1-STEP FUNCTION MACHINES (NUMBER)

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

An inverse operation undoes another operation. Adding and subtracting are inverses. Multiplying and dividing are inverses.

$7 + 5 = 12$ so $12 - 5 = 7$

$4 \times 6 = 24$ so $24 \div 6 = 4$

1 Write the inverse of each operation.

a) + 6 → ☐ b) − 4 → ☐ c) × 3 → ☐

d) ÷ 2 → ☐ e) × 10 → ☐ f) ÷ 5 → ☐

2 Use the first fact to complete the others.

a) $9 + 4 = 13$

$13 - 4 =$ ☐

$13 - 9 =$ ☐

b) $6 \times 7 = 42$

$42 \div 7 =$ ☐

$42 \div 6 =$ ☐

3 Find the missing numbers.

a) ☐ + 8 = 15 b) ☐ − 6 = 10 c) ☐ × 4 = 28

d) ☐ ÷ 3 = 5 e) 9 + ☐ = 20 f) 50 ÷ ☐ = 10

4 Square numbers. 4^2 means $4 \times 4 = 16$

a) $3^2 =$ ☐ b) $6^2 =$ ☐ c) $10^2 =$ ☐

d) Which number multiplied by itself makes 25? ☐

5 a) I think of a number. I add 7. My answer is 19. What was my number? ☐

b) I think of a number. I multiply it by 5. My answer is 40. What was it? ☐

6 Ben says $36 \div 4 = 8$. Use the inverse operation to check his answer. Is Ben correct? Explain how you know.

1-STEP FUNCTION MACHINES (NUMBER)

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Forwards: do the operation to the input.

5 → + 3 → 8

Backwards: do the inverse to the output.

5 → + 3 → 8

← – 3

1 Find the output.

a) 6 → + 4 → ☐

b) 9 → – 5 → ☐

c) 7 → × 2 → ☐

d) 20 → ÷ 4 → ☐

2 Find the input. Use the inverse operation.

a) ☐ → + 6 → 10

b) ☐ → × 3 → 15

c) ☐ → – 2 → 9

d) ☐ → ÷ 2 → 8

3 Complete the table for this machine.

input → × 5 → output

Hint: for the last two rows, work backwards with ÷ 5

input	output
1	
3	
6	
	20
	50

4 "Square" means multiply a number by itself.

a) 3 → square → ☐

b) 5 → square → ☐

c) ☐ → square → 16

d) ☐ → square → 100

5 Kim puts 4 into this machine. She says the output is 7.

4 → × 3 → 7

a) What mistake has Kim made?

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b) What is the correct output? ☐

6 I think of a number and subtract 8. The answer is 12. What is my number? ☐

1-STEP FUNCTION MACHINES (NUMBER)

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

To find an output, apply the function to the input. To find an input, apply the inverse function to the output. Check by putting your input back through the machine.

1 Find the output. You may use a calculator.

a) 3.5 → + 2.8 → ☐

b) 12 → × 7 → ☐

c) −4 → + 9 → ☐

d) 81 → √ → ☐

2 Find the input.

a) ☐ → + 15 → 32

b) ☐ → × 6 → 54

c) ☐ → − 3.5 → 10

d) ☐ → ÷ 4 → 2.5

e) ☐ → square → 49

f) ☐ → √ → 6

3 Complete the table for this machine.

input → × 4 → output

input	output
7	
2.5	
−3	
	48
	2

4 Here is a function machine.

input → subtract from 100 → output

a) The input is 35. Find the output. ☐

b) The output is 28. Find the input. ☐

c) Explain why the inverse of "subtract from 100" is not "+ 100".

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5 Sam is finding the input. He says, "I work from left to right, so the input is 56 × 8 = 448." Explain Sam's mistake and find the correct input.

☐ → × 8 → 56

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1-STEP FUNCTION MACHINES (NUMBER)

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

1 The same number is put into both machines. Both outputs are the same.

[ ] → + 12 → [ ] [ ] → × 4 → [ ]

What is the input? [ ] What is the output? [ ]

2 Write two different functions for each machine.

a) 6 → [ ] → 18 or [ ] b) 8 → [ ] → 2 or [ ]

c) Write three different functions where the output is always the same as the input. [ ] [ ] [ ]

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) A "× 3" machine gives an output bigger than the input. ALWAYS SOMETIMES NEVER

b) A "square" machine gives an output bigger than the input. ALWAYS SOMETIMES NEVER

c) Putting an output through the inverse machine gives the input. ALWAYS SOMETIMES NEVER

d) The inverse of "subtract from 50" is "+ 50". ALWAYS SOMETIMES NEVER

4 This table shows the inputs and outputs of a 1-step function machine.

input	output
3	1.5
7	3.5
10	5

a) Write two possible functions. [ ] [ ]

b) Find the output when the input is 4.8 [ ]

c) Find the input when the output is 12 [ ]

CHALLENGE

5 Here is a function machine. input → divide 60 by → output

a) Find the output when the input is 4, and when it is 0.5 [ ] [ ]

b) The output is 20. Find the input. [ ]

c) Mo says the inverse of this function is "× 60". Is he right? What is the inverse function? Explain.