LESSON MAKER PRO

Rule Machine Detectives

Find the pattern from input to output.

GRADE 5 · MA.5.AR.3

MA.5.AR.3 "Analyze patterns and relationships between inputs and outputs."

NAME _____ DATE _____

FIND THE RULE

Compare more than one input-output pair to find the rule. A rule may have two steps, such as multiplying first and then adding or subtracting.

WORKED EXAMPLE

A rule multiplies each input by 13, then adds 17. What is the output for an input of 21?

1. Start with 21.
2. Multiply: 21 x 13 = 273.
3. Add: 273 + 17 = 290.

Answer: 290

PRACTICE 6 problems

1 Input: 2, 5, 8 Output: 18, 33, 48 What is the rule?

ANSWER _____

2 The rule is: multiply the input by 3, then add 2. What is the output for an input of 7?

ANSWER _____

3 The rule is: divide the input by 2, then add 8. The output is 20. What is the input?

ANSWER _____

4 Input: 10, 14, 18, 22 Output: 22, 26, 30, ___ What number belongs in the blank?

ANSWER _____

5 Input: 16, 20, 24, 30 Output: 8, 10, 12, ___ What number belongs in the blank?

ANSWER _____

6 Input: 15, 20, 25, 30 Output: 58, 78, 98, ___ What number belongs in the blank?

ANSWER _____

APPLY IT Show your work

1 In an arcade challenge, Maya earns the same number of stars for each completed level. Her record shows that 2 levels earn 14 stars, 5 levels earn 35 stars, and 8 levels earn 56 stars. How many stars will she earn for 11 levels?

WORK SPACE

ANSWER _____

2 An art club puts the same number of stickers in every pack and adds 2 bonus stickers to each order. An order of 2 packs has 18 stickers, and an order of 5 packs has 42 stickers. How many stickers are in an order of 9 packs?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Input: 12, 18, ___, 30 Output: 29, 41, 53, 65 What is the missing input? Explain the rule in words.

WORK SPACE AND ANSWER

ANSWER KEY

Rule Machine Detectives

GRADE 5 · MA.5.AR.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Input: 2, 5, 8 Output: 18, 33, 48 What is the rule?	**Multiply the input by 5, then add 8.**
2	The rule is: multiply the input by 3, then add 2. What is the output for an input of 7?	**23**
3	The rule is: divide the input by 2, then add 8. The output is 20. What is the input?	**24**
4	Input: 10, 14, 18, 22 Output: 22, 26, 30, ___ What number belongs in the blank?	**34**
5	Input: 16, 20, 24, 30 Output: 8, 10, 12, ___ What number belongs in the blank?	**15**
6	Input: 15, 20, 25, 30 Output: 58, 78, 98, ___ What number belongs in the blank?	**118**

PART 2 · APPLY IT

1. **77 stars** The rule is to multiply the number of levels by 7. Multiply 11 by 7 to get 77.
2. **74 stickers** Each pack has 8 stickers because 18 minus 2 is 16, and 16 divided by 2 is 8. Multiply 9 by 8, then add 2.

CHALLENGE

24; multiply each input by 2, then add 5.

Accept equivalent wording for each rule, such as “times 5 plus 8.” For the challenge, accept an explanation that clearly shows the missing input follows the same relationship.