Warm Up Grade 7

1. Determine the expression that relates the input to the output

n	
Input	Output
5	3
6	6
7	9
8	12
9	15

As Input increases by 1, The output increases by 3.

Increase by 1

Increase by 3

$3n$

Check $In = 5$

$3n$

$3(5)$

15

Out = 3

Not same

Need to subtract

-12

$3n - 12$

2. Determine the expression that relates the input to the output

Input	Output
5	11
6	14
7	17
8	20
9	23

As Input increases by 1, Output increases by 3.

Increase by 1

Increase by 3

$3n$

Check $n = 5$

$3n$

$3(5)$

15

out = 11

Not same

Subtract 4

$3n - 4$

Key words

For each
For every
Per

} # goes with variable

Pg 23

let n = students

#2c) $G = \frac{n}{2}$

2d) $S = 4n + 10$

3a) $10n$ $n \equiv$ # hours

3b) $n = 30$

$10n$

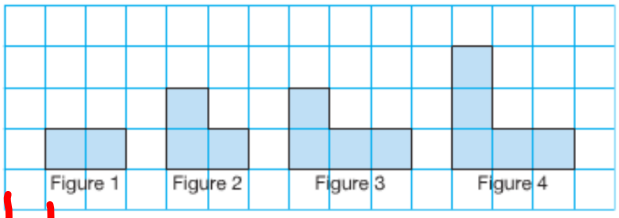
$10(30)$

300

She earned $300 for 30 hours.

Patterns From Table

How does this pattern of squares represent the table of values?



Input	Output
1	2
2	3
3	4
4	5

Increase by 1

n

n=1 Check out = 2

1n + 1

Do you see a pattern in the table?

As Input increases by 1, Output increases by 1.

n + 1

Draw students' attention to the pattern of squares and the table of values at the top of Student Book page 11. Ensure they see the connection between the input numbers in the table of values and the figure numbers in the pattern of squares, as well as the connection between the output numbers and the number of squares in each figure.

Look at the following chart

Figure (In)	Number of edges (Out)
1	1
2	3
3	5
4	7
5	9
6	11
7	13

What pattern do you see in the figures?

Figure number increases by 1

What pattern do you see in the chart?

As fig number increases by 1, number of edges increases by 2.

Write the pattern rule that relates the figure number to the number of edges.

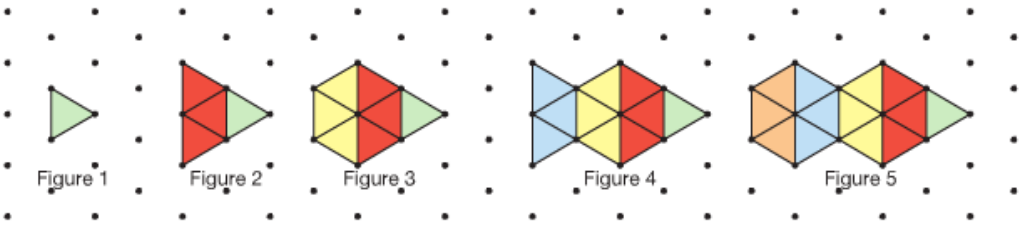
Connect

➤ We can draw pictures to show the relationship in a table of values.

Input	Output	
1	1	
2	4	3
3	7	3
4	10	3
5	13	3

In this table:
The input increases by 1 each time.
The output increases by 3 each time.

We could draw a pattern of triangles on triangular dot paper.
The figure number is the input.
The number of triangles in each figure is the output.



Pattern Rule

Can relate the input to the output.

It will tell us the numbers and operations to do to the input

The table shows the input and output for this one-operation machine.

To identify the numbers and operation in the machine:

Δx	Input	Output	Δy
up 1	1	7	up 7
	2	14	
	3	21	
	4	28	
	5	35	

7n

n=1, out=7

7n

7(1)

7 works

The pattern rule for the input is start at 1 and increase by 1 each time

The pattern rule for the output is start at 7 and increase by 7 each time

this is a clue on what to do

The pattern rule that relates the input to the output is

7n

You try (One operation)

The table shows the input and output for this one operation machine.

