

# What's My Rule?

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**Strand:** Patterns, Functions, and Algebra

**Topic:** Patterns

**Primary SOL:** 3.16 The student will identify, describe, create, and extend patterns found in objects, pictures, numbers, and tables.

**Related SOL:** 3.3

## Materials

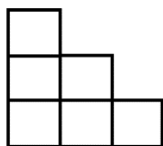
- What's My Rule? activity sheet (attached)
- Cubes
- Input-Output Scenarios A-D
- Input-Output Scenarios Recording Sheet
- Input-Output Tables
- Directions for Making the Input/Output Machine (attached)

## Vocabulary

*function, geometric pattern, growing, extending, numeric pattern, pattern, repeating, rule, table*

## Student/Teacher Actions: What should students be doing? What should teachers be doing?

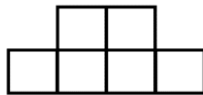
1. Give pairs of students about 25 cubes and give each student the What's My Rule? activity sheet. Show them the following configuration of cubes and have them create a match. Ask them to describe what they notice about the cubes.
2. Tell them that you need an additional row of cubes and ask what they think the next row should look like. Have them build the next row using four cubes.



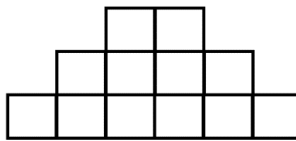
3. Ask, "What do you notice about each row of cubes?" "How many cubes will be in the fifth row?" Have students build the fifth row. Discuss the repeating pattern that comes from adding a cube to each row and the number of cubes in each. Have them record what they see on the first table on the "What's My Rule?" sheet. Ask, "What's the rule for each row of cubes?"

Rule:		
Row	Number of Cubes	What It Looks Like
1		
2		
3		
4		
5		

- Ask, “How many cubes do you think will be in the 10th row?” Pairs of students will need to work with another pair of students to build a set of blocks with 10 rows to prove their answer.
- Have students build the following configuration of cubes.



- Ask, “How many blocks do you believe will be in the next row?” Have students build the next row.
- Have students record their information on the second table on the What’s My Rule? activity sheet. Ask, “How many cubes would be in the eighth row?” “How can you figure this out without building the rows?” “What is the rule for this pattern of cubes?”



- Engage students in a discussion on the different sets of cubes and the rule for finding each. Ask how the rules are similar and how they are different.
- Explain that the table works as an Input/Output table. When you enter numbers in the input side (Row) and follow the rule, the number on the output side (the cubes) is created.
- Distribute the Input-Output Scenarios A–D activity sheet. Have students work with partners to solve the scenarios. (Note: The scenarios provided can be solved using addition or multiplication. Identifying and using the multiplication rules exceeds the expectations for SOL 3.16.)

## Assessment

- **Questions**
  - How do you determine the output numbers in an input-output table?
  - What strategies do you use to figure out the relationship between the input and output numbers?
  - How can you justify or prove that your rule for an input-output table is correct?
- **Journal/writing prompts (include a minimum of two)**
  - Explain the strategies you should use to figure out the relationship between input and output numbers.
  - Your teacher gives you a card with an input/output table on it that is partially completed. Attach the table to a page of your journal, and complete table. Then, write a justification for your answers and reasoning.
- **Other Assessments (include informal assessment ideas)**
  - Input-Output Tables. Have students complete the tables and name the rule if it is not named.

## Extensions and Connections (for all students)

- Create an Input-Output machine (directions attached).
- Have students create their own Input-Output tables with rules for a partner to solve.

## Strategies for Differentiation

- For students who have difficulty with the concept of using numbers in input-output tables, the use of pictures or images can be helpful to understanding. For example, ask students to complete a table that shows the relationship of eyes to students. Ask one student to come to the front of the room and “go in the INPUT slot.” Then, slide a card with a picture of two eyes out of the OUTPUT slot: input number = 1, output number = 2.
- Use pattern blocks as input and numbers of sides as output.

**Note: The following pages are intended for classroom use for students as a visual aid to learning.**

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**What's My Rule?**

RULE: _____		
Row	Number of Cubes	What it looks like
1		
2		
3		
4		
5		

RULE: _____		
Row	Number of Cubes	What it looks like
1		
2		
3		
4		
5		

## Input-Output Scenarios A–D

### SCENARIO A:

One bicycle has two wheels. Two bicycles have four wheels. Continue the pattern on the table. Name the rule. How many wheels would there be on seven bicycles?

### SCENARIO B:

A store is selling CDs 2 for \$12.00, 3 for \$18.00. Complete the table to show how much up to 5 CDs would cost.

How much would 8 CDs cost?

### SCENARIO C:

Sharon paid \$0.50 for one candy bar. Two candy bars would cost her \$1.00. Complete the table to show the cost of up to five candy bars.

Name the rule. What would be the cost of seven candy bars?

### SCENARIO D:

Jerry can buy 2 subs at a cost of \$6. He can buy 4 subs at a cost of \$12. If the pattern continues, what is the OUTPUT if he buys 8 subs? Complete the table. Name the rule.



### Input-Output Tables

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**RULE: Subtract 5**

INPUT	OUTPUT
50	45
75	
80	
95	
100	

**RULE: Add 10**

INPUT	OUTPUT
250	
265	
282	
318	
537	

**RULE: Add 4**

INPUT	OUTPUT
63	
74	
88	
91	
99	

**RULE: Subtract 10**

INPUT	OUTPUT
50	
65	
74	
85	
93	

**RULE: \_\_\_\_\_**

INPUT	OUTPUT
4	16
7	28
9	
8	
12	

**RULE: \_\_\_\_\_**

INPUT	OUTPUT
25	22
36	33
42	
51	
67	

**RULE: Multiply by 3**

<b>INPUT</b>	6	8	9	11	12
<b>OUTPUT</b>					

**RULE: \_\_\_\_\_**

<b>INPUT</b>	7	8			
<b>OUTPUT</b>	2	3	5	7	10



## Directions for Making the Input-Output Machine

### Materials:

- Large cardboard box
- Tape
- Foil or decorative wrapping paper (optional)
- Paper towel tube
- Utility knife
- Glue
- Markers
- Index cards

### Directions:

1. Tape the top flaps of the box closed. Cut off one side of the box so that access to the inside of the box from the back is unimpeded.
2. Cut two rectangular slots on the opposite side of the box. The slots should be about 6 inches wide and 2 inches high so that the index cards can pass through easily. The slots should be side by side with about 6 to 8 inches between them. Wrap the box in foil or decorative wrapping paper (optional).
3. Write the word INPUT above the left slot and the word OUTPUT above the right slot. Then, wrap the paper towel tube (optional), and glue it to the left side of the machine. This is the handle that is “pulled” to cause the machine to perform the “rule” and make a card come out of the OUTPUT slot.

