Single function machines

INPUT → [ ] → OUTPUT

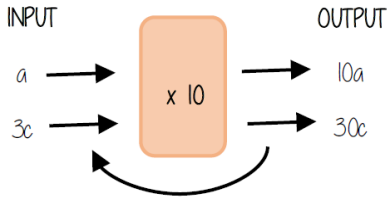
The number that goes IN

The number that comes out

This box gives the calculation instruction

To find the input from the output
Use the INVERSE operation

Single function machines (algebra)



To find the input from the output
Use the INVERSE operation

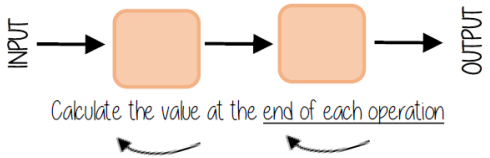
Find functions from expressions

INPUT 7x → ? → OUTPUT 14x

Find the relationship between the input and the output

Sometimes there can be a number of possible functions e.g. +7x or x 2 could both be solutions to the above function machine

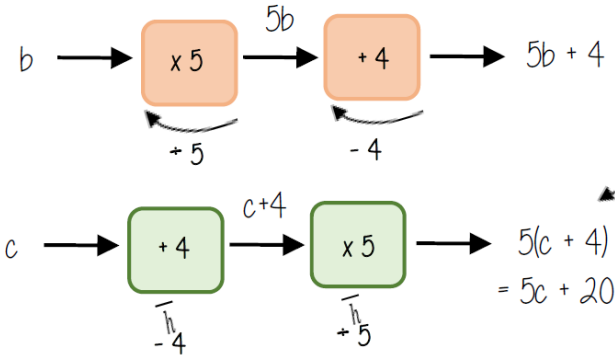
Two step function machines



Calculate the value at the end of each operation

For the input use the INVERSE operations

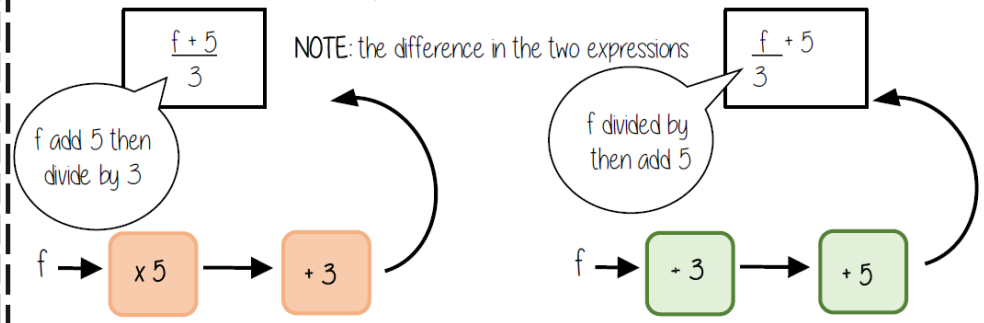
Two step function machines (algebra)



IMPORTANT
Calculate the value at the end of each operation

NOTE:
The whole first output is multiplied by 5

Find functions from expressions



Sometimes it helps to try to explain the expression in word – and consider what has happened to the input

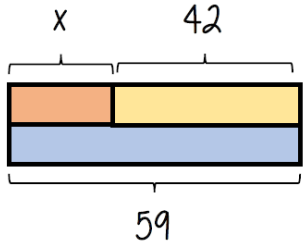
Solve one step equations (+/-)

There is more to this than just spotting the answer

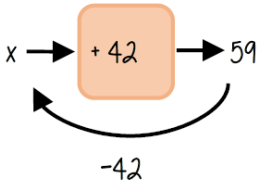
$x + 42 = 59$

$x + 42 = 59$
$42 + x = 59$

$59 - x = 42$
$59 - 42 = x$



Don't forget you know how to use function machines

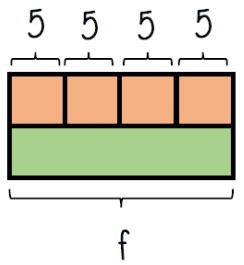


Solve one step equations (x/÷)

