

Name: Key

Class: _____

Show What You Know – Patterns & Equations

1. The pattern rule that relates the input to the output is:
Divide the input by 5, then subtract 1.

a) Check the data in the table. Identify any output numbers that are incorrect.

b) Write the pattern rule for the input.

+5 twice then +15 twice

c) Write the pattern rule for the corrected output.

+1 twice then +3 twice

Input	Output
5	0
10	1
15	2
30	5
45	8
50	9
55	10
70	13
85	16
90	17

d) The pattern continues write the next output numbers.

2. The table shows the input and output for this machine.

a) Identify the numbers and operations in the machine.

$\times 2 - 2$

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

$2n - 2$

c) Choose 4 different inputs and find the outputs for each.

d) Predict the output when the input is 11.

Input	Output
1	0
2	2
3	4
4	6
5	8
6	10
7	12
8	14
9	16
10	18
11	20

3. In a dogsled race, teams of 6 dogs race to the finish.

a) Make a table to show the numbers of dogs in a race when 2, 3, 4, 5, and 6 teams are entered.

b) Write a pattern rule that relates the numbers of teams entered to the number of dogs.

$\times 6$

# of Teams	# of Dogs
2	12
3	18
4	24
5	30
6	36

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c) Write an expression to represent this pattern.

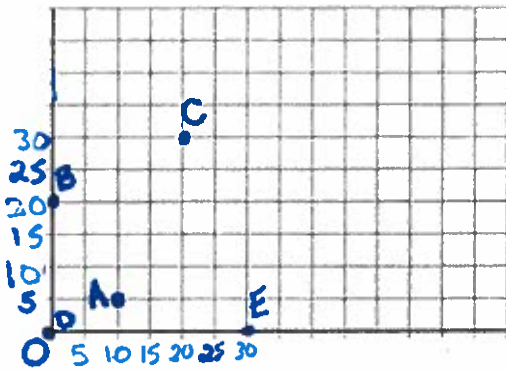
$$6n$$

d) Use the expression to find the number of dogs when 13 teams are entered.

$$6n = 6 \times 13 = 78 \text{ dogs}$$

4. Draw and label a coordinate grid. Plot each point on the grid below.

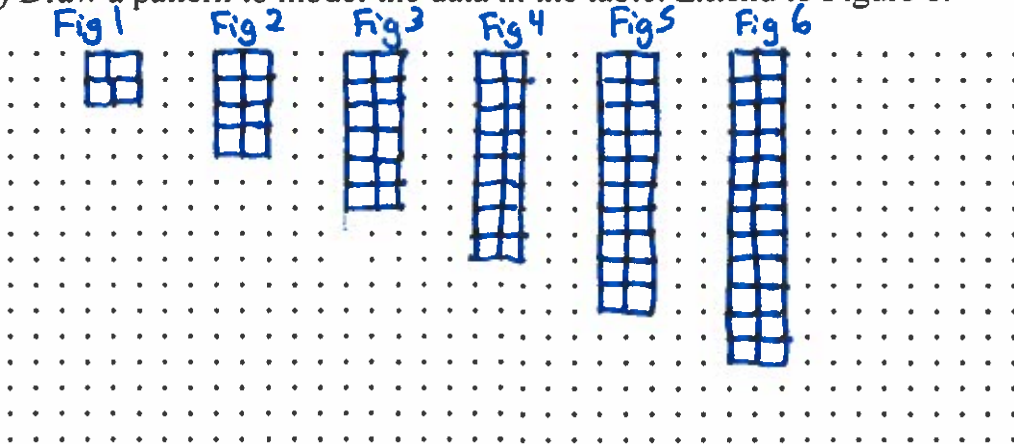
a) A(10,5) b) B(0,20) c) C(20,30) d) D(0,0) e) E(30,0)



5. Use the dot paper.

Figure #	1	2	3	4	5	6
# of Shapes	4	8	12	16	20	24

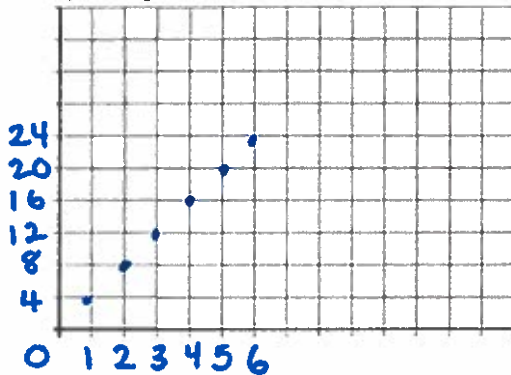
a) Draw a pattern to model the data in the table. Extend to Figure 6.



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b) Graph the data in the table.



c) Describe the trend of the data on the graph.

- increases
- diagonal

d) Write an expression to represent the pattern.

$$4n$$

e) Find the number of shapes in the 21st figure.

$$4 \times 21 = 84$$

6. Rewrite each expression using a commutative property.

a) 24×3

b) $121 + 27$

$$24 \times 3 = 3 \times 24$$

$$121 + 27 = 27 + 121$$

c) $46 + 15$

d) 9×12

$$46 + 15 = 15 + 46$$

$$9 \times 12 = 12 \times 9$$

e) 11×8

f) $37 + 93$

$$11 \times 8 = 8 \times 11$$

$$37 + 93 = 93 + 37$$

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7. For each equation below:

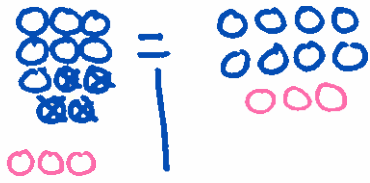
a) Model the equation with counters

b) Use counters to model the preservation of equality. Use a different operation for each equation.

c) Draw diagrams to record your work

d) Use symbols to record your work

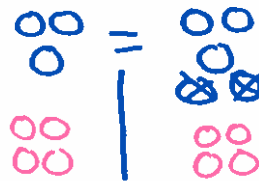
i. $11 - 3 = 8 + 3$



iii. $3 + 4 = 7$



ii. $3 \times 1 = 5 - 2$



iv. $12 \div 6 = 9 - 7$



8. For each equation below:

- apply the preservation of equality. Write an equivalent form of the equation

a) $4n = 8$

$$4n + 2 = 8 + 2$$

$$4n + 2 = 10$$

b) $n = 3$

$$n - 1 = 3 - 1$$

$$n - 1 = 2$$

c) $12 = 6n$

$$12 + 4 = 6n + 4$$

$$16 = 6n + 4$$

d) $4 = 2n$

$$4 - 2 = 2n - 2$$

$$2 = 2n - 2$$

How do you know the equality has been preserved each time?

Because what I did to the left side I did to the right side or what I did to the right side I did to the left side