Warmup 11/**(Dark blue digit of pi in our pi chain)** **Created by Kaylee Gunn**

1) Try to figure out how many blocks would be in pattern #43. (The patterns shown are pattern #1, #2, and #3)
2) If "n" is the pattern number, write an equation to tell how many blocks would be in pattern "n".

Uncle Earl Discussion

- What is the main difference between option 1 and option 2?

- What is the difference in how the money in each account grew?

PREDICTIONS?

- **Option A: You start with 1 penny and you double it every day**

- **Option B: You start with $100,000,000 and you get $20,000,000 every day**

- **When do you think Option A will pass Option B?**

What is an equation for Option A of Uncle Earl?

- Start with $1, double your money every day.

$$y = 1 \cdot 2^x \ or \ y = 2^x$$

x = # of days

Equation for this?

- What if you started with $50 and tripled your money every day?

$$y = 50 \cdot 3^x$$

x = # of days

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OBJECTIVE

Identify the differences between
Linear and Exponential Functions

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1) Find an Equation to
Describe the Data in the Table

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

$f(x) = 5x + 10$

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2) Find an Equation to
Describe the Data in the Table

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

$f(x) = 2x + 8$

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3) Find an Equation to
Describe the Data in the Table

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

$f(x) = 5(2)^x$

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4) Find an Equation to
Describe the Data in the Table

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

$f(x) = 10(3)^x$

Linear vs Exponential Functions

- The first two were charts of linear functions. Linear Functions have a constant rate of change.

- The last two described Exponential Functions. Exponential Functions show growth or decay by equal factors over equal intervals

Exponential Functions
- Have the form $f(x) = a \cdot b^x$
  - $a \neq 0$
  - $b \neq 1$ **(We'll talk about all this later, for now just write it down)**
  - $b > 0$

- *a is the "initial value"*

- *b is the **growth or decay rate***

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1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

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

f(x) = 10x
Linear

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1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
-2	1/100
-1	1/10
0	1
1	10
2	100

$y = 10^x$
Exponential

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1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

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

$f(x) = 5^x$
Exponential

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1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	0
1	20
2	40
3	60
4	80

f(x) = 20x
Linear

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1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

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

f(x) = 5x + 20
Linear

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	5
1	7
2	9
3	11
4	13

$f(x) = 2x + 5$
Linear

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	2
1	6
2	18
3	54
4	162

$f(x) = 2(3)^x$
Exponential

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	2
1	4
2	8
3	16
4	32

$f(x) = 2(2)^x$
Or $f(x) = (2)^{x+1}$
Exponential

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
-2	16
-1	18
0	20
1	22
2	24

$f(x) = 2x + 20$
Linear

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
-2	6/25
-1	6/5
0	6
1	30
2	150

$f(x) = 6(5)^x$
Exponential

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
-2	7/16
-1	7/4
0	7
1	28
2	112

$f(x) = 7(4)^x$
Exponential

Slide 1

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
-2	2
-1	4
0	7
1	11
2	16

TRICK QUESTION - Neither

Slide 2

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	99
1	33
2	11
3	11/3
4	11/9

$f(x) = 99\left(\frac{1}{3}\right)^{x}$
Exponential

Slide 3

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	3
1	6
2	12
3	24
5	96

$f(x) = 3(2)^{x}$
Exponential

Slide 4

1. Linear or Exponential?
2. Find an Equation to Describe the Data in the Table

x	f(x)
0	3
.5	4.243
1	6
2	12
3	24

$f(x) = 3(2)^{x}$
Exponential- equal factors over equal intervals

Slide 5

Homework

• Worksheet