Lesson Plan
Financial Algebra
Chapter 3 Banking Services
Unit 3-7 Future Value of Periodic Deposit Investment
Patrick Lamb

Title: How **Does** Your Money "Grow" When Deposited In A Bank?

Students, having created groups of three, will be given various principal dollar amounts with varying interest rates that will be deposited at regular intervals for a certain period of time. They will then determine how much money they will have after this given period of time. They will have to represent their findings on poster paper and explain what they discovered to their colleagues.

o Lesson Objective: **SWBAT**: Calculate the future value of a periodic investment

o Prerequisite Skills: converting percentage to decimal, exponential valuation, principal, investment, computing compound interest

o Vocabulary: periodic investment, future value of a single deposit investment, biweekly, future value of a periodic deposit investment

o State Standards addressed: Al.7.B
   Analyze functions using different representations
   Use the property of exponents to interpret expressions for exponential functions (identifying rate of change and classifying as representing exponential growth or decay).

Having completed their work they will then be taught the formula for future value of periodic deposit investment and will check their answers with the answers they will obtain using the formula.

$$B = \frac{P((1 + r/n)^{nt} - 1)}{r/n}$$

where B = balance at end of investment period
       p = periodic deposit amount
       r = annual interest rate expressed as a decimal
       n = number of times interest is compounded annually
       t = length of investment in years

Handouts on the continuing page

Handouts you will give to the various teams to work out without a formula

Team A
Invest $200.00 per month for three years at 4% interest
Invest $180.00 per month for three years at 5% interest
Invest $250.00 per month for three years at 3% interest

Before you begin, talk it over and estimate which investment would have the greatest return.

Team B
Invest $200.00 per month for three years at 8% interest
Invest $180.00 per month for three years at 5% interest
Invest $250.00 per month for three years at 7% interest

Before you begin, talk it over and estimate which investment would have the greatest return.

Team C
Invest $200.00 per month for three years at 4% interest
Invest $180.00 per month for three years at 5% interest
Invest $250.00 per month for three years at 3% interest

Before you begin, talk it over and estimate which investment would have the greatest return.

Team D
Invest $200.00 per month for three years at 4% interest
Invest $180.00 per month for three years at 5% interest
Invest $250.00 per month for three years at 3% interest

Before you begin, talk it over and estimate which investment would have the greatest return.

Team E
Invest $200.00 per month for three years at 4% interest
Invest $180.00 per month for three years at 5% interest
Invest $250.00 per month for three years at 3% interest

Before you begin, talk it over and estimate which investment would have the greatest return.

Lab Framework

Text: Financial Algebra
Unit number and title:
   Short Description: Unit 3-7 Future Value of Investments
Developed by: Patrick Lamb
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Date: June 27, 2012

Lab Title

Comparing Investment Rates and the Best Option for a Return on Investment

Lab Plan

TEACHER: Teacher Prep/Lesson Plan
- o **Lab Objective**
  To determine which investment firm would accrue the highest return on investments

- o **Statement of prerequisite skills needed** (i.e., vocabulary, understanding compound interest, formulas)
  Understand the formulas $B = P(1 + r/n)^{nt}$ and $B = (P((1 + r/n)^{nt} - 1))/(r/n)$ and how to implement these formulas using the TI-84 Plus calculators.

- o **Vocabulary**
  Interest
  Interest rate
  Principal
  Compound interest
  Annual, quarterly, monthly compounding
  Bar charts
  Future value of a single deposit investment
  Future value of a periodic deposit investment

- o **Materials List**
  TI-83+ or TI-84+ graphing calculator

- o **State Standards addressed**
  Al.7.B
  Analyze functions using different representations
  Use the property of exponents to interpret expressions for exponential functions (identifying rate of change and classifying as representing exponential growth or decay).

- o **Leadership Skills**
  Teamwork and presentation skills

- o **Teacher Assessment of student learning** (scoring guide, rubric)
  Rubric will be created to score the graph information, the calculations, and the presentations

The teacher will also observe your work habits

STUDENT INSTRUCTIONS

Statement of problem addressed by lab
You are a smart young person at age 21 who has already completed the carpentry apprenticeship program. The economy is picking up and you have had strong advice to invest part of your income and to always be faithful to that investing. You consulted with those in the know and you begin your long range plans. The year is 1969 and these were the options that you pursued over the 30-year time span.

Investment Investigation

Years	1969-1975	1975-1979	1979-1981	1981-1985	1985-1994	1994-1999

Various monthly investments in parentheses

Rates	Interest		Interest		Interest		Interest		Interest		Interest	
Bank A Quarterly	($100)	3.65	($200)	8.15	($300)	15.00	($350)	9.00	($400)	7.25	($500)	5.25
Bank B Monthly	($100)	3.55	($200)	8.10	($300)	16.20	($350)	7.50	($400)	7.95	($500)	4.15
Broker's Yearly	($100)	4.10	($200)	8.20	($300)	17.00	($350)	8.20	($400)	6.20	($500)	3.45
Gov't Bonds Monthly	($100)	3.20	($200)	6.50	($300)	10.00	($350)	10.00	($400)	8.15	($500)	5.15

$$B = \frac{P((1 + r/n)^{nt} - 1)}{r/n} \qquad B = P(1 + r/n)^{nt}$$

This will require that you use both the single deposit investment formula and the periodic investment formula. This will require meticulous work on your part since you will combining the two formulas after you have completed column. The following columns will require that you figure the single deposit investment formula for the figure from column one and the periodic investment formula for the new investment time period for the changed monthly investment.

1. You are working in groups and, therefore, should share the responsibilities in figuring out the new balances over the years.
2. You will cross check your work with others in your group for discrepancies and correct these errors.
3. You will then determine which was the better investment if the investor stayed with one option.

https://wa-appliedmath.org/

Group instructions and roles

1. As a group, determine what each person's job is and what they should be doing when they have completed their initial task.
2. Assign other tasks as necessary always working together.

Outcome instructions

You will create four bar charts, one for each investment firm indicating the return on investment during each time period.
Using the bar charts you will demonstrate how you could have received the highest rate on return by switching to another investment firm each time you increased your monthly investment.

Assessment instructions

Turn in your bar graphs, all your rate calculations, and your reasoning as to why you chose the investment firms that you did.

Name:_____Per:_____Date:_____
Quiz 3-7 Future Value of Investments B

You go to two different banks to determine which bank would be best for you to invest $10,000.00. Bank A offers a 5% yield compounded yearly. Bank B offers a 4.9% yield compounded weekly. Which bank should you invest your money and why? Show all work including the formulas you used as well as the formulas with all pertinent data inserted.

Bonus: Is there a time when one investment is better than the other? Can you plot the curve to determine the time if and when the two investments are the same?

Name:_____Per:_____Date:_____

Quiz 3-7 Future Value of Investments A

You decide to start saving for a car because you want to pay cash and not pay the bank interest on an auto loan. You are only 18 (and apparently smarter than your friends) and have started a carpentry apprenticeship to which you can walk. Therefore, you are able to save (invest) $250.00 each month into an account that yields 4.25% interest, compounded quarterly. How much money will you have accrued in four years? Explain in your own words why you would go this route instead of borrowing $12,000.00 from the bank at 5% interest to be paid in 60 monthly installments. Show all work.