3x + 2)^2 = 25, 3x + 2 = \pm 5$

$x = 1$ or $x = \frac{-7}{3}$

8 Composite functions

$f(x) = ax - 2, g(x) = x + 5$ and $fg(1) = 22$

- a) Find the value of a .
b) Explain why $fg(x) = gf(x)$ has no solutions.

a) $g(1) = 6, 6a - 2 = 22, a = 4$

b) $fg(x) = 4x + 18, gf(x) = 4x + 3$

$18 \neq 3$, so they are never equal