Financial Algebra Unit 3-6 Lesson Plan

Text: *Financial Algebra* **by Robert Gerver and Richard Sgroi**
Unit number and title: Unit 3-6 Continuous Compounding
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Short Description:
Compounding interest daily makes money grow more quickly than simple interest. This unit covers the functions that are used to increase a value toward infinity, which is the process of continuous compounding.

LESSON PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Essential Question**
  How can interest be compounded continuously?

- **Lesson Objectives**
  The student can:
     1. Compute interest on an account that is continuously compounded.

- **Statement of pre-requisite skills needed**
  Skills taught in:
     Unit 3-3 Savings Accounts
     Unit 3-4 Explore Compound Interest
     Unit 3-5 Compound Interest Formula

- **New Vocabulary:**

Limit	A concept in calculus which means an unreachable value.
Finite	Something that has an end and can be represented by a real number.
Infinite	Something without end, that cannot be represented by a real number.
Continuous Compounding	A method of calculating interest so that is is compounded on an infinite number of times each year rather than being compounded every minute, or even microsecond.
Exponential base *(e)*	The exponential base *e* is an irrational number which is a non-terminating, non-repeating decimal with an approximate value of $e \approx 2,718281828\ldots$
Continuous Compound Interest Formula	A formula for calculating continuous compound interest; $B = pe^{rt}$, where *B* is the ending balance, *p* is the principal, *e* is the exponential base, *r* is the interest rate, and *t* is the number of years the principal earns interest.

- **State Standards addressed:**
     Math: 1.1.4; 1.2; 2.2.2; 3.3.2

Algebra 1: A1.1.A; A1.1.D; A1.1.E; A1.2.F; A1.3.A; A1.3.B; A1.5.A; A1.5.B;
      A1.5.C; A1.5.D; A1.7.C
Algebra 2: A2.1.A; A2.1.C; A2.2.A; A2.5.A; A2.8.A; A2.8.B; A2.8.C; A2.8.D;
      A2.8.E; A2.8.F
Reading: 1.2.2; 2.1.4; 2.1.5; 2.3.4
Common Core Standards: Number and Quantity – The Real Number System N-
      RN; Algebra – Seeing Structure in Expressions A-SSE

- **Set-up information (Remind students to follow these basic rules.)**
- Be Prepared to work
- No Teasing
- Proper Computer Usage

- **Teacher Assessment of student learning (scoring guide, rubric)**
  Informal Assessments:

  1. Walk around
  2. Thumbs up or down
  3. Homework

  Formal Assessments:

  1. End of Unit test

- **Summary of learning**
  1. Introduce the vocabulary to the students.
     a. Give the vocabulary list without definitions
     b. Give the definitions to the vocabulary list
     c. Discussion about each term of the vocabulary
  2. Ask:
     a. How can interest be compounded continuously?
     b. Can there be compounding every half-second?
  3. Work on Examples to Strengthen skills
     a. Example 1, page 151
     b. Example 2, page 151
     c. Example 3, page 152
     d. Example 4, page 152
     e. Example 5, page 153
     f. Example 6, page 153
  4. Check for Understanding
     a. Check Your Understanding 1, page 151
     b. Check Your Understanding 2, page 151
     c. Check Your Understanding 3, page 152
     d. Check Your Understanding 4, page 152
     e. Check your Understanding 5, page 153
     f. Check your Understanding 6, page 153
  5. Assess with Applications

REACHING ALL LEARNERS – Differentiated Instruction for students with

Developing	On-level	Advanced

Knowledge	Knowledge	Knowledge
☐ Needs help working Example 1, page 151 (Group work)	☐ Able to work Example 1, page 151 without assistance	☐ Able to create additional problems like Example 1, page 151
☐ Needs help working Example 2, page 151 (Group work)	☐ Able to work Example 2, page 151 without assistance	☐ Able to create additional problems like Example 2, page 151
☐ Needs help working Example 3, page 152 (Group work)	☐ Able to work Example 3, page 152 without assistance	☐ Able to create additional problems like Example 3, page 152
☐ Needs help working Example 4, page 152 (Group work)	☐ Able to work Example 4, page 152 without assistance	☐ Able to create additional problems like Example 4, page 152
☐ Needs help working Example 5, page 153 (Group work)	☐ Able to work Example 5, page 153 without assistance	☐ Able to create additional problems like Example 4, page 153
☐ Needs help working Example 6, page 153 (Group work)	☐ Able to work Example 6, page 153 without assistance	☐ Able to create additional problems like Example 4, page 153
☐	☐ Able to work the Check Your Understanding problems, pages 151-153	☐ Able to work and explain the Check Your Understanding problems, pages 151-153
☐ Exit Slip consisting of answering the question: How does today's class relate to me?	☐ Exit Slip consisting of answering the question: How does today's class relate to me?	☐ Exit Slip consisting of answering the question: How does today's class relate to me?

- **Optional activities**
  Hands-on Labs

- **Career Applications**
  Banker
  Venture Capitalist
  Economist
  Builder
  Investor
  Lawyer
  Doctor
  Teacher
  Laborer

- **Evaluation of Lesson Plan**

  What went well?

  What did not go as well as planned?

  What would I keep and what would I toss? Why?

How well did the students master the skills? Will we need to review this in order for them to remember the information long-term?

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Unit 3-6 Continuous Compounding Quiz Answer Key

Solution to #1.

Use the Continuous Compound Interest Formula. $$B = pe^{rt}$$

Substitute $$B = \$500(2.718281828)^{.0275(4)}$$

Calculate $\$2055.76$

Definitions:

Finite: Something that has an end and can be represented by a real number

Continuous Compounding: A method of calculating interest so that it is compounded an infinite number of times each year rather than being compounded every minute, or every microsecond

Exponential Base: The exponential base e is an irrational number which is a non-terminating, non-repeating decimal with an approximate value of $e \approx 2.718281828$

Two Tools: Calculator, Computer

Unit 3-6 Continuous Compounding Quiz

Answer the following question on this paper. Show your work or explain your key strokes on the calculator as this will also be a part of the grade.

Formulas / Data:
Exponential base (e) ≈ 2.718281828

Continuous Compound Interest Formula: $B = pe^{rt}$
          Where B = Ending Balance
          p = principal
          e = exponential base
          r = interest rate expressed as a decimal
          t = number of years

1. You deposit $500 at 2.75% interest, compounded continuously, what would be your ending balance to the nearest cent after four years?

Define the following terms:

2. Finite

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3. Continuous Compounding

4. Exponential Base

5. Name at least two tools that can be used to help with Continuous Compounding calculations?