

Warm Up

Below is a table of data. Is it linear or exponential?

	x	y
	0	10
+1 <	1	30
+1 <	2	90
+1 <	3	270

> +20 } x3
> +60 } x3
> +180 } x3

If it is exponential, how do we find the growth factor?

Divide "up the table"



Slope = $\frac{20}{1} \neq \frac{60}{1} \neq \frac{180}{1}$

Not Linear

Exponential because as the value of x increases by 1 there is a constant growth factor of 3.

	x	y
	1	46
+1 <	2	552
+1 <	3	6624
+1 <	4	79,488

$\frac{552}{46} = 12$

$\frac{6624}{552} = 12$

$\frac{79,488}{6624} = 12$

Constant Growth Factor = 12

Problem 1.3

Square Number	GF=2	GF=3	GF=4	Not Exp
	Plan 1	Plan 2	Plan 3	Constant Slope = 5
1	1	1	1	20
2	2	3	4	25
3	4	9	16	30
4	8	27	64	35
5	16	81	256	40
6	32	243	1,024	45
7	64	729	4,096	50
8	128	2187	16,384	55
9	256	6561	65,536	60
10	512	19,683	262,144	65

D For each plan, how many rubas are on the final square? List them from least to greatest.

Plan 4: 335 $r = 5(64) + 15$

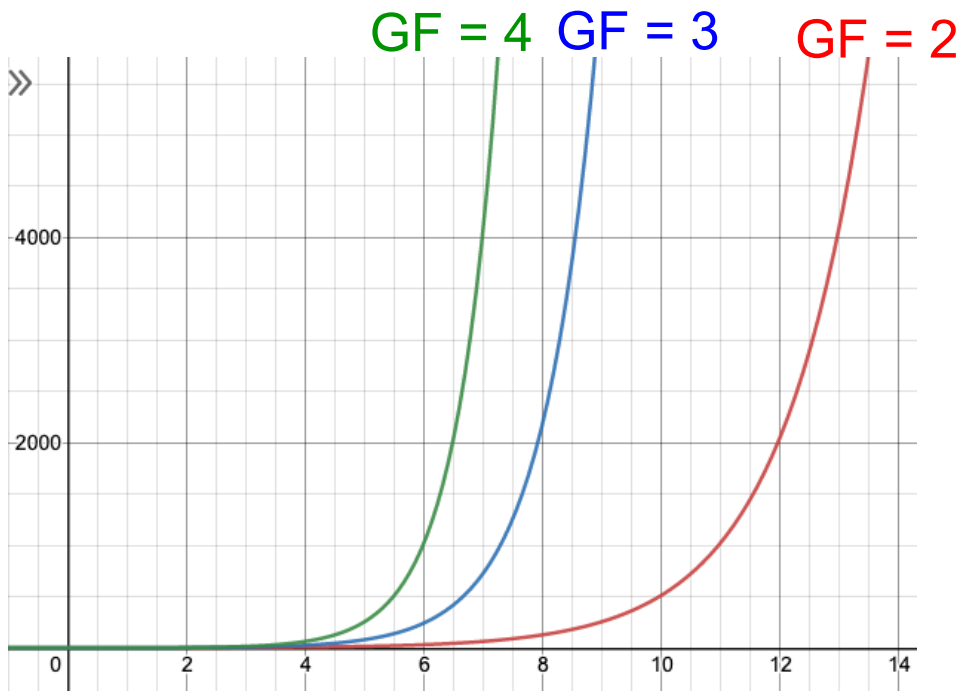
Plan 3: 4,194,304 $r = \frac{4^{12}}{4}$

Plan 2: 14,348,907 $r = \frac{3^{16}}{3}$

Plan 1: 9,223,372,037,000,000,000 $r = \frac{2^{64}}{2}$
 9.22337×10^{18}

- Which plan should the king choose? Explain.
- Which plan should the peasant choose? Explain.

Look how fast things grow depending on the Growth Factor!



Classwork

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15. Carmelita is planning to swim in a charity swim-a-thon. Several relatives said they would sponsor her.

I will give you \$1 if you swim 1 lap, \$3 if you swim 2 laps, \$5 if you swim 3 laps, \$7 if you swim 4 laps, and so on.—**Grandmother**

I will give you \$1 if you swim 1 lap, \$3 if you swim 2 laps, \$9 if you swim 3 laps, \$27 if you swim 4 laps, and so on.—**Father**

I will give you \$2 if you swim 1 lap, \$3.50 if you swim 2 laps, \$5 if you swim 3 laps, \$6.50 if you swim 4 laps, and so on.—**Aunt Josie**

I will give you \$1 if you swim 1 lap, \$2 if you swim 2 laps, \$4 if you swim 3 laps, \$8 if you swim 4 laps, and so on.—**Uncle Sebastian**

WOW! Thanks everyone for your support!—**Carmelita**

- Decide whether each donation pattern is an *exponential function*, *linear function*, or *neither*.
- For each relative, write an equation for the total donation d if Carmelita swims n laps. Which variable is the independent variable? Dependent variable?
- For each plan, tell how much money Carmelita will raise if she swims 20 laps.

For Exercises 17–21, study the pattern in each table.

- a. Tell whether the relationship between x and y is a *linear function*, *exponential function*, or *neither*. Explain your reasoning.
- b. If the relationship is a linear or exponential, give its equation.

17.

x	0	1	2	3	4	5
y	10	12.5	15	17.5	20	22.5

18.

x	0	1	2	3	4
y	1	6	36	216	1,296

19.

x	0	1	2	3	4	5	6	7	8
y	1	5	3	7	5	8	6	10	8

20.

x	0	1	2	3	4	5	6	7	8
y	2	4	8	16	32	64	128	256	512

21.

x	0	1	2	3	4	5
y	0	1	4	9	16	25

51. The king tried to figure out the total number of rubas the peasant would receive under Plan 1. He noticed an interesting pattern.
- a. Extend and complete this table for the first 10 squares.

Reward Plan 1

Square	Number of Rubas on Square	Total Number of Rubas
1	1	1
2	2	3
3	4	7
4	■	■

- b. Describe the pattern of growth in the total number of rubas as the number of the square increases. Do either of these relationships represent an exponential function? Explain.
- c. Write an equation for the relationship between the number of the square n and the total number of rubas on the board t .
- d. When the total number of rubas reaches 1,000,000, how many squares will have rubas?
- e. Suppose the king had been able to give the peasant the reward she requested. How many rubas would she have received?