1.1 Something to Talk About

A Develop Understanding Task

Cell phones often indicate the strength of the phone's signal with a series of bars. The logo below shows how this might look for various levels of service.
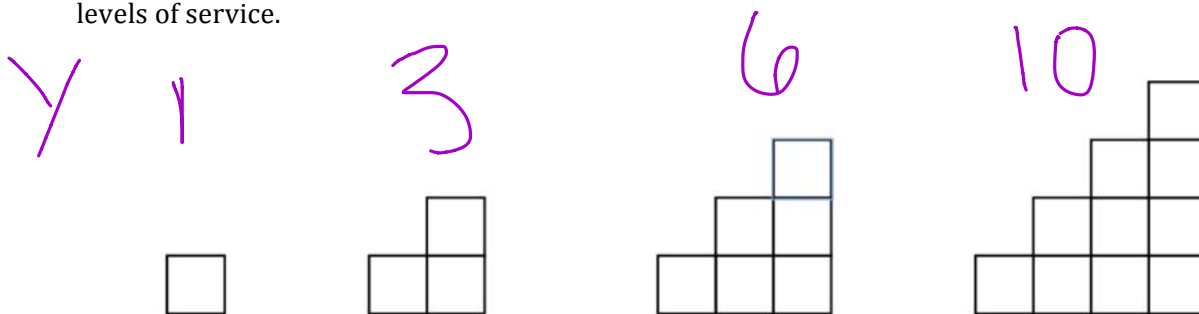
Figure 1   Figure 2   Figure 3   Figure 4

1. Assuming the pattern continues, draw the next figure in the sequence.

2. How many blocks will be in the figure 10?

3. Examine the sequence of figures and find a rule or formula for the number of tiles in any figure number.

Handwritten annotations:

Figure values: 1, 3, 6, 10 labeled "output"
Figures labeled "X" "input"

Answer to #2: **55**

Formula: $y = \frac{1}{2}n(n+1)$

Table:

x	y	
1	1	+2
2	3	+3
3	6	+4
4	10	+5
5	15	+6
6	21	+7
7	28	+8
8	36	+9
	45	+10
10	55	

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READY

Topic: Distributive Property

Simplify the following expressions

1. $3(2x + 7)$

2. $-12(5x - 4)$

3. $5a(-3a + 13)$

4. $9x(6x - 2)$

5. $\frac{2x}{3}(12x + 18)$

6. $\frac{4a}{5}(10a - 25b)$

7. $\frac{-4x}{11}(121x + 22)$

SET

Topic: Recognizing Linear Exponential and Quadratic Functions

In each set of 3 functions, one will be linear and one will be exponential. One of the three will be a new category of function. List the characteristics in each table that helped you to identify the linear and the exponential functions. What are some characteristics of the new function? Find an explicit and recursive equation for each.

8. Linear, exponential, or a new kind of function?

a.

x	$f(x)$
6	64
7	128
8	256
9	512
10	1024

(handwritten) ×2 →+64 +64; ×2 →+128 +128; ×2 →+256 +256; ×2 →+512; 1│2

Type and characteristics?

(handwritten) Exponential: Multiply to get next y value

Explicit equation: *(handwritten)* $y = 2^x$

Recursive equation: *(handwritten)* $y = 1 \cdot 2^x = 2^x$

b.

x	$f(x)$
6	36
7	49
8	64
9	81
10	100

(handwritten) +13 +2; +15 +2; +17 +2; +19 +2; 1│2

Type and characteristics?

(handwritten) Quadratic: equal second column (difference)

Explicit equation: *(handwritten)* $y = x^2$

Recursive equation:

c.

x	$f(x)$
6	11
7	13
8	15
9	17
10	19

(handwritten) +2 0; +2 0; +2 0; +2 0; 1│2; 2(10); 20+(-1)=19

Type and characteristics?

(handwritten) Linear: Equal first diff. (column)

Explicit equation: *(handwritten)* $y = 2x + (-1)$

Recursive equation:

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9. Linear, exponential, or a new kind of function?

d.

x	$f(x)$
-2	-17
-1	-12
0	-7
1	-2
2	3

(handwritten: +5 between each row)

(handwritten: $5(2) = 10 - 7 = 3$)

Type and characteristics?

(handwritten: Linear)

Explicit equation:

(handwritten: $y = 5x - 7$)

Recursive equation:

e.

x	$f(x)$
-2	1/25
-1	1/5
0	1
1	5
2	25

(handwritten: ×5 between each row)

Type and characteristics?

(handwritten: Exponetial)

Explicit equation:

(handwritten: $y = 5^x$)

Recursive equation:

f.

x	$f(x)$
-2	9
-1	6
0	5
1	6
2	9

(handwritten: -3, -1, +1, +3 and +2, +2, +2)

Type and characteristics?

