LESSON MAKER PRO

Pattern Rule Detectives

Find the expression that connects each input and output.

GRADE 5 · MA.5.AR.3.1

MA.5.AR.3.1 "Given a numerical pattern, identify and write a rule that can describe the pattern as an expression."

NAME _____ DATE _____

BUILD THE RULE

A rule tells what to do to an input to make an output. Look for the same operations each time, then write the input as a blank in an expression.

WORKED EXAMPLE

Input 7 gives 97. Input 9 gives 121. Input 11 gives 145. Write a rule.

1. Multiply each input by 12.
2. 7 × 12 = 84.
3. Add 13 to get 97.
4. Check: 9 × 12 + 13 = 121.

Answer: (___ × 12) + 13

PRACTICE 6 problems

1 Input 1 gives 6. Input 2 gives 10. Input 4 gives 18. Write a rule.

ANSWER _____

2 Input 4 gives 22. Input 6 gives 32. Input 8 gives 42. Write a rule.

ANSWER _____

3 Input 20 gives 16. Input 30 gives 26. Input 40 gives 36. Write a rule.

ANSWER _____

4 Input 5 gives 20. Input 10 gives 40. Input 15 gives 60. Write a rule.

ANSWER _____

5 Input 2 gives 16. Input 3 gives 24. Input 4 gives 32. Write a rule.

ANSWER _____

6 Input 40 gives 17. Input 50 gives 27. Input 60 gives 37. Write a rule.

ANSWER _____

APPLY IT Show your work

1 A music app starts a playlist with 4 featured songs. It adds 3 new songs each day. After 2 days, there are 10 songs. After 5 days, there are 19 songs. Write an expression rule for the total number of songs after any number of days.

WORK SPACE

ANSWER _____

2 In a coding club, a robot begins with 5 points. It earns 6 points for each completed mission. After 2 missions, it has 17 points. After 4 missions, it has 29 points. Write an expression rule for the robot's total points after any number of missions.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Input 4 gives 35. Input 6 gives 51. Input 8 gives 67. Write a rule. Then explain how you know the rule works for all three inputs.

WORK SPACE AND ANSWER

ANSWER KEY

Pattern Rule Detectives

GRADE 5 · MA.5.AR.3.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Input 1 gives 6. Input 2 gives 10. Input 4 gives 18. Write a rule.	**(___ × 4) + 2**
2	Input 4 gives 22. Input 6 gives 32. Input 8 gives 42. Write a rule.	**(___ × 5) + 2**
3	Input 20 gives 16. Input 30 gives 26. Input 40 gives 36. Write a rule.	**___ - 4**
4	Input 5 gives 20. Input 10 gives 40. Input 15 gives 60. Write a rule.	**___ × 4**
5	Input 2 gives 16. Input 3 gives 24. Input 4 gives 32. Write a rule.	**___ × 8**
6	Input 40 gives 17. Input 50 gives 27. Input 60 gives 37. Write a rule.	**___ - 23**

PART 2 · APPLY IT

1. **(___ × 3) + 4** Multiply the number of days by 3. Then add the 4 featured songs.
2. **(___ × 6) + 5** Multiply the number of missions by 6. Then add the 5 starting points.

CHALLENGE

(___ × 8) + 3. Each input is multiplied by 8, then 3 is added, which gives 35, 51, and 67.

Accept equivalent expressions that multiply the input first and then add or subtract the same amount. For example, 2 + (4 × ___) is equivalent to (___ × 4) + 2.