WAMC Lesson Plan

Name(s): Chris Shepard
Lesson Title: Compounding Interest
Date: June 25, 2014
Text: Financial Algebra   Lesson Length:45 min

Domain:

> Domain:
> - A-SSE   Seeing structure in expressions
> - N-RN   The real number system
> - A-CED   Creating equations
> - F-IF   Interpreting Functions

Big Idea (Cluster):

- Interpret functions that arise in applications in terms of the context
- Create equations that describe numbers or relationships
- Interpret the structure of expressions

Common Core State Standards:
- Extend the properties of exponents to rational numbers
- Interpret the structure of expressions
- Write expressions in equivalent forms to solve problems
- Create equations that describe numbers or relationships
- Interpret functions that arise in applications in terms of the context
- Analyze functions using different representations

Mathematical Practice(s): Algegbra in relation the compounding interest formua

Content Objectives:	Language Objectives:
1. Define saving 2. Identify reasons why people save. 3. Compare simple and compound interest. 4. Apply the formula for calculating simple interest. 5. Apply the Rule of 72 to determine how much time it takes for a given amount of savings to double.	- Make sure students with poor vocabulary understand the terms. - Record vocabulary with google voice for students to listen and respond to. - Describe, analyze, interpret are important words for ESL students to know.

Vocabulary:	Connections Prior to Learning
Compound interest Consumption Income Rule of 72 Saving Simple interest Compound Interest formula Annual percentage rate (APR)	- Writing agebraiac expressions - Solving for a given variable

Annual percentage yield (APY)	
Questions to Develop Mathematical Thinking: To make a million, start with $900,000. How might these words apply to what you have learned in this class?	Common Misconceptions: THERE IS ONLY ONE TYPE OF GROWTH

Assessment (Formative and Summative): formative

- Compounding interest work sheet attached

Materials:

- Calculator for each student
- Overhead projector and pens
- Discussion sheet 1,2 and 3

Instruction Plan:

Launch: Tell the students that this lesson will focus on saving: what it is, why people save, and how interest is calculated on money saved. Many financial experts think Americans save too little. The U.S. Bureau of Labor Statistics reports that we spend (consume), on average, 97 percent of our disposable income (after-tax income). In other words, we save only three percent of our disposable income
Explore: Show Discussion 1 Explain that disposable income equals consumption plus savings. Point out that for younger students disposable income might include money from an allowance, money received as a gift or money earned for doing jobs at home or in the neighborhood. Explain that consumption is spending on goods and services. Define saving by explaining that saving equals disposable income minus consumption Show Discussion 2 Explain the Simple Interest Adds column and the Compound Interest Adds column.
When I observe students: - Look for engagement

- Try to incorporate the whole class in the discussion.

Questions to Develop Mathematical Thinking as you observe:
- How long will it take to double the money in your pocket at 2% interest compounded daily?

Answers: answers will vary

Summarize:

Ask:

What is saving?
Saving is disposable income minus consumption.
Remind the students that there are several reasons for saving, such as saving to make a large purchase, saving for emergencies or saving to pay for a college education. These reasons encourage many people to get an early start on saving.

2. Pose a practice problem for use with the simple-interest formula. Initial savings are $1,000; the interest rate is 5 percent. If you keep the initial savings for five years, how much simple interest will be paid?
$1,000 x 5% = $50 per y
ear; $50 x 5 years = $250

3.Pose a practice problem for use with the Rule of 72.
Initial savings are $500. At an interest rate of 3 percent, how long would it take to double your initial savings?
72 divided by 3 = 24 years

Career Application(s):

- **Loan officer**: Usually works at a bank dealing with customers who are interested in borrowing money for cars, homes, home improvements, etc. Needs to know how to calculate interest in order to inform the customer how much money will need to be paid back to the bank each month to satisfy the loan.
- **Credit card company employee**: Needs to know how to calculate interest so when customers buy something with the credit card, they can charge the customer that amount above the cost of the purchase. Most credit card companies have computer programs that will calculate this for them, but knowledge of this calculation helps when speaking to customers.
- **Car salesman**: Needs to know how to calculate interest in case a customer asks for clarification on his or her bills. Even though most computer programmers calculate this automatically, the salesman needs to know how this amount is calculated so that he can answer any questions the customer will have.
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21st Century Skills and Interdisciplinary Themes:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)
☐ Global Awareness   ☐ Financial/Economic/Business/Entrepreneurial Literacy   ☐ Civic Literacy
☐ Health/Safety Literacy   ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
☐ Think Creatively
☐ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☐ Reason Effectively
☐ Use Systems Thinking
☐ Make Judgments and Decisions
☐ Solve Problems
Communication and Collaboration
☐ Communicate Clearly
☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
☐ Access and Evaluate Information
☐ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
☐ Adapt to Change
☐ Be Flexible
Initiative and Self-Direction
☐ Manage Goals and Time
☐ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
☐ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
☐ Produce Results
Leadership and Responsibility
☐ Guide and Lead Others
☐ Be Responsible to Others

Disposable income = consumption + saving
Saving = disposable income – consumption

Interest Earned on an Initial $100 Saved at 8% Interest Rate

Year	Simple Interest Adds	Total Saving Using Simple Interest	Compound Interest Adds	Total Saving Using Compound Interest
1	$8.00	$108.00	$8.00	$108.00
2	8.00	116.00	9.00	117.00
3	8.00	124.00	9.00	126.00
4	8.00	132.00	10.00	136.00
5	8.00	140.00	11.00	147.00
6	8.00	148.00	12.00	159.00
7	8.00	156.00	12.00	171.00
8	8.00	164.00	14.00	185.00
9	8.00	172.00	15.00	200.00

Note: All numbers are rounded using the previous number as the base.

THE RULE OF 72

The Rule of 72 is a simple way to illustrate the magic of compound interest.

72 divided by the Rate (of interest being paid on savings) = the number of years it will take for savings to double when interest is allowed to compound.

The Rule of 72 illustrates how compound interest doubles savings more quickly than simple interest.

Example: Compound Interest at 8% for 9 years

72 divided by 8% = 9 years

At the end of nine years, the initial savings of $100 have increased to

$200 — double the amount of initial savings.

Quiz Compounding Interest

Multiple-Choice Questions

1. Which of the following is the best definition of saving?

    a. The discount received from buying something on sale
    b. Disposable income minus consumption spending
    c. Putting your money under your mattress
    d. The interest paid on a savings account

2. Which of the following is a reason to save?

    a. Your parents place a dollar into your savings for every
       dollar you save.
    b. The penalty for taking your savings out of the bank
    c. Not being able to buy something right now
    d. Having to go to the bank before making a purchase

3. If you have $50 in savings for one year at an interest rate
   of 6 percent, how much interest will you earn at the end
   of the year?

    a. $5
    b. $4
    c. $3
    d. $2

4. If you divide the interest rate paid on savings into 72,
   the result tells you how many years it will take for your
   savings to double if you receive compound interest. At a
   compound interest rate of 10 percent, how many years
   will it take to double your money?

    a. 2.7 years
    b. 7.2 years
    c. 7.0 years
    d. 10.0 years

Essay Question
1.Explain in your own words what this statement means:
"Pay yourself first."

Answer Key

1. b. Disposable income minus consumption spending
2. a. Your parents place a dollar into your savings for every dollar you save.
3. c. $3
4. b. 7.2 years
5. Paying yourself first means making saving a priority over spending. The decision on how much to save is made before the decision on how much to spend on consumption. Paying yourself first allows a person to more easily achieve goals for saving.