



Practice Task: What's My Rule?

In this task, students will work to discover an unstated rule that the teacher is using to find outcomes.

STANDARDS FOR MATHEMATICAL CONTENT

Perform operations with multi-digit whole numbers and with decimals to the hundredths.

MCC5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students may soon realize that by using 1 as their suggested number, the result will clearly show the rule. Since one is the multiplicative identity, any number times one will equal itself. For example, using the sample table above, if the rule is $n \cdot 0.25$ and students suggest the number 1, the rule is seen immediately in the result of $1 \cdot .25 = .25$. Once students start using this strategy for uncovering the rule, you may need to eliminate 1 as a number that students can suggest.

The second sample table gives the rule $n \div 0.01$. This rule gives the same result as $n \times 100$. This is a great problem to get students to rethink their understanding of the relationship between multiplication and division. If a student suggests $n \times 100$, be clear that this could be the rule, but isn't the one you had planned. Push students to determine another possibility to elicit the actual rule for the table. They should have had enough experience with dividing decimals that it will be apparent to them.

ESSENTIAL QUESTIONS

- What are some patterns that occur when multiplying and dividing by decimals?
- What strategies are effective for finding a missing factor or divisor?

MATERIALS

- Overhead projector, white/chalk board, or computer projector
- Scratch paper
- “Guess My Rule” problems (pre-determined)

GROUPING

Whole group/small group task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION:

Comments:

When creating problems to present to the class, think about the level of difficulty of each problem and the order in which you present the problems.

Students will need time to consider number relationships after each entry, so encourage students to be patient and quiet during this time. When first doing this activity, you may want to begin with simpler rules such as adding or subtracting a number and then work toward using multiplication and division.

The teacher will want to decide on a predetermined rule for an input/output table. The students are asked to give numbers and the teacher will complete the chart using the predetermined rule. This process continues until several entries are in the table. When students think they’ve discovered the rule, they should keep it to themselves while other students are still trying to determine the rule. Here are some sample “rule tables.”

NOTE: When recording the table for students to see, the rule is not to be displayed initially.

Rule: $x \cdot 0.25$	
In	Out
3	0.75
5	1.25
7	1.75
10	2.5
12	3

Rule: $n \div 0.01$	
3	300
6	600
10	1,000
15	1,500
0.1	10

TASK

- Draw an input/output table for students to see.
- Tell students you're thinking of a rule for the table and ask them to give you numbers to add to the table. You will then complete the chart for each number they give you.
- After several numbers are entered, students will likely begin to discover the rule. When students think they know the correct rule, give them a number and ask them to use the rule to give you the correct number to record in the table, without actually stating the rule. This will allow you to check their thinking and still allow other students to think independently.
- When students have discovered the rule, have a discussion about the strategies they used to determine the rule.

FORMATIVE ASSESSMENT QUESTIONS

- What strategies are you using to determine the rule?
- At what point did you know your prediction for the rule was correct?
- How did you know for sure your rule was correct?

DIFFERENTIATION

Extension

- Have students develop their own rule tables to share with partners or in small groups.

Intervention

- Begin with simpler rules and have students explain their thinking so any misconceptions can be addressed immediately.