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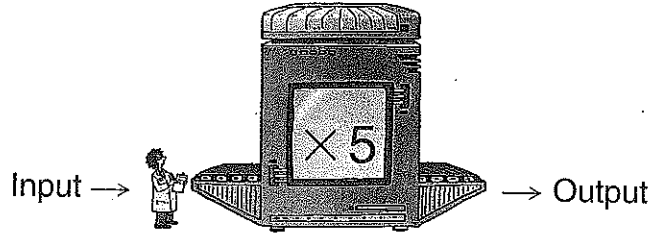
Creating Number Patterns

Look at this **Input/Output machine**.

Any number that is put into this machine is multiplied by 5.

If you input 5, the output is 25.

If you input 9, the output is 45.



Explore

- Draw your own Input/Output machine.
 - Choose a number to go inside your machine.
 - Choose an operation.
 - Use your machine to create a number pattern.
- Copy and complete this table for your pattern.
 - Write the pattern rule for the output numbers.

An operation is add, subtract, multiply, or divide.

Input	Output
1	
2	
3	

Show and Share

Share your machine and table with another pair of classmates.

Use your classmates' machine to extend their number pattern.

Connect

We can use an Input/Output machine to make a growing pattern.

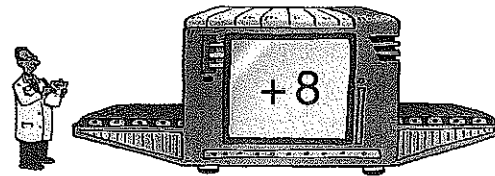
Each input is added to 8 to get the output.

When we input 1, the output is 9.

When we input 2, the output is 10.

The pattern rule for the output is:

Start at 9. Add 1 each time.



Input	Output
1	9
2	10
3	11
4	12


Practice


Use a calculator when it helps.

1. For each Input/Output machine:


- Choose 5 numbers to input.
- Find each output number.
- Copy and complete the table.

Input	Output

a) Input →  → Output

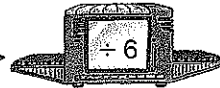
b) Input →  → Output

2. Copy and complete the table for this Input/Output machine.

Input →  → Output

Input	Output
20	
19	
18	
17	
16	

3. a) Copy and complete the table for this Input/Output machine.

Input →  → Output

Input	Output
36	
42	
48	
54	
60	
66	
72	

b) What is the pattern rule for the input numbers? The output numbers?

Math Link

Number Sense

When an Input/Output machine uses multiplication, and the input numbers are whole numbers, the output numbers are multiples of the number in the machine.

4. Each table shows the Input/Output from a machine.
- Identify the number and the operation in the machine.
 - Continue the patterns.

Write the next 4 input and output numbers for each table.

a)

Input	Output
2	20
4	40
6	60
8	80
10	100

b)

Input	Output
500	485
450	435
400	385
350	335
300	285

5. For each table:

- Write the pattern rules for the output numbers and the input numbers.
- The patterns continue. Write the next 4 input and output numbers.

a)

Input	Output
110	101
99	90
88	79
77	68
66	57

b)

Input	Output
84	12
91	13
98	14
105	15
112	16
119	17



6. Draw an Input/Output machine.

Choose a number and an operation.

Use multiples of any number as the input numbers.

Find the output numbers.

Make a table to show your results.

Write the pattern rules for the

input numbers and the output numbers.

Reflect

When you see an Input/Output table, how can you tell what the operation is in the machine?

Use words, pictures, or numbers to explain.

Numbers Every Day

Mental Math

Add.

$$156 + 302$$

$$411 + 298$$

$$2356 + 1009$$

Which strategies did you use?