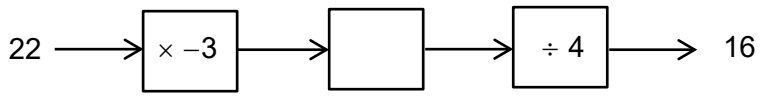
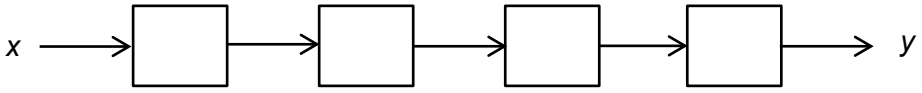
Higher Check In - 6.05 Language of functions

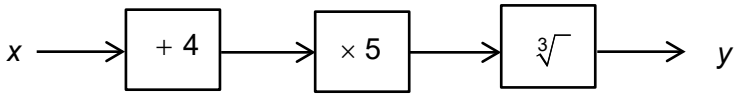
1. Fill in the empty box in this function machine.



2. Fill in the empty boxes in the function machine below to show the function $y = \dfrac{(3x-2)^2}{5}$.

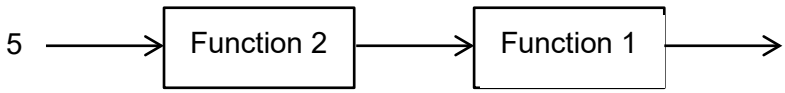


3. Write the equation for the function given by this function machine.

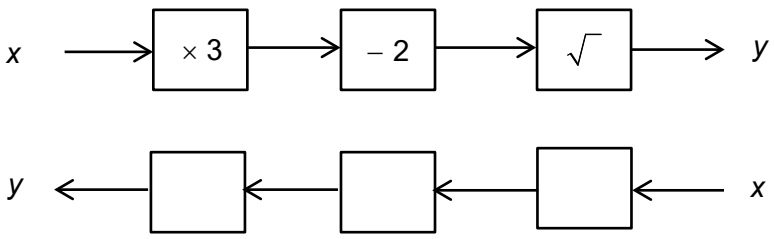


4. Write down the inverse function of $y = \dfrac{x}{7} + 1$.

5. Function 1 is given by $y = x - 3$ and Function 2 is given by $y = 3x + 1$. Use the diagram below to work out the output when the input is 5.



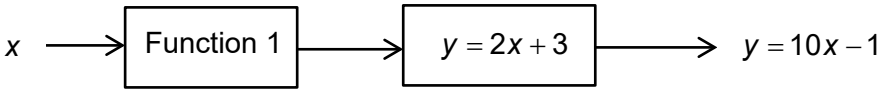
6. A function is given by the first function machine below. Use the blank function machine below to show that the inverse function is given by $y = \dfrac{x^2 + 2}{3}$.



7. Function 1 is given by $y = x + 2$ and Function 2 is given by $y = 2x - 3$.
Show that the composite function, 'Function 1 followed by Function 2' is different to the composite function, 'Function 2 followed by Function 1'.

8. Function 1 is given by $y = x - 1$ and Function 2 is given by $y = 3x^2$.
   Show that the equation for the composite function formed by Function 1 followed by Function 2 is the same as $y = 3x^2 - 6x + 3$.

9. Work out Function 1 for the composite function below given that the composite function, 'Function 1 followed by Function 2', is given by $y = 10x - 1$.



10. Function 1 is given by $y = 4x + 6$ and Function 2 is given by $y = \frac{x}{2} - 1$.
    A composite function is produced by applying Function 1 followed by Function 2.
    Work out an equation for the inverse of this composite function.

Extension

Write function machines to change the following:

a) km/h into m/s,

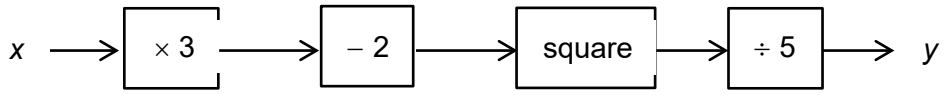
b) miles per gallon into kilometres per litre,

   (Hint: use 5 miles = 8 kilometres and 1 gallon = 4.5 litres)

c) g/cm^3 into kg/m^3.

Answers

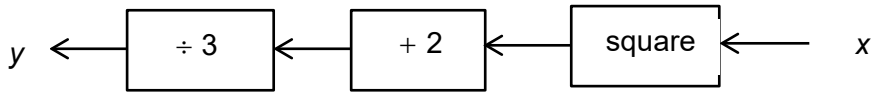
1. + 130

2. 

3. $\sqrt[3]{5(x+4)}$

4. $y = 7(x-1)$

5. 13

6. 

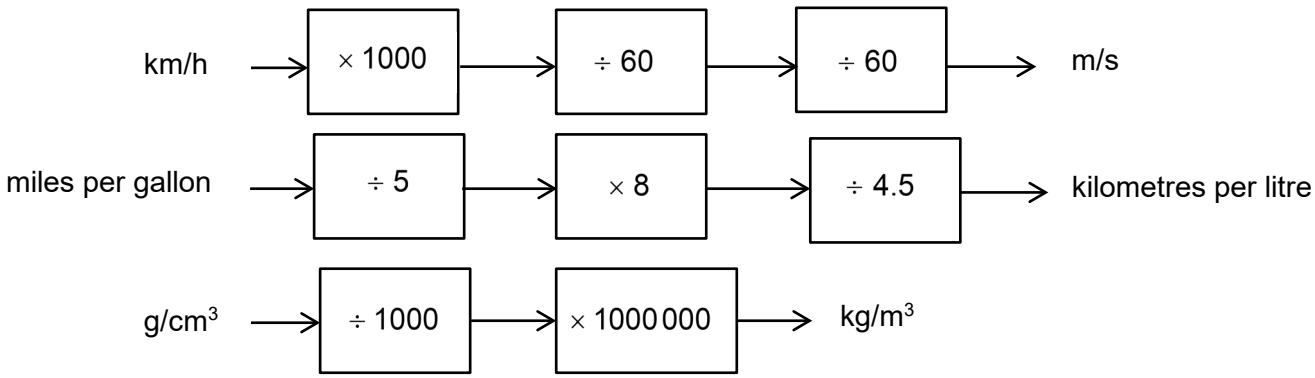
7. Function 1 followed by Function 2 is given by $2(x+2)-3 = 2x+1$.
   Function 2 followed by Function 1 is given by $(2x-3)+2 = 2x-1$.
   $2x+1 \neq 2x-1$ so they will give different outputs for all values of x oe.

8. $3(x-1)^2 = 3(x-1)(x-1)$
   $= 3(x^2-2x+1)$
   $= 3x^2-6x+3$

9. $5x-2$

10. $y = \frac{4x+6}{2} - 1$ simplifies to $y = 2x+2$. The inverse function is given by $y = \frac{x-2}{2}$.

Extension



(Note: 1 m^3 = 1 000 000 cm^3)

GCSE (9–1) MATHEMATICS

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Find a missing operation in a function machine			
AO1	2	Complete a function machine for an equation			
AO1	3	Write an equation for a function machine			
AO1	4	Write down an inverse function			
AO1	5	Find the output of a composite function			
AO2	6	Complete a function machine for an inverse function			
AO2	7	Express a composite function as an equation, and understand the order of operations			
AO2	8	Express a composite function as an equation, and simplify			
AO3	9	Solve a problem involving a composite function			
AO3	10	Write the inverse of a composite function			

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