Resources Aligning with New Brunswick Curriculum

Grade Level: 6, 7, 8, 9
Outcomes: PR1, PR2
Purpose: Unit Starter, Warm-Up, Inquiry-Based Activity, Discrepant Event
Topics: Input-Output Machines, Input-Output Tables, Linear Relationships, Dependent and independent variables, Table of Values

GETTING STARTED

PART I:

1. First, ensure students understand how an input-output machine works: the machine accepts a number (input) and transform it into another number (output) using a rule.
2. Model this concept with the input-output machine, using **1-beginner** setting. Input several numbers.
3. Think-Pair-Share: Have students think about the rule, discuss with a team member, and then share with the class.
4. Verify the modeled example using "**Guess the Rule**" button. NB - on level beginner, the input value is only multiplied.

PART II:

1. Increase the difficulty level to **2 - Novice**.
2. As a class, input 4-10 values into the machine.
3. Think-Pair-Share: Either in teams or in pairs, have students try to determine the input-output rule. Teacher should circulate class to highlight good strategies for students to share.
4. As a class, discuss strategies that students used. Some important strategies to focus on:
   - By inputting "0", examining the output will allow you to know which number the machine will add or subtract by (e.g., Input = 0, Output = 7: This means the machine is adding by 7 every time)
   - By inputting consecutive numbers and looking at their difference, you can determine which number the machine is multiplying (e.g., Input 0, Output 7 / Input 1, Output 9: Because the difference between 7 and 9 is 2, the input machine multiplies by 2 and then adds 7).
   - By examining the table of values and the graph, we can see patterns
5. Repeat 2-3 times until students gain comfort
6. *Grade 7-9* Show the **graph function** and ask students how they can use the graph to determine the input-output rule.

Optional Activities:

1.1 Input-Output Machine Reflection
1.2 Create-a-Machine

WORKING ON IT

1. Present **1.3 Input-Output Machine Real-World Problem.** This activity is differentiated by encouraging students to use as many strategies as possible to solve the problem.
2. Circulate the class to observe students' strategies. Students who finish quickly should be encouraged to search for more strategies to solve their problem.
3. Take pictures or take note of the following strategies: table of values, the input-output rule (i.e. equation), or a graph. Alternatively, provide large poster paper for students to then display and present to their classmates.

CONSOLIDATION & PRACTICE

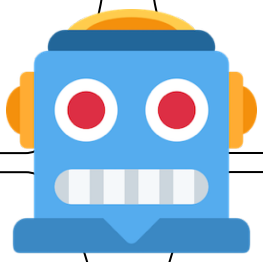
1. Discuss strategies students used for solving **1.3 Input-Output Machine Real-World Problem.** Name the strategies students have used and have them display their work on the board/take a photo and display on the projector.
2. Discuss which strategies were most effective.
3. Individual practice problems can then be used from textbook resources

Name_____ Date_____

1.1 Input-Output Machine Reflection

How does the input-output machine work?

What does the table of values tell us?



How do you determine how the machine transforms (changes) input numbers?

How do you think input-output machines might be used in real life?

Name_____ Date_____

1.2 Create-a-Machine

1. What will be the rule for your input-output machine?

✕ Multiply by ÷ Divide by		+ then add − then subtract	

2. Create a table of values for your input-output machine:

INPUT VALUES	OUTPUT VALUES

3. Use your table of values to graph your patterns

1.3 Input-Output Machine Real-World Problem

When you take a taxi, you must first pay a fee to sit in the taxi, and then more for every kilometer you ride.

In Fredericton, it costs $6.00 to enter the taxi, and then $1.50 for every additional kilometer.

How much would it cost to ride 20-km to the nearby town of Oromocto?

Use as many strategies as possible to solve this problem:

Strategy 1:

Strategy 2: