

## Inquiry Question

*Can I use my knowledge of compound interest to save enough money to purchase a car?*

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_



You have been diligently saving money for the past few years and have accumulated \$1000 in cash. The goal has been to save up enough money to buy a used car. You determine that it would be better to invest the money in a bank and collect interest until you are ready to make your big purchase. After speaking with a bank representative, you are given several different savings options. You will use your ability to work with financial functions to determine the best savings plan.

### General Instructions

Solve each problem in order and save your work along the way, as you will create a professional report at the conclusion of the project.

#### 1. First problem: **Impact of Interest Rates**

Many banks try to attract customers by providing the best interest rates possible. In this exercise, you will analyze several different interest rates to determine the true impact of a higher rate.

$P$ (principal)	$r$ (annual rate)	How often compounded	$m$ (number of compounding periods)	$t$ (number of years)	$A$ (amount)
\$1000	1%	Monthly	12	1 year	
\$1000	2%	Monthly	12	1 year	
\$1000	5%	Monthly	12	1 year	
\$1000	8%	Monthly	12	1 year	

## 2. Second Problem: Compounding Periods

Along with changing interest rates, various banks use different compounding periods. Some of them compound monthly (12 times a year), others quarterly (4 times a year), and some compounded daily (365 times a year). In this exercise, you will analyze these three different types of compounding periods to determine their effect on the amount of interest..

$P$ (principal)	$r$ (annual rate)	How often compounded	$m$ (number of compounding periods)	$t$ (number of years)	$A$ (amount)
\$1000	5%	Annually	1	1 year	
\$1000	5%	Quarterly	4	1 year	
\$1000	5%	Monthly	12	1 year	
\$1000	5%	Daily	365	1 year	

Based on the data that you have gathered, write a statement about the effect of higher interest rates and the effect of the number of compounding periods. Do you think that the interest rate or the compounding period has the greatest impact?

## 3. Third Problem: Length of Contract

If you obtain a Certificate of Deposit (CD) from a bank, one of the options is length of contract meaning the amount of time you guarantee that your money will stay in the account. Typically, longer lengths of contracts yield greater interest rates. However, you do not have access to your money for the specified number of years.

$P$ (principal)	$r$ (annual rate)	How often compounded	$m$ (number of compounding periods)	$t$ (number of years)	$A$ (amount)
\$1000	2%	Monthly	12	3 years	
\$1000	3%	Monthly	12	5 years	

Based on your data, do you believe that it is worthwhile to have your money “locked up” for an additional two years in order to receive the higher interest rate? Explain your thinking.

#### 4. Fourth Problem: **Purchasing a Car**

Now you have to decide how to save enough money to purchase a used car in three years. You have the \$1000 that you saved up and you plan to continue working. According to your estimates, you can save an additional \$60 per month to put towards the car purchase. After conducting some research at the banks, you have decided on two options (see below). You need to figure out which option will yield the most money after the three years.

**Option #1-CD for 3 years**  
**Interest rate of 3% compounded monthly.**  
**No money can be added to the CD.**  
**However you can save your money on the side.**

**Option #2-CD for 1 year**  
**Interest rate of 2% compounded quarterly.**  
**You can add your earned money to the investment at the end of each year.**  
**You will renew it each year for 3 years.**

Explain what you have learned about investing in terms of rates, compounding, and length of contract.

Present your solution in a way that makes it easy for someone investing money to understand your results. Be sure to clearly explain your reasoning at each stage and conclude with recommendations about interest rates, compounding periods, and length of contract. You should look through bank advertisements to see what the current interest rates are for each type of CD and savings account. Explain how your results can transfer to these different situations.

Adapted from [http://www.montereyinstitute.org/courses/DevelopmentalMath/U18PROJECT\\_RESOURCE/index.html](http://www.montereyinstitute.org/courses/DevelopmentalMath/U18PROJECT_RESOURCE/index.html)