

Rule Detectives

Find, use, and compare input-output rules.

GRADE 5 • TEKS 5.1.F

5.1.F "analyze mathematical relationships to connect and communicate mathematical ideas; and"

NAME _____

DATE _____

FOLLOW THE RULE

A relationship rule tells what to do to each input to get its output. Check more than one input-output pair to make sure the same rule works each time. Then use the rule to find a missing value or compare results.

WORKED EXAMPLE

A machine follows one rule. Input 7 gives output 58. Input 9 gives output 74. What output does it give for input 11?

1. $7 \times 8 = 56$.

2. $56 + 2 = 58$, so the rule is multiply by 8, then add 2.

3. $11 \times 8 = 88$.

4. $88 + 2 = 90$.

Answer: 90

PRACTICE 6 problems

- 1** Input: 1, 3, 5, 10 Output: 10, 18, 26, ____
Describe the rule. Then fill in the missing output.

ANSWER _____

- 2** A rule says, "Multiply the input by 5, then add 1." What is the output when the input is 10?

ANSWER _____

- 3** Input: 13, 16, 20, 24 Output: 28, 31, 35, ____
Describe the rule. Then fill in the missing output.

ANSWER _____

- 4** A rule says, "Multiply the input by 6, then subtract 4." The output is 56. What was the input?

ANSWER _____

- 5** Table A: Input 4, 5, 6; Output 16, 19, ____
Table B: Input 4, 5, 6; Output 19, 23, ____ For an input of 6, which table has the greater output? How much greater is it?

ANSWER _____

- 6** A robot's rule only multiplies each input by the same whole number. Input 15 gives output 45, and input 18 gives output 54. Describe the rule. What input gives an output of 60?

ANSWER _____

APPLY IT Show your work

- 1** A reading app gives you 10 bonus points when you join. You earn 5 more points for each book you finish. Write the relationship in words, then find your total points after finishing 6 books.

WORK SPACE

ANSWER _____

- 2** An art club makes prize packs for its showcase. Each pack needs 4 printed stickers, and the club adds 3 special stickers to the whole order. Write the relationship in words, then find how many stickers are needed for 13 packs.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A snack shop tracks the cost of equal packs. Four packs cost \$19, six packs cost \$27, and ten packs cost \$43. Tariq says the rule is "multiply the number of packs by 4, then add 3." Lena says the rule is "add 3, then multiply by 4." Who is correct? Explain how you know, then find the cost of 15 packs.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Input: 1, 3, 5, 10 Output: 10, 18, 26, ____ Describe the rule. Then fill in the missing output.	Multiply by 4, then add 6; 46
2	A rule says, "Multiply the input by 5, then add 1." What is the output when the input is 10?	51
3	Input: 13, 16, 20, 24 Output: 28, 31, 35, ____ Describe the rule. Then fill in the missing output.	Add 15; 39
4	A rule says, "Multiply the input by 6, then subtract 4." The output is 56. What was the input?	10
5	Table A: Input 4, 5, 6; Output 16, 19, ____ Table B: Input 4, 5, 6; Output 19, 23, ____ For an input of 6, which table has the greater output? How much greater is it?	Table B; 5 greater
6	A robot's rule only multiplies each input by the same whole number. Input 15 gives output 45, and input 18 gives output 54. Describe the rule. What input gives an output of 60?	Multiply by 3; 20

PART 2 • APPLY IT

- Start with 10 points and add 5 points for each book; 40 points** Multiply 6 by 5 to get 30 points from books. Add the 10 bonus points to get 40 points.
- Multiply the number of packs by 4, then add 3; 55 stickers** Multiply 13 by 4 to get 52 printed stickers. Add 3 special stickers to get 55 stickers.

CHALLENGE

Tariq is correct. $4 \times 4 + 3 = 19$, while adding 3 first gives 28, not 19. The cost of 15 packs is \$63 because $15 \times 4 + 3 = 63$.

Accept equivalent wording for relationship rules, such as "four times the input plus six." For explanation responses, accept any correct check that uses the table values and correct arithmetic.