(handwritten: Quadratic $y = x^2$)

Explicit equation:

(handwritten: $y = x^2 + 5$)

Recursive equation:

(handwritten: $1 + 5 = 9$)

10. Graph the functions from the tables in #8 and #9. Add any additional characteristics you notice from the graph. Place your axes so that you can show all 5 points. Identify your scale. Write your explicit equation above the graph.
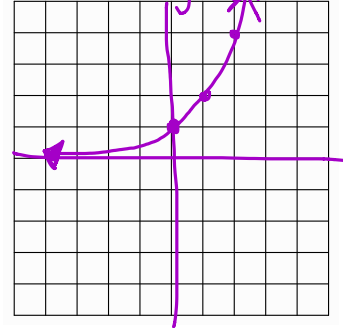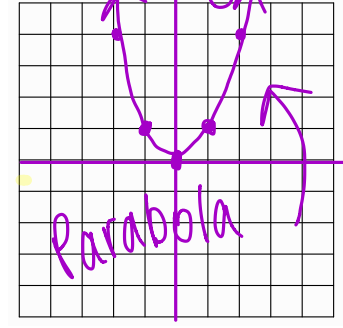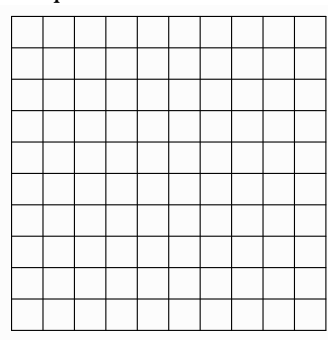
a. Equation: *(handwritten: Exponential $y = x$)*

(handwritten: Linear, Line)

b. Equation: *(handwritten: $y = 2^x$)*

c. Equation: *(handwritten: Quadratic $y = x^2$)*

(handwritten: Parabola)
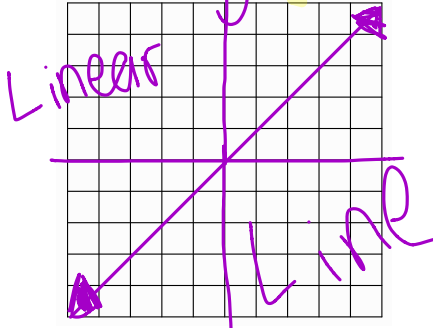
d. Equation:

e. Equation:

f. Equation:

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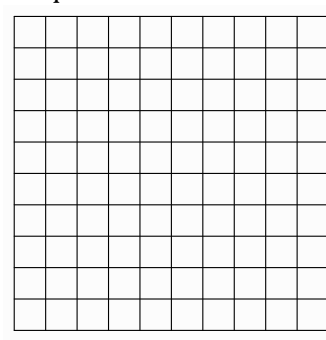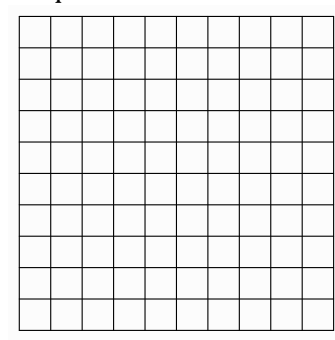
GO

Topic: Rates of Change

Identify the rate of change in each of the representations below.

11.

(handwritten: $\frac{4}{1} = 4$)

(handwritten: (x_1, y_1) $(1, 1)$, (x_2, y_2) $(0, -3)$, $\frac{-3-(1)}{0-(1)} = 4$)
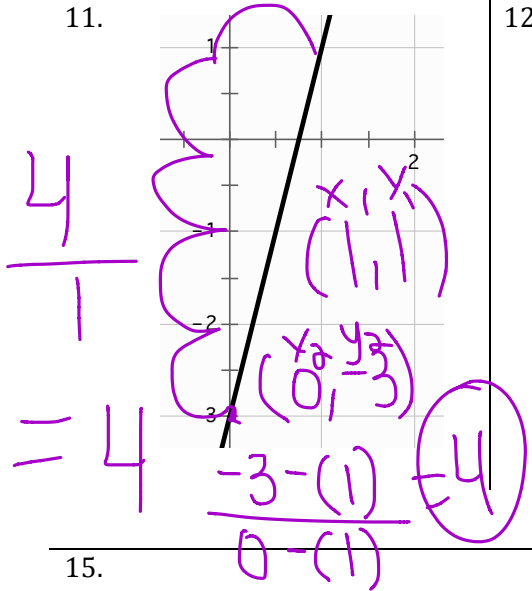
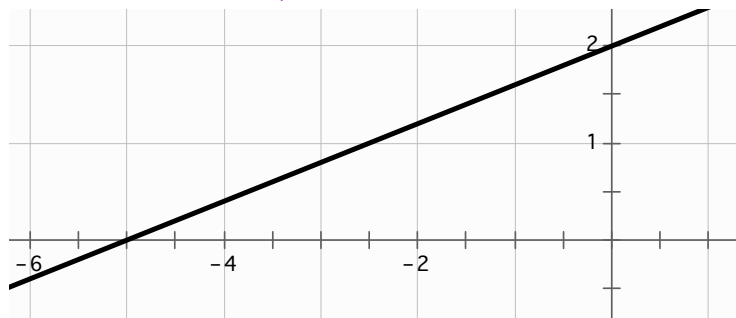12.
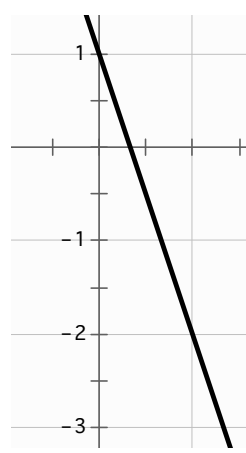
13.

x	f(x)
25	65
26	68
27	71
28	74

14.

$f(0) = 7; f(n + 1) = f(n) + 5$

15.

16.

Slope of $\overleftrightarrow{AB}$

A(-3, 12) B(-11, -16)

17. George is loading freight into an elevator. He notices that the weight limit for the elevator is 1000 lbs. He knows that he weighs 210 lbs. He has loaded 15 boxes into the elevator. Each box weighs 50 lbs. Identify the rate of change for this situation.

18.

Independent variable	4	5	6	7	8
Dependent variable	5	5.5	6	6.5	7

19.

$f(-4) = 24 \text{ and } f(6) = -36$

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