Grade 6 Math

Date: Oct. 7, 2019

1) Complete this table. The pattern rule that relates the input to the output is Subtract 6 from the input

-6

show work

input	output	
20	14	20 - 6
30	24	30 - 6
40	34	40 - 6
50	44	
60	54	

+10 +10

a) Write the pattern rule for the input.

Input starts at 20 and add 10 each time.

b) Write the pattern rule for the output.

Output start at 14 and add 10 each time.

Practice

Solutions PAge 8,9

1 For each Input/Output machine:
- Copy and complete the table.
- Write the pattern rule that relates the input to the output.
- Write the pattern rule for the input.
- Write the pattern rule for the output.

a)

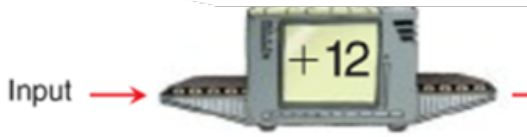
Input	Output	
1	9	= 1x9
2	18	= 2x9
3	27	= 3x9
4	36	= 4x9
5	45	= 5x9

Pattern Rule for Input to output is to multiply the input by 9 to get an output

Pattern Rule for input
- input starts at 1 and increases by 1 each time

Pattern Rule for Output
→ Starts at 9 and increases by 9 each time.

b)



Input to output Pattern Rule
↳ Add 12 to input to get out put (Start with input 1)

Input	Output	
1	13	= 1 + 12
2	14	= 2 + 12
3	15	= 3 + 12
4	16	= 4 + 12
5	17	= 5 + 12

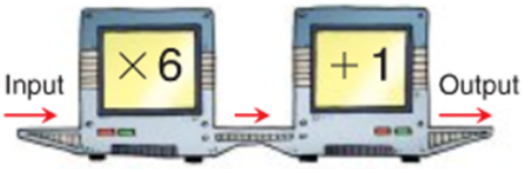
Pattern Rule Input
↳ Start Input at 1 and increase by 1

Pattern Rule of Output
↳ Start at 13 and add 1 each time.

Solutions PAge 8,9

2. For each Input/Output machine:
   - Copy and complete the table.
   - Write the pattern rule that relates the input to the output.
   - Write the pattern rule for the input.
   - Write the pattern rule for the output.

a)



Input	Output
2	13
4	25
6	37
8	49
10	61

+2 +12

Show work

In = 2: 2 x6 +1, 12 +1, 13

In = 4: 4 x6 +1, 24 +1, 25

In = 6: 6 x6 +1, 36 +1, 37

In = 8: 8 x6 +1, 48 +1, 49

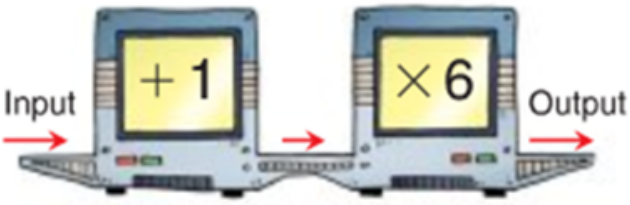
In = 10: 10 x6 +1, 60 +1, 61

In/Out Rule
↳ Multiply input by 6 then add 1

Pattern Rule Input
→ Start input at 2, then increas by adding 2 each time

Pattern Rule Output
→ Start at 13 and add 12 each time.

b)



Input	Output
2	
4	
6	
8	
10	

Solutions PAge 8,9

3. Look at question 2 and your tables.
   a) How are the Input/Output machines the same? How are they different?
   b) How do the output numbers from the two machines compare? Explain.
   c) Is it possible to get more than one output number for each input? How do you know?

a) the input and output machines use the same numbers and operations. They perform the operations in different orders

b) For each input, the output in part b is greater than the output in part a

c) There is only one output for each input number. When you x a given # by a certain #, there can only be one solution. Same is true for addition. So therefore you can only get one output for each input number.

Solutions PAge 8,9

4. Copy and complete this table.
The pattern rule that relates the input to the output is:
Divide the input by 6.
a) Write the pattern rule for the input.
b) Write the pattern rule for the output.

