MCR 3U **Exponential Functions Investigation** Day 3

Part I – Enter a World of Pure Imagination

a) Suppose Maranda is building an addition to her home. She needs to hire a contractor to build it. Maranda tells the contractor, Marissa, $50,000 on the first day followed by an additional $1,000 per day for 24 days. Mr. Nantais, desperate for work, undercuts Marissa. He will do the job in 24 days and work the first day for just $0.01. (A penny). The next day he wants to DOUBLE his money…4 pennies, and so on. How much money will Mr. Nantais be paid on his last day of work (day 24)? Which is the better DEAL?

Marissa's Pay

Day	Pay	Day	Pay	Day	Pay	Day	Pay
1		7		13		19	
2		8		14		20	
3		9		15		21	
4		10		16		22	
5		11		17		23	
6		12		18		24	

Mr. Nantais' Pay

Day	Pay	Day	Pay	Day	Pay	Day	Pay
1		7		13		19	
2		8		14		20	
3		9		15		21	
4		10		16		22	
5		11		17		23	
6		12		18		24	

TOTALS:

b) Does Marissa's pay model a linear relation, quadratic relation, or neither? Explain.

c) Divide each subsequent pay of Mr. Nantais' by the one before it (i.e., take the pay of day two and divide it by the pay of day one, and so on).

d) If the ***ratios*** that you found in part c) are equal, then this represents an exponential model. Is Mr. Nantais' pay an exponential model?

Part II – EXPONENTIAL GROWTH

The situation above is an example of EXPONENTIAL GROWTH. We will look at how we want to write these equations formally next class. But today we just want to talk about how this works.

Let's try another example. A colony of 100 bacteria double every day. Fill in the chart below:

Day	Population
0	
1	
2	
3	
4	

a) Graph the relation.
b) Is the graph increasing faster or slower as the number of days increases?
c) What would the population of the bacterial colony be after 1 week?

Act III – EXPONENTIAL DECAY

The opposite of exponential GROWTH is exponential DECAY. This is where a number gets SMALLER by a constant multiplier.

A ball is bounced from 40 feet. Each bounce it loses HALF of its height. Fill in the table below.

Bounces	Height
0	
1	
2	
3	
4	

a) Graph the relation.
b) Is the graph decreasing faster or slower as the number of bounces increase?
c) According to the graph, will the ball ever stop bouncing?
d) Determine the domain and range of the graph.

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