**Scenario: Making Money**

Duration: 30 days Choice of 2 options

* **Option 1:** You will receive one cent ($0.01). This penny will be put into a bank account. After each day, 200 additional dollars will be added to your bank account. After 30 days, you will be able to cash out your bank acct.
* **Option 2:** You will receive one cent ($0.01). This penny will be put into a bank account. After each day the balance in your bank account will double. After 30 days, you will be able to cash out your bank acct.
1. Initially (after zero days), how much money was in the bank account?
2. What will the value of the account balance be for both options after 1 day?

|  |  |
| --- | --- |
| Option 1: | Option 2: |
|  |  |

1. What will the value of the account balance be for both options after 5 days?

|  |  |
| --- | --- |
| Option 1: | Option 2: |
|  |  |

1. What will the value of the account balance be for both options after 13 days?

|  |  |
| --- | --- |
| Option 1: | Option 2: |
|  |  |

1. Describe the steps or process that you followed in order to answer #4 for each option.

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| --- | --- |
| Option 1: | Option 2: |
|  |  |

1. Can you condense your work from #4 into one expression for each option?

|  |  |
| --- | --- |
| Option 1: | Option 2: |
|  |  |

1. Write an equation for the balance in dollars, *B*, as a function of the number of days, *t,* for both options*.*

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| --- | --- |
| Option 1: | Option 2: |

1. What will the value of the account balance be after 30 days for both options?

|  |  |
| --- | --- |
| Option 1: | Option 2: |

1. Describe at least three ways in which the growth in option 2 differs from the growth in option 1.

**Linear and Exponential Equations**

Linear:

* For a ONE unit increase in the input, a constant number is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the output.
* The general form of a linear equation is:

Exponential:

* For a ONE unit increase in the input, a constant number is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the output.
* The general form of an exponential equation is:
1. Determine if the function from the table is linear, exponential, or neither.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **t** | **F(t)** | **G(t)** | **H(t)** | **J(t)** | **K(t)** | **L(t)** | **M(t)** |
| 0 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 1 | 30 | 15 | 12.5 | 11 | 15 | 5 | 10 |
| 2 | 90 | 20 | 15 | 14 | 22.5 | 2.5 | 10 |
| 3 | 270 | 25 | 17.5 | 19 | 33.75 | 1.25 | 10 |

* F(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* G(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* H(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* J(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* K(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* L(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
* M(t) is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** because for a one unit increase in t, the function is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** by a value of **\_\_\_\_\_.**
1. Write the equation for all linear and exponential functions from #10.
2. Use the following functions to answer the questions below:

|  |  |  |
| --- | --- | --- |
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* 1. Which of the above functions are linear?
	2. For those functions listed in **part a**, identify the slope and vertical intercept.
	3. Which of the above functions are exponential?
	4. For those functions listed in **part c**, identify the factor and vertical intercept.
	5. As *t* increases, which function, *B(t)* or *C(t)*, do you expect to also increase? Explain.
1. Using your calculator, evaluate the functions below for the given values of *t.*

|  |  |  |
| --- | --- | --- |
| ***t*** |  |  |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

1. Using your graphing calculator, graph B(t) and C(t). Sketch a graph of the functions below.

|  |  |
| --- | --- |
| **B(t)** | **C(t)** |
|  |  |

1. Circle the word that makes the following conclusions true.
	1. Conclusion: When the value of the factor is greater than 1 ($)$, the exponential function is (growing / decaying).
	2. Conclusion: When the value of the factor is between 0 and 1 ($)$, the exponential function is (growing / decaying).