To identify the numbers and operations in the machine:

Input	Output
7	5
8	6
9	7
10	8
11	9

Inc 1

Inc 1

n − 2

check

The pattern rule for the input is _____

The pattern rule for the output is _____ ← this is a clue on what to do

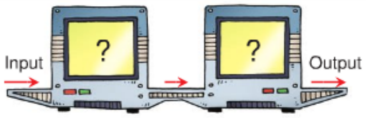
The pattern rule that relates the input to the output is

n − 2

Pattern Rule

(2 operations)

The table shows the input and output for this two-operation machine.



To identify the numbers and operations in the machine:

x Input	y Output
1	1
2	5
3	9
4	13
5	17

Inc 1 G

Incr by 4

4n

This change suggest what you multiply the input by

Check n=1

4n

4(1)

4

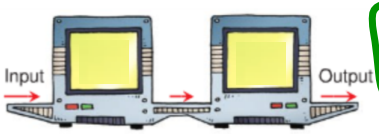
Out=1

Not same

Subtract 3

The pattern rule for the input is _____

The pattern rule for the output is _____ ← this is a clue on what you multiply the input by



4n - 3

The Second operation is gotten by taking one input value from the chart and applying the multiplication to it and see what do you have to do to get its output (do you add a value or subtract a value?)

Must think

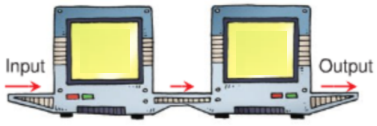
Input	Output
1	1
2	5
3	9
4	13
5	17

so try our suggestion

_____ NOT _____

so how do I go from__to 5?

need to _____



The pattern rule that relates the input to the output is

_____

Identify the number and operation in the machine

Input	Output
1	26
2	27
3	28
4	29

Write the pattern rule that relates the input to the output

Sheet (On next page)

1ab, 2abc, 3a, 4, 5a

Practice

1. Each table shows the input and output from a machine with one operation. For each table:
   - Identify the number and the operation in the machine.
   - Continue the patterns.
     Write the next 4 input and output numbers.
   - Write the pattern rule that relates the input to the output.

a)

Input	Output
1	7
2	14
3	21
4	28

up 1 → up 7 → 7n

b)

Input	Output
50	39
49	38
48	37
47	36

down 1 → down 1 → 1n

1(50) → 50 → out 39 → not same → Subtract 11 → n − 11

c

5	35
6	42
7	49
8	56

46	35
45	34
44	33
43	32

2. Each table shows the input and output from a machine with two operations. For each table:

- Identify the numbers and the operations in the machine.
- Predict the output when the input is 10. Check your prediction.

a)

Input	Output
1	2
2	5
3	8
4	11

b)

Input	Output
1	9
2	14
3	19
4	24

c)

Input	Output
3	3
4	5
5	7
6	9

d)

Input	Output
4	17
5	21
6	25
7	29

3

4. Each table shows the input and output from a machine with two operations.

- Find the pattern rule that relates the input to the output.
- Use the pattern rule to find the missing numbers in the table.
- Use the patterns in the columns to check your answers.
- Predict the output when the input is 40. Check your prediction.

a)

Input	Output
5	21
6	24
7	27
?	30
9	?
10	?

b)

Input	Output
0	1
5	2
10	3
?	4
20	?
25	?

4

Input	Output
1	6
2	8
3	10
4	12

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

b) Predict the output when the input is 9. Extend your pictures to check.

c) Which input has an output of 28? Describe the strategy you used to find out.

5) Write the pattern rule that relates the input to the output

a)

Input	Output
1	15
2	19
3	23
4	27

b)

Input	Output
1	4
2	10
3	16
4	22