÷6

Input	Output
36	6
42	7
48	8
54	9
60	10

+6 +1

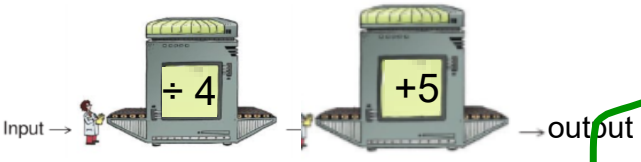
36 ÷ 6
42 ÷ 6
48 ÷ 6
54 ÷ 6
60 ÷ 6

a) Pattern rule for input is start at 36 and increase by 6.

b) The pattern rule for output is start at 6 and increase by 1.

Copy the input/output machine (rule)

show work



input	output
24	11
32	13
40	15
48	17
54	18.5

+8, +8, +8, +6

a) Complete the table

In=24

24 ÷4 +5

6 + 5

11

In=32

32 ÷4 +5

8 +5

13

40 ÷4 +5

10 + 5

15

48 ÷4 +5

12 + 5

17

54 ÷4 +5

13.5 +5

18.5

b) Write the pattern rule that relates the input to the output.

Machine

Divide the input by 4 then add 5 to get output

c) Write the pattern rule for the input.

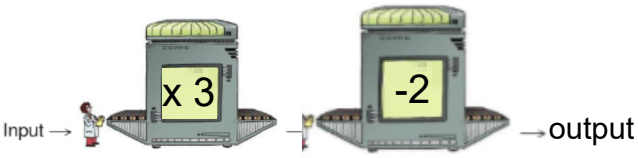
Input starts at 24 and add 8 for 3 entries

d) Write the pattern rule output.

output Start at 11 and add 2 each time.

Copy the input/output machine (rule)

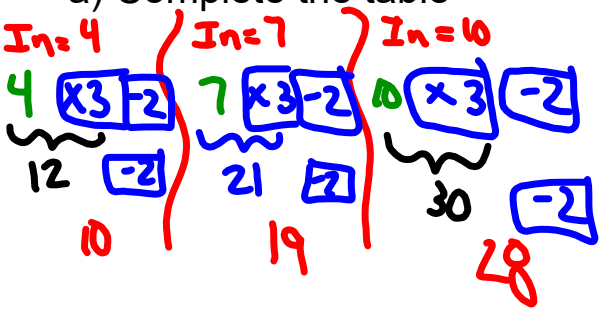
show work



input	output
4	10
7	19
10	28
13	37
16	46

+3 +9

a) Complete the table



b) Write the pattern rule that relates the input to the output. (Machine)

→ multiply input by 3, then subtract 2 to get output.

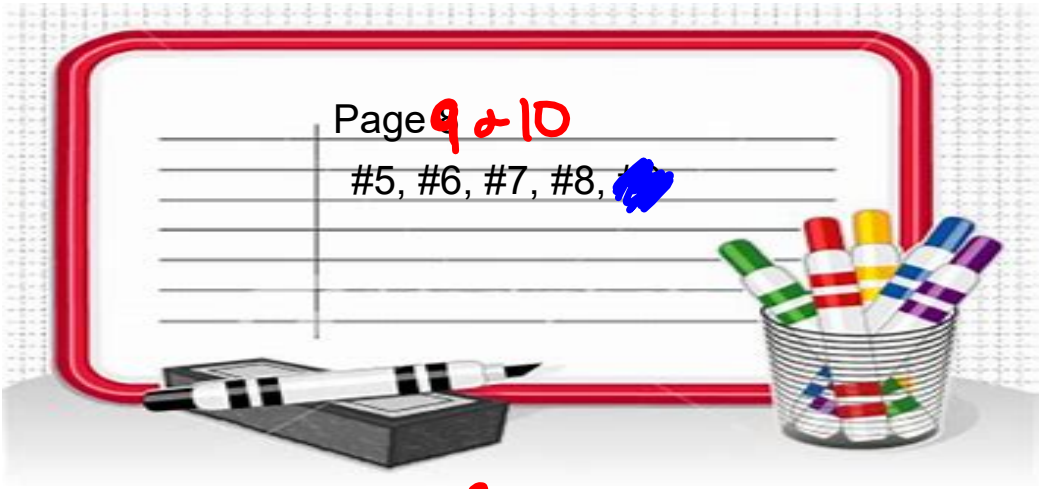
c) Write the pattern rule for the input.

→ Input starts at 4, then add 3 each time.

d) Write the pattern rule output.

→ Output starts at 10 then add 9 each time.

