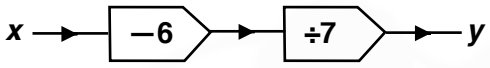
Inverse and composite functions

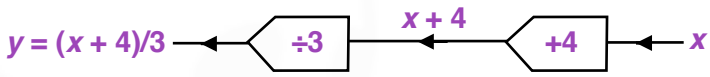
Starter

1. Draw the inverse function machines for these functions and find an expression for y in terms of x.

(a) 

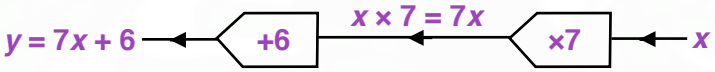
(b) 

Working: (a) ***Reverse the arrows, do the opposite operation.***
The opposite of $\times 3$ is $+3$.
The opposite of -4 is $+4$.
Swap the x and y around.

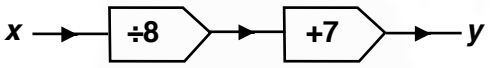


The inverse function is $y = \dfrac{x+4}{3}$

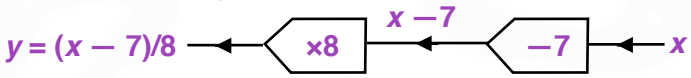
(b) ***Reverse the arrows, do the opposite operation.***
The opposite of -6 is $+6$.
The opposite of $\div 7$ is $\times 7$.
Swap the x and y around.



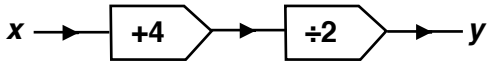
The inverse function is $y = 7x + 6$

E.g. 1 Find the inverse function of: 

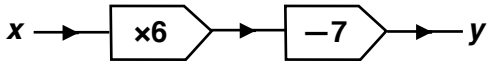
Working: ***Reverse the arrows, do the opposite operation.***
The opposite of $\div 8$ is $\times 8$.
The opposite of $+7$ is -7.
Swap the x and y around.



The inverse function is $y = 8(x-7)$

E.g. 2 Let Function A be 

and

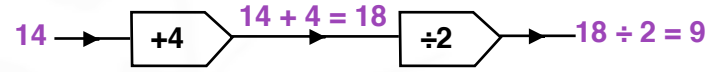
Function B be 

(a) What is the final value when the number 14 enters Function A and its output then enters Function B?

(b) What is the final value when the number 3 enters Function B and its output then enters Function A?

(c) The unknown x is put into Function A and the output then enters Function B. Find a simplified expression in terms of x for the final output.

(d) The unknown x is put into Function B and the output then enters Function B again. Find a simplified expression in terms of x for the final output.

Working: (a) Function A: 

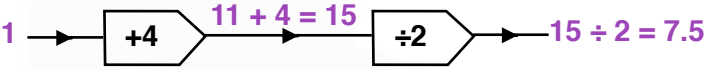
When 14 is the input of Function A, 9 is the output.
9 now becomes the input for Function B.

Function B: 

The final value is 47.
N.B. You do not need to draw out function machines as above.

(b) Function B: 

When 3 is the input of Function B, 11 is the output.
11 now becomes the input for Function A.

Function A: 

The final value is 7.5.

(c) Function A: 

When x is the input of Function A, $\dfrac{x+4}{2}$ is the output.
$\dfrac{x+4}{2}$ now becomes the input for Function B.

First of all, the output gets multiplied by 6***:*** $\quad 6\times\left(\dfrac{x+4}{2}\right)$

The 6 ***and*** 2 ***can cancel to be*** 3***:*** $\quad 3(x+4)$
Then 7 ***is subtracted:*** $\quad 3(x+4)-7$
Expand… $\quad 3x+12-7$
…and simplify: $\quad 3x+5$
The final output is $3x+5$.

(d) x goes into Function B
x gets multiplied by 6… $6x$
…then 7 is subtracted: $6x - 7$
This output then gets put back into Function B.
$6x - 7$ gets multiplied by 6… $6(6x - 7)$
…then 7 is subtracted: $6(6x - 7) - 7$
Expand… $36x - 42 - 7$
…and simplify: $36x - 49$
The final output is $36x - 49$

Video: Inverse functions
Video: Composite functions

Solutions to Starter and E.g.s

Exercise
OCR GCSE 9-1 Functions PPQ

9-1 class textbook:	Function notation is not included in the OCR GCSE course
A*-G class textbook:	Function notation is not included in the OCR GCSE course
9-1 homework book:	Function notation is not included in the OCR GCSE course
A*-G homework book:	Function notation is not included in the OCR GCSE course

Homework book answers (only available during a lockdown)
OCR GCSE 9-1 Functions PPQ SOLUTIONS