



### About the Lesson

In this activity, students explore interest related to consumer loans, credit, and savings accounts. As a result, students will:

- Use technology to calculate payments on loans.
- Become astute in the decision making of loans.

### Vocabulary

- nominal interest rate
- effective (annual) interest rate
- compounded interest

### Teacher Preparation and Notes

- This is a great opportunity to speak to students about financial literacy. Take the time to begin a class discussion about investments, setting aside money to grow for retirement, etc. These are concepts that students need to hear early in their life.

### Activity Materials

- Compatible TI Technologies:

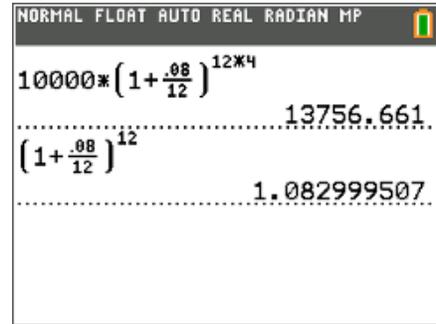
TI-84 Plus\*

TI-84 Plus Silver Edition\*

 TI-84 Plus C Silver Edition

 TI-84 Plus CE

\* with the latest operating system (2.55MP) featuring MathPrint™ functionality.



### Tech Tips:

- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

### Lesson Files:

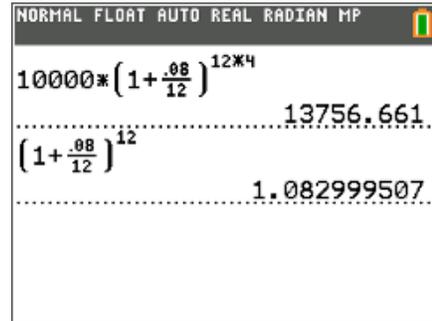
- Very\_Interesting\_Student.pdf
- Very\_Interesting\_Student.doc



## Problem 1 – Introducing Compounding

In this problem, students first explore the issue of compounding and the difference between nominal and effective percentage rates.

Ask students about the meaning of the word nominal. Students who have had Latin or have extensive vocabularies may recognize that this term comes from the Latin word for name. The term nominal means “in name only” in this context because a nominal interest rate isn’t really “honest” when compounding any number of times other than once per year.



1. Define or explain the following terms.

a. Compounding Interest

**Answer:** Interest is added periodically (daily, monthly, quarterly, annually, etc.) into the original account; future interest calculations include this added amount. This is a benefit to those saving money in bank accounts as the percentage of interest earned is actually slightly higher than the annual nominal percentage rate. This is detrimental to those with credit card and loan debt.

b. Nominal Rate

**Answer:** Interest rate stated without the effect of compounding being taken into account.

c. Effective (Annual) Rate

**Answer:** Interest rate with compounding taken into account. The effective rate is higher than the nominal rate in cases other than annual compounding of interest.

2. Using the formula from the first page, answer the following question.

As a college freshman, a student takes out a \$10,000 school loan at 8% interest compounded monthly. This loan is unsecured (interest accumulates while in school, but payment is not required until after graduation). What will the value be of this loan after 4 years?

**Answer:** \$13,756.66

3. What is the effective annual interest rate for this loan?

**Answer:** 8.30%

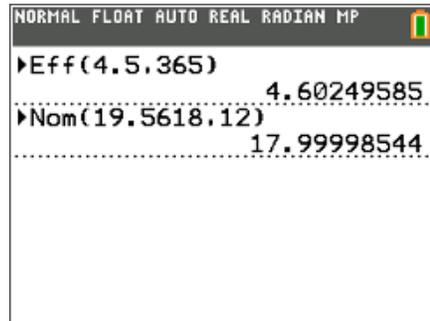


If time allows, take time to discuss the student loan issue with students. Most of them will soon be taking out loans for college and lack the background knowledge of how interest rates and compounding work. There is also a significant issue regarding understanding the loan type. Secured loans do not accrue interest while the student is enrolled in college full time, while unsecured loans accrue interest during college and are usually at a higher rate. If extra time allows, ask students to determine the difference between costs of college education to the student for similar loans of the two types. Students could research these loan types and current rates to make some cost projections.

**Problem 2 – Nominal and Effective Rates**

Students learn to use tools available with the Finance Application to convert nominal interest rates to effective (annual) rates and vice versa. A few basic questions are asked to provide the student practice in applying these tools to financial problems.

Consider having each student find an interest rate for a loan or savings account. If the rate is nominal, have the student convert it to effective and vice versa.



- 4. Use the finance application to find the effective rate if the nominal rate for a savings account is 4.5% compounded daily.

**Answer:** 4.6025%

- 5. Use the finance application to find the nominal rate for a credit card account if the effective rate is 19.5618% compounded monthly.

**Answer:** 18%

**Problem 3 – Finance Solver**

Students explore the use of the finance solver for determining the monthly payment for purchasing a convertible.

As students follow the steps in using the finance solver, instruct them to leave the payment (**PMT**) space empty. If a number is in that field, it must be deleted. To help students through this, the key details regarding the values to be placed in the values to be placed in the solver are provided in the worksheet. Once all necessary values are entered, students should use the arrow keys to move to tab to the payment (**PMT**) field and press `[alpha][enter]`. The **PMT** field will populate with the monthly payment amount.



Ask students why it might make sense for the amount that appears to appear as a negative quantity.

When would a positive quantity appear in this window?

- Let's say that you want to buy a convertible that costs \$32,035. You are offered a 60-month loan at 7.11%, compounded annually. What will the monthly payment amount be?

**Answer:** \$632.64

Sometimes, sales people ask consumers what they want their monthly payments to be rather than what the consumer is willing to pay for an item. Ask students how purchasing items in this way often puts the consumer at a disadvantage. What does the consumer need to understand in such situations?

