

# Opener Activity

Key

Using what we learned about the Uncle Earl activity, describe each table as linear or exponential. Then write an equation to represent each table.

x	f(x)
0	10
1	15
2	20
3	25
4	30

LINEAR  
 $y = 5x + 10$

x	f(x)
0	1
1	6
2	36
3	216
4	1296

Exponential  
 $y = 6^x$

x	f(x)
-2	4
-1	6
0	8
1	10
2	12

Linear  
 $y = 2x + 8$

x	f(x)
0	5
1	10
2	20
3	40
4	80

Exponential  
 $y = 5 \cdot 2^x$

x	f(x)
0	10
1	30
2	90
3	270
4	810

Exponential  
 $y = 10 \cdot 3^x$

Slope intercept form is one form of a linear equation we have used:  $y = mx + b$

Write what you think the general form for an exponential equation is:  $y = a \cdot b^x$

## Linear vs Exponential Notes

- Linear Functions have a constant rate of change
- Exponential Functions Show growth or decay by equal factors over equal intervals

Exponential Functions have the form  $a \cdot b^x$  where  $a \neq 0$ ,  $b \neq 1$ , and  $b > 0$

$a$  is the initial value or the y-intercept

$b$  is the ~~y-intercept~~ growth or decay rate

x	f(x)
-2	-20
-1	-10
0	0
1	10
2	20

+10  
+10  
+10  
+10

x	f(x)
-2	$\frac{1}{100}$
-1	$\frac{1}{10}$
0	1
1	10
2	100

$\times 10$   
 $\times 10$   
 $\times 10$   
 $\times 10$

x	f(x)
-2	$\frac{6}{25}$
-1	$\frac{6}{5}$
0	6
1	30
2	150

$\times 5$   
 $\times 5$   
 $\times 5$   
 $\times 5$

x	f(x)
-2	18
-1	21
0	24
1	27
2	30

+3  
+3  
+3  
+3

Linear or Exponential?

Why? Add some # every time

Equation:  $y = 10x$

Linear or Exponential?

Why? Multiply by 10 every time

Equation:  $y = 10^x$

Linear or Exponential?

Why? Multiply by 5 every time

Equation:  $y = 6 \cdot 5^x$

Linear or Exponential?

Why? Add 3 each time

Equation:  $y = 3x + 24$

x	f(x)
0	4
1	2
2	1
3	0.5
4	0.25

$\times \frac{1}{2}$   
 $\times \frac{1}{2}$   
 $\times \frac{1}{2}$   
 $\times \frac{1}{2}$

x	f(x)
0	5
2	7
4	9
6	11
8	13

+2  
+2  
+2  
+2

Slope: 1

x	f(x)
-2	$\frac{7}{16}$
-1	$\frac{7}{4}$
0	7
1	28
2	112

$\times 4$   
 $\times 4$   
 $\times 4$   
 $\times 4$

x	f(x)
0	99
1	33
2	11
3	$\frac{11}{3}$
4	$\frac{11}{9}$

$\times \frac{1}{3}$   
 $\times \frac{1}{3}$   
 $\times \frac{1}{3}$   
 $\times \frac{1}{3}$

Linear or Exponential?

Why? Multiply by  $\frac{1}{2}$  each time

Equation:  $y = 4 \left(\frac{1}{2}\right)^x$

Linear or Exponential?

Why? Add some count each time

Equation:  $y = x + 5$

Linear or Exponential?

Why? Multiply by 4 each time

Equation:  $y = 7(4)^x$

Linear or Exponential?

Why? Multiply by  $\frac{1}{3}$  each time

Equation:  $y = 99 \left(\frac{1}{3}\right)^x$

Name: \_\_\_\_\_

### Linear or Exponential Homework

Say whether the given equation, table, or situation is linear or exponential, and explain why.

1)  $y = 4x + 2$

2)  $y = 3 \cdot 4^x$

3)

x	y
0	5
1	15
2	45
3	135
4	405

4)

x	y
0	100
1	85
2	70
3	55
4	40

5) The population of fish in a pond doubles every 3 years.

6) A man weighs 225 pounds, and loses 6 pounds per month.

Write an equation from the given table.

7)

x	y
0	5
1	10
2	20
3	40
4	80

8)

x	y
0	8
1	20
2	32
3	44
4	56

9)

x	y
0	120
1	60
2	30
3	15
4	7.5

10)

x	y
0	20
1	30
2	45
3	67.5
4	101.25