FUNCTION MACHINES (ONE STEP)

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Ask: what has happened to the input to make the output? Sometimes more than one operation works.

4 → + 8 → 12 $4 + 8 = 12$

4 → × 3 → 12 $4 \times 3 = 12$

1 Write the missing operation. Use + or −.

a) 6 → ☐ → 11 b) 15 → ☐ → 9

c) 8 → ☐ → 20 d) 30 → ☐ → 18

2 Write the missing operation. Use × or ÷.

a) 4 → ☐ → 20 b) 18 → ☐ → 6

c) 7 → ☐ → 70 d) 40 → ☐ → 5

3 Find two different operations for each machine.

a) 5 → ☐ → 10 or ☐

b) 12 → ☐ → 6 or ☐

c) 3 → ☐ → 9 or ☐

4 Each table shows a rule. Write the rule.

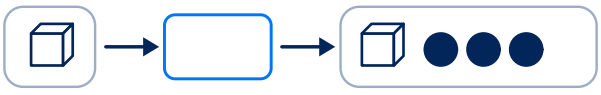
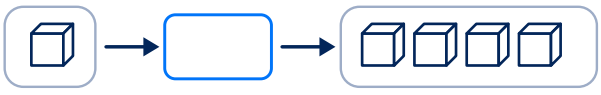
input	output
1	5
2	6
3	7
4	8

rule: ☐

input	output
1	3
2	6
3	9
4	12

rule: ☐

5 A cube is a mystery number. A counter is 1. What has the machine done?

a)  b) 

6 This machine does not change the input. What could the function be?

10 → ☐ → 10 or ☐

FUNCTION MACHINES (ONE STEP)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Look at how the output is made from the input.

x → × 5 → 5x



5 lots of x

x → + 5 → x + 5



x and 5 ones

1 Find the function.

a) 6 → ☐ → 13

b) 9 → ☐ → 45

c) 24 → ☐ → 8

d) 15 → ☐ → 7

2 Find the function.

a) a → ☐ → 4a

b) a → ☐ → a + 4

c) b → ☐ → b – 2

d) b → ☐ → $\frac{b}{3}$

e) c → ☐ → c^2

f) c → ☐ → 10c

3 This table shows the inputs and outputs of a machine.

input	output
1	7
2	14
5	35

a) What is the function? ☐

b) What is the output when the input is 10? ☐

4 What is the same and what is different about these two machines?

x → × 5 → 5x

x → + 5 → x + 5

.....

.....

5 Ali says the function in this machine is "× 2".

a → ☐ → a^2

a) Explain why Ali is wrong.

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b) What is the correct function? ☐

FUNCTION MACHINES (ONE STEP)

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Compare the output with the input to decide what has happened. Check by putting the input through your function. There can be more than one correct function.

1 Find a function for each machine.

a) 2.5 → ☐ → 10

b) 12 → ☐ → –3

c) 0.6 → ☐ → 6

d) 49 → ☐ → 7

2 Find the function.

a) x → ☐ → 9x

b) y → ☐ → y – 7

c) 3a → ☐ → 12a

d) 6b → ☐ → 2b

e) 2p → ☐ → 2p + 5

f) n → ☐ → $\frac{n}{5}$

3 Find three different functions for this machine.

a → ☐ → 2a ☐ ☐ ☐

4 Each table shows a 1-step function. Find the function.

input	output
x	x + 6
2x	2x + 6
5	11

function: ☐

input	output
y	4y
3y	12y
4	16

function: ☐

5 Mia says, "If the output is smaller than the input, the function must be a subtraction or a division." Do you agree? Explain, using examples.

6 Make up your own algebraic input and output for a "÷ 4" machine.

☐ → ÷ 4 → ☐

FUNCTION MACHINES (ONE STEP)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

1 Each machine gives the output 6y + 4. Find each function.

a) 6y → ☐ → 6y + 4

b) 3y + 2 → ☐ → 6y + 4

c) 12y + 8 → ☐ → 6y + 4

d) 6y + 1 → ☐ → 6y + 4

e) Make up your own input and function that give 6y + 4.

☐ → ☐ → 6y + 4

2 Is each statement always, sometimes or never true? Circle your answer.
If it is sometimes true, give an example of when it is true and when it is not.

a) "× 2" and "+ b" give the same output when the input is b. ALWAYS SOMETIMES NEVER

b) "+ 3" and "× 3" give the same output. ALWAYS SOMETIMES NEVER

c) If the output is bigger than the input, the function is + or ×. ALWAYS SOMETIMES NEVER

d) There is only one function that changes x into x^2. ALWAYS SOMETIMES NEVER

3 These input and output pairs all come from the same machine.

input	output
2	5
4	9
10	21

Jo says the function is "+ 3". Kai says it is "× 2.5". Explain why neither of them can be right. Could any 1-step function work?

4 In "Guess my rule", Ella tries the inputs 5, 0 and –2. She gets the outputs 20, 0 and –8.

a) What is the rule? ☐

b) Why was 0 a clever input to try?

CHALLENGE

5 Find one 1-step function that works for every pair in the set.

a) 4 → 2, 9 → 3, 100 → 10

b) 2 → 4, –3 → 9, 5 → 25

c) 8 → 2, 20 → 5, 1 → 0.25

☐
☐
☐

Make up a set of three pairs for a partner.