1-STEP FUNCTION MACHINES (ALGEBRA)

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

Repeated adding is multiplying:

5 + 5 + 5 = 3 × 5

A cube can stand for a mystery number.



= 2 mystery numbers + 3

1 Write each addition as a multiplication.

a) **4 + 4 + 4** = ☐ × ☐

b) **7 + 7 + 7 + 7 + 7** = ☐ × ☐

c) **2 + 2 + 2 + 2 + 2 + 2** = ☐ × ☐

2 A division can be written as a fraction: $3 \div 4 = \frac{3}{4}$

a) **1 ÷ 2 =** ☐ b) **5 ÷ 8 =** ☐ c) **7 ÷ 10 =** ☐

3 A cube is a mystery number. A counter is 1. How many of each?

a)



cubes ☐ ones ☐

b)



cubes ☐ ones ☐

c)



cubes ☐ ones ☐

4 Find the output.

a) 6 → × 3 → ☐ b) 10 → + 4 → ☐

c) 12 → ÷ 2 → ☐ d) 9 → − 5 → ☐

5 Fill in the boxes.

a) **5 × 3 = 3 ×** ☐ b) **8 + 2 = 2 +** ☐

c) Is 12 − 4 the same as 4 − 12? Explain.

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6 A box holds 6 eggs. How many do the following hold?

Eggs in 2 boxes ☐ Eggs in 5 boxes ☐ Eggs in 10 boxes ☐

How would you work out the number of eggs in any number of boxes?

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1-STEP FUNCTION MACHINES (ALGEBRA)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

A letter (a variable) stands for any number.

y → × 3 → 3y

y → + 3 → y + 3

3y means 3 × y

y + 3 means 3 more than y. y ÷ 2 is written $\frac{y}{2}$

1 Write each of these using algebra.

a) y + y + y = ☐ b) a + a = ☐ c) 4 × b = ☐

d) c × 5 = ☐ e) m ÷ 2 = ☐ f) x × x = ☐

2 Find the output.

a) a → + 5 → ☐ b) a → × 4 → ☐

c) b → – 2 → ☐ d) b → ÷ 3 → ☐

e) x → square → ☐ f) k → × 10 → ☐

3 Complete the table for this machine.

input → × 2 → output

input	output
y	
3y	
5	
	8p

4 Circle the correct way to write each one.

a) b × 4 4b b4 4 + b b) n + n + n n^3 3n n + 3

c) p × p 2p p^2 p + 2 d) a ÷ 6 $\frac{a}{6}$ $\frac{6}{a}$ 6a

5 Find the input.

a) ☐ → × 3 → 3m b) ☐ → + 4 → t + 4

1-STEP FUNCTION MACHINES (ALGEBRA)

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Write the number first: 4a not a4. ab means a × b. a^2 means a × a. $\frac{a}{b}$ means a ÷ b.

A variable can be any number, so the output is an expression, e.g. k → × 2 → 2k

1 Find the output.

a) a → × 7 → ☐

b) b → ÷ 4 → ☐

c) d → × d → ☐

d) 2e → × 3 → ☐

e) 3g → + 5 → ☐

f) c → − 9 → ☐

2 Find the input.

a) ☐ → × 5 → 10x

b) ☐ → + 3 → 4y + 3

c) ☐ → square → p^2

d) ☐ → × 4 → 12ab

3 Complete the table for this machine.

input → + 5 → output

input	output
x	
2x	
x − 1	
3x + 2	
	7y + 8

4 True or false? Circle your answer.

a) a × b = ab — TRUE FALSE

b) 4 × y = y4 — TRUE FALSE

c) $\frac{x}{3} = \frac{3}{x}$ — TRUE FALSE

d) n + n = n^2 — TRUE FALSE

e) 6c − c = 5 — TRUE FALSE

f) 3 × p × p = $3p^2$ — TRUE FALSE

5 Lily puts k + 3 into a "× 2" machine. She says the output is 2k + 3. Explain her mistake and write the correct output.

1-STEP FUNCTION MACHINES (ALGEBRA)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

1 Find the output. Write it in two different ways.

a) 2a + 1 → × 3 → ☐ or ☐

b) 4b + 6 → ÷ 2 → ☐ or ☐

2 Find the missing function. Can you find more than one?

a) a → ☐ → a^2

b) 4n → ☐ → n

c) x → ☐ → 2x

d) y → ☐ → 0

3 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) **2y is greater than y** — ALWAYS / SOMETIMES / NEVER

b) **a + 4 = 4 + a** — ALWAYS / SOMETIMES / NEVER

c) **a – 4 = 4 – a** — ALWAYS / SOMETIMES / NEVER

d) **y^2 is greater than 2y** — ALWAYS / SOMETIMES / NEVER

4 A cube is x and a counter is 1. Here is the input to a "× 3" machine.



Write the input and the output as expressions. Find two ways to write the output.

input: ☐ **output:** ☐ or ☐

CHALLENGE

5 a) The output of a "× 4" machine is 8m + 12. What was the input? ☐

b) Rosa puts an expression into a "÷ 2" machine and gets n + 5. What did she put in? ☐

c) The same number goes into a "× 6" machine and a "+ 6" machine. The outputs are equal. What is the number? ☐