Class/Homework



Some are wrong

+4 ÷2

6)

In	Out
4	2
8	4
16	10
26	15
30	19

Class/homework

Practice

1 For each Input/Output machine:

- Copy and complete the table.
- Write the pattern rule that relates the input to the output.
- Write the pattern rule for the input.
- Write the pattern rule for the output.

Input	Output
1	
2	
3	
4	
5	

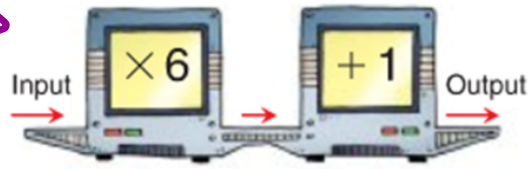
a)

b)

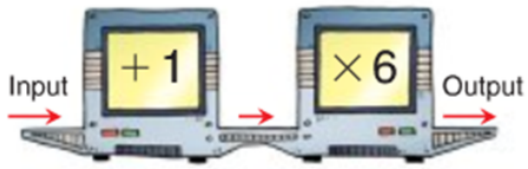
2. For each Input/Output machine:
   - Copy and complete the table.
   - Write the pattern rule that relates the input to the output.
   - Write the pattern rule for the input.
   - Write the pattern rule for the output.

Input	Output
2	
4	
6	
8	
10	

a)



b)



3. Look at question 2 and your tables.
   a) How are the Input/Output machines the same?
   How are they different?
   b) How do the output numbers from the two machines compare? Explain.
   c) Is it possible to get more than one output number
   for each input? How do you know?

4. Copy and complete this table.
The pattern rule that relates the input to the output is:
Divide the input by 6.
   a) Write the pattern rule for the input.
   b) Write the pattern rule for the output.

Input	Output
36	
42	
48	
54	
60	

5. Copy and complete this table.
The pattern rule that relates the input to the output is:
Divide the input by 3, then subtract 2.

a) Write the pattern rule for the input.

b) Write the pattern rule for the output.

Input	Output
30	
60	
90	
120	
150	

6. The pattern rule that relates the input to the output is:
Add 4 to the input. Then divide by 2.
Check the data in the Input/Output table.
Identify any output numbers that are incorrect.
How do you know they are incorrect?
Show your work.

Input	Output
4	2
8	4
16	10
26	15
30	19

7 The pattern rule that relates the input to the output is:
Divide the input by 6, then add 5.

a) Check the data in the Input/Output table. Identify any output numbers that are incorrect. How do you know they are incorrect?

b) Correct the table.

c) Write 3 more input and output numbers for this pattern rule.

Show your work.

Input	Output
6	6
12	7
30	10
42	2
54	15

8. The pattern rule that relates the input to the output is:
Multiply the input by 4. Then subtract 3.
Find the missing numbers in the table.
How can you check your answers?

Input	Output
3	9
6	?
9	?
12	45
15	?

TIP

9. The pattern rule that relates the input to the output is:
Add 5 to the input. Then multiply by 3.
Find the missing numbers in the table.
What strategies did you use?

Input	Output
2	21
5	?
?	39
11	?
?	57
?	66

10. a) Draw an Input/Output machine with two operations.
Choose two numbers and two operations for your machine.
b) Choose 5 input numbers.
Find the output numbers.
c) Erase 2 input numbers and 2 output numbers.
Each row must have at least one number.
Trade tables with a classmate.
Trade pattern rules that relate the input to the output.
Find your classmate's missing numbers.

Reflect

Suppose you want to make an Input/Output machine to convert millimetres to metres.
Describe what your machine would look like.

ASSESSMENT FOR LEARNING

What to Look For	What to Do If You Don't See It
Conceptual Understanding ✔ Students explain that an Input/Output machine is used to create a pattern. ***Procedural Knowledge*** ✔ Students can identify, extend, and create patterns with Input/Output machines. ✔ Students can identify erroneous data in a table of input and output numbers. ✔ Students can describe the pattern within each column of a table of values. ✔ Students can generate values in one column of a table of values given values in the other column and a pattern rule.	***Check Further*** As students work, ask: • What are the differences in consecutive input numbers? • What are the differences in consecutive output numbers? • How can you use these differences to write pattern rules for the input and output numbers? • How can you use the pattern rules to extend the table? ***Adjust Instruction*** Students who have difficulty identifying number patterns may benefit from creating their own patterns. Have students work independently to create and extend different types of number patterns. They can trade patterns with a classmate, and identify each other's patterns.