

1-step function machines

Notes and guidance

In this small step, children begin to formally look at algebra for the first time by exploring function machines. This builds on their work in earlier years using operations and their inverses to find missing numbers.

Children need to learn the meanings of the terms “input”, “output”, “function” and “rule”. At first, they are given a number, told what to do to it using any of the four operations and calculate the output. They then move on to finding the input from a given output, using inverse operations.

Finally, children explore examples where the input and output are given, but the function is not. They should recognise that one rule may fit for some of the numbers given, but not for all, and that they need to find a rule that works for all the numbers.

Things to look out for

- Children may carry out the function on the output when working out the missing input, rather than using the inverse operation.
- Children may find a function that works for some of the numbers given, but not all.

Key questions

- How does the function machine work?
- What is the difference between an input and an output?
- If you know the input and function, how can you work out the output?
- If you know the output and function, how can you work out the input?
- What is the inverse of _____?
- Does your rule work for all the sets of numbers?

Possible sentence stems

- If the input is _____, the output is _____
- If I know the output, I need to ...
- If the input is _____ and the output is _____, then the function is _____

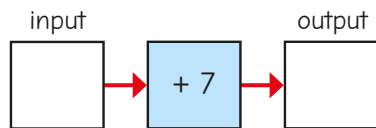
National Curriculum links

- Use simple formulae
- Generate and describe linear number sequences

1-step function machines

Key learning

- Mo has made a function machine.

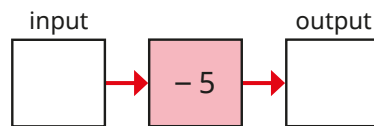


If the input is 5, the output is 12



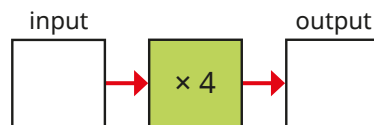
- ▶ If the input is 7, what is the output?
- ▶ If the input is 4,023, what is the output?

- Complete the table for the function machine.



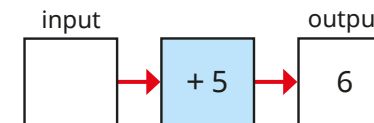
Input	5	23	5.1	23.2	0	-3	-5
Output							

- Complete the table for the function machine.



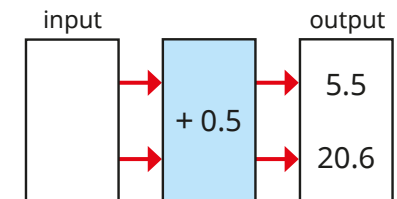
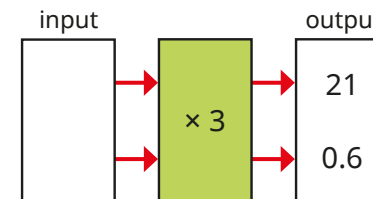
Input	3	10	0	2.5	0.25	7	70
Output							

- The function machine shows the output, but not the input.

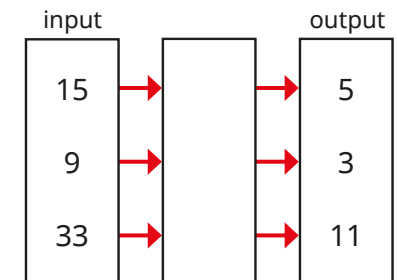
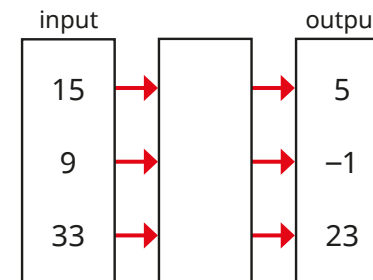


Talk to a partner about how you can work out the input.

- Work out the missing inputs.



- What are the missing functions?

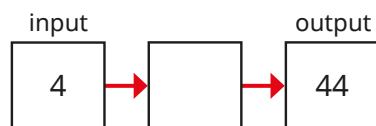


What do you notice?

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Reasoning and problem solving

Jo and Ron are working out the rule for the function machine.



Jo

The rule is
 $+ 40$

The rule is
 $\times 11$



Ron

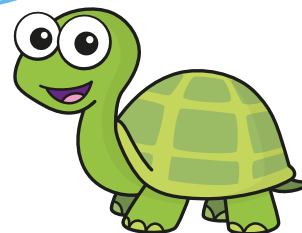
Who do you agree with?
Explain your answer.

Either could
be correct.

Tiny is working out the missing number.

Input	9	7	3.5	-2
Output	19	17	13.5	

The missing
number is -12



Explain Tiny's mistake.
What is the missing number?

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