Student: ___________________________ Class: ___________________ Date:______________

Decision Making in Finance: Present Value of an Investment

VI.B Student Activity Sheet 4: Road to $1 Million

In Student Activity Sheet 3, you analyzed the future value of an investment over time. You began with $2,600 invested in a savings account for 30 years. After 30 years, your initial investment would be worth $9.062.70. In this activity, you will look at the same investment in a different way. The question relates to the **time value of money** (TVM). *What is that $9,062.70 future value worth at various times in the 30-year investment?*

The following table lists the principal required to obtain the same future value of $9,062.70 for various investment lengths. So, in the table, the 30-year investment is the one you have already explored. The other values in the table show how much principal you would need to invest and the length of time of the investment for the same yield. This can be thought of as the **present value** of the investment.

Years Till Maturity	Principal Required
0	$9,062.70
5	$7,359.95
10	$5,977.16
15	$4,854.16
20	$3,942.20
25	$3,201.50
30	$2,600.00

1. Create a scatterplot of the given data. Label the axes and scales, and provide a title.

2. Calculate the regression equation for the given data. Graph the regression equation on the scatterplot. Explain why the function model you used makes sense in the problem situation.

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3. Josephine is 20 years old and wants to save $1 million for retirement in 50 years. Assume she invests in a savings account that earns at least the current rate of inflation. Determine how much Josephine must save today to reach her retirement goal.

Recall the future-value formula $FV = PV\left(1 + \frac{i}{n}\right)^{nt}$, using

- ***FV*** for future value
- ***t*** for time (years)
- ***i*** for interest rate (in decimal form)
- ***n*** for number of compound periods per year
- ***PV*** for the principal or present value

4. Suppose Josephine does not want to begin saving for her retirement immediately. Fill in the following table to show the amount of money that Josephine must invest to retire 50 years from now with $1,000,000 based on the number of years that she waits to start saving.

Years of Waiting to Save	Principal Required
0	
10	
20	
30	
40	
50	

5. **REFLECTION:** Suppose Josephine believes in spending now and saving later. How could you use the table from Question 4 to convince her otherwise?

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VI.B Student Activity Sheet 4: Road to $1 Million

6. Blaine wants to have $1,000 in 10 years. The following are the choices in which he can invest:

- a savings account earning 3% compounded quarterly,
- a checking account earning 1% compounded monthly, or
- a money market account earning 4.5% compounded semiannually.

Blaine plans on making no withdrawals or deposits for 10 years.

Rewrite the formula from Question 3 for present value and allow for any compounding period (***n***).

7. Rewrite the present-value formulas for each account that Blaine is considering. Make sure that the formulas include compounding periods other than annual and incorporate the different rates.

8. Graph the present-value formula for each account. Label the axes, scales, and curves, and provide titles.

Which factor has the most significant effect on the curve: the interest rate or compounding periods? Why?

9. **REFLECTION:** In which account should Blaine invest? Why?

10. **EXTENSION:** Locate an article about what investments financial experts are currently recommending for clients at various times of life (young, middle age, etc.). Prepare a short presentation to share with the class regarding your findings.