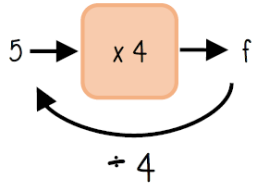
$\frac{f}{4} = 5$

$f \div 4 = 5$
$f \div 5 = 4$

$5 \times 4 = f$
$4 \times 5 = f$



Don't forget you know how to use function machines



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Solve two step equations

I am trying to find the value of the unknown so I need to get it by itself.

examples

$4a + 2 = 18$ - I need to get a by itself so first I will take away 2 from both sides (the opposite of adding)

$-2 \quad -2$

$4a = 16$ - I still need to get a by itself to I will divide by 4 ($4a$ means $4 \times a$)

$\div 4 \quad \div 4$

$a = 4$

Check it! - Substitute your answer into the original question to see if it is correct

$4 \times 4 + 2 = 18$ ✓

$\frac{b+2}{3} = 7$ - I need to get b by itself so first I will multiply by 3 from both sides (the opposite of dividing)

$\times 3 \quad \times 3$

$b + 2 = 21$ – I still need to get b by itself so I will subtract 2 from both sides (the opposite of adding)

$-2 \quad -2$

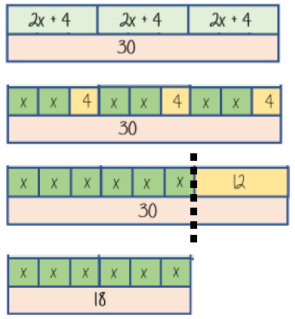
$b = 19$

Check it! - Substitute your answer into the original question to see if it is correct

$\frac{19+2}{3} = 7$ ✓

Solve equations with brackets

$3(2x + 4) = 30$



$3(2x + 4) = 30$

Expand the brackets

$6x + 12 = 30$

$-12 \quad -12$

$6x = 18$

$\div 6 \quad \div 6$

$x = 3$

Substitute to check your answer. This could be negative or a fraction or decimal

Equations with unknown on both sides

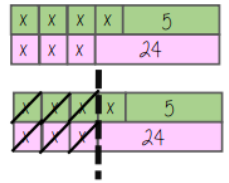
$4x + 5 = 3x + 24$

$-3x \quad -3x$

$x + 5 = 24$

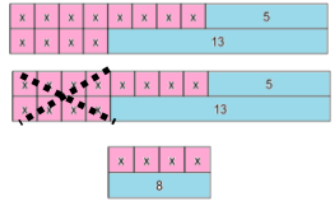
$-5 \quad -5$

$x = 19$



Equations: unknown on both sides (R)

$8x + 5 = 4x + 13$



$8x + 5 = 4x + 13$

$-4x \quad -4x$

$4x + 5 = 13$

$-5 \quad -5$

$4x = 8$

$\div 4 \quad \div 4$

$x = 2$

Rearranging Formulae (one step)

$x = y + z$

Rearrange to make y the subject

$y = x - z$

$y \rightarrow +z \rightarrow x$

$y \leftarrow -z \leftarrow x$

Using inverse operations or fact families will guide you through rearranging formulae

Rearranging can also be checked by substitution

Language of rearranging...

Make XXX the subject

Change the subject

Rearrange

Rearranging Formulae (two step)

In an equation (find x)

$4x - 3 = 9$

$+3 \quad +3$

$4x = 12$

$\div 4 \quad \div 4$

$x = 3$

In a formula (make x the subject)

$xy - s = a$

$+s \quad +s$

$xy = a + s$

$\div y \quad \div y$

$x = \frac{a+s}{y}$

The steps are the same for solving and rearranging

Rearranging is often needed when using $y = mx + c$

e.g. Find the gradient of the line $2y - 4x = 9$

Make y the subject first $y = \frac{4x+9}{2}$

Gradient $= \frac{4}{2} = 2$