Show Me the Money: Investments and Earning Analysis

**Purpose:** To determine investigate the impact of changing values of initial investment, and length of investment on money earned.

**Outline:** For Part A you will determine the quick growth of an exponential equation when the base value is large. For Parts B and C you will investigate the effect of investing at a certain percentage for periods of time.

**Content Objectives:** Identify relationships, tabulating values, exponential equation, interest, earning analysis.

**Instructions:** Go through the following exercises, and answer the questions given. You must show all work, and provide a cover page (date, project title, names)

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**Part A:**

*You are given a choice. After one month (31 days) you can have either $1 million, or you can start with $0.01 on Day 0 and double your money every day for those 31 days.*

1. Make a table of values similar to below up to 31 days.

<table>
<thead>
<tr>
<th>Day</th>
<th>Cents</th>
<th>Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>0.01</td>
</tr>
</tbody>
</table>

2. According to your table, how much money will you have after 31 days if you choose to “double your money”?
3. Which would you choose, and why?
4. According to your chart, between what two days do you “crack” a million dollars?
5. Graph the equation, with day along the horizontal and dollars along the vertical. On the same plot graph the horizontal line at $2,000,000.
6. Using your graph, between what days do you “crack” a million dollars?
7. Find the exponential equation that represents this word problem.

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**Part B:**

*When investing, you discover you can at most earn 6% per year. You are now 35, and want to retire with $1 million at age 65.*

1. You have an initial investment of $20,000. You make no additional deposits and withdraws. Make a table of values similar to below up to year 30 (age 65).

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>35</td>
<td>20,000.00</td>
</tr>
<tr>
<td>1</td>
<td>36</td>
<td>21,200.00</td>
</tr>
</tbody>
</table>

2. According to your table, how much money will you have at age 65?
3. Well, obviously you are going to have to deposit some money regularly to have that $1 million. Make another table of values, and add in a yearly deposit amount, $A$. Find the value of $A$ you will need to invest (rounded to the nearest $100) to have $1 million by age 65.

4. What is the total amount you are investing in addition to the initial investment of $20,000 over the 30 year period?

Part C:

_This is why “they” say to start investing early. Again, you discover you can at most earn 6% per year. You are now 25, and want to retire with $1 million at age 65._

1. You have an initial investment of $20,000. You make no additional deposits and withdraws. Make a table of values similar to below up to year 40 (age 65).

<table>
<thead>
<tr>
<th>Year</th>
<th>Age</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>35</td>
<td>20,000.00</td>
</tr>
<tr>
<td>1</td>
<td>36</td>
<td>21,200.00</td>
</tr>
</tbody>
</table>

2. According to your table, how much money will you have at age 65?
3. How much more do you have after 40 years in comparing to Part B, when you only have 30 years to invest?
4. Again, you are going to have to deposit some money regularly to have that $1 million. Make another table of values, and add in a yearly deposit amount, $A$. Find the value of $A$ you will need to invest (rounded to the nearest $100) to have $1 million by age 65.

5. Compare the above value to the value found in Part B. How much less (as a percentage) is the yearly investment value when you invest for the extra 10 years?
6. What is the total amount you are investing in addition to the initial investment of $20,000 over the 30 year period?
7. Compare the above value to the value found in Part B. How much less (as a percentage) is the total investment value when you invest for the extra 10 years?