Planner

Functions

- Identifying a linear function
- Writing a function machine, using algebra
- Identifying and writing rules linking inputs and outputs
- Finding the inverse of a linear function

Keywords

You should know

explanation 1a | explanation 1b | online

1 Copy each function and find the outputs.

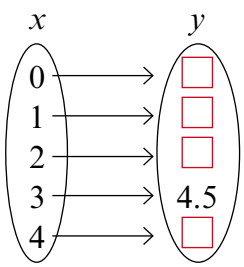
a input x → output y

$-1, 0, 1, 2, 3 \rightarrow$ [+ 1] → [× 3] → □, □, 6, □, □

b $y = \frac{12}{x}$

Input (x)	1	2	3	4
Output (y)		6		

c $x \rightarrow \frac{x}{2} + 3$



d $y = x^2 + 1$

Input (x)	1	2	3	4
Output (y)				17

4^2 is 4×4

So $4^2 + 1 = 17$

2 Which of the functions in question **1** are linear functions?
Give a reason for your answer.

3 Write each function machine as an equation.

a $x \rightarrow \boxed{\times 2} \rightarrow y$

b $x \rightarrow \boxed{+ 5} \rightarrow y$

c $x \rightarrow \boxed{- 6} \rightarrow y$

d $x \rightarrow \boxed{\times 2} \rightarrow \boxed{+ 1} \rightarrow y$

e $q \rightarrow \boxed{\div 7} \rightarrow \boxed{- 1} \rightarrow p$

f $t \rightarrow \boxed{+ 5} \rightarrow \boxed{\times 4} \rightarrow y$

g $b \rightarrow \boxed{- 4} \rightarrow \boxed{\div 2} \rightarrow a$

h $k \rightarrow \boxed{\times 2} \rightarrow \boxed{\div 3} \rightarrow j$

explanation 2a | explanation 2b | online

4 What is the rule that links each set of input and output numbers?
Write each rule as a function machine.

a

Input (x)	Output (y)
1	4
2	5
3	6
4	7
5	8

b

Input (x)	Output (y)
1	3
2	6
3	9
4	12
5	15

c

Input (x)	Output (y)
1	$\frac{1}{2}$
2	1
3	$1\frac{1}{2}$
4	2
5	$2\frac{1}{2}$

d

Input (x)	2	3	4	5	6
Output (y)	0	3	6	9	12

e

Input (x)	1	2	3	4	5
Output (y)	5	9	13	17	21

f

Input (x)	1	2	3	4	5
Output (y)	1.5	2	2.5	3	3.5

5 Write an equation for each of your function machines in question **4**.

explanation 3a | explanation 3b | online

6 Find the inverse of each function. Check that it does reverse the original function using a simple pair of input and output values.

a $x \to x + 3$ **b** $x \to x - 4$ **c** $x \to 10x$

d $x \to 7x + 1$ **e** $x \to 2x + 3$ **f** $x \to 4x - 3$

g $y = 2x - 15$ **h** $y = \frac{x}{4}$ **i** $y = \frac{x}{3} - 1$

j $y = \frac{x}{2} + 10$ **k** $x \to 2(x + 5)$ **l** $x \to 3(x - 1)$

m $x \to \frac{(x + 1)}{2}$ **n** $y = \frac{x - 3}{4}$ **o** $y = \frac{2x}{5}$

7 Find the function that links these inputs and outputs.

input x output y

$-1, 0, 1, 2, 3$ → ☐ → ☐ → $7, 9, 11, 13, 15$

8 Find the inverse of the function in question **7**. Check your answer.

9 Look at these inputs and outputs.

Input (x)	2	4	6	8	10
Output (y)	7	13	19	25	31

a What are the differences between the outputs?

b What would be the difference between the outputs if the input increased by 1 each time?

c Find the function that links the inputs and the outputs.

d Find the inverse function and check your answer.

10 This is the table of values for a linear function.

Input (x)	0	2	4	6	8	10	12
Output (y)	2			20			

a Copy and complete the table.

b What is the linear function?

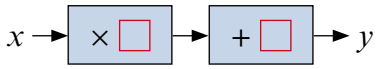
c Find the inverse function and check your answer.

11 Lucy writes the function $y = 10 - 2x$.

a Find the output when $x = 3$.

b Lucy then writes the function as $y = -2x + 10$.

Copy and complete the function machine.



c Find the inverse function.

d Explain how you can check that your inverse function is correct.

12 Find the inverse of each function.

Check that they do reverse the original functions.

a $x \rightarrow 12 - 3x$

b $y = 8 - 2x$

c $x \rightarrow 2 - x$

d $y = 6 - \frac{x}{2}$

13 Jim writes the function $y = 3 - 5x$.

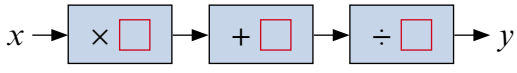
a **i** The output is the same as the input when the input value is a.
Jim says that a is the solution of the equation $3 - 5a = a$.
Explain why he is right. Solve the equation to find a.

ii Find the inverse function. Check your answer.

b Use your answers to part **a** to write down the solution of $3 - 5x = \frac{3 - x}{5}$.

Explain how you know.

14 **a** Copy and complete the function machine for the function $y = \frac{9 - 2x}{7}$.



b Find the outputs when $x = 1$, 2 and 3. Explain whether this function is linear.

c Write the inverse function.
Check your answer using the output values you found in part **b**.

d Use your answer to part **c** to solve these equations.

i $\frac{9 - 2x}{7} = 8$

ii $\frac{9 - 2x}{7} = 1$