

## Compound Interest: Your Best Friend or Worst Enemy

### LESSON DESCRIPTION (Background for the Instructor)

In this lesson, students will learn about compound interest as it applies to credit, debt, and saving. They will learn what compound interest is and how it can work for someone (by growing savings deposits over time) or against them (by increasing the amount owed on unpaid debt). Students will also learn ways to earn the best interest rates on their savings and how time magnifies the benefits or costs of compound interest.

The lesson includes five activities that instructors can select from. In these activities, students will:

- ◆ View and debrief the YouTube videos *Compound Interest Explained* and *Cut Credit Card Interest Costs by Exceeding Minimum Payments*
- ◆ Use an online or cardboard calculator to create a table with data about credit card minimum payments
- ◆ Use an online or cardboard calculator to create a table with data about the growth of savings over time
- ◆ Write a *Smart Summary Soundbite* of no more than 12 words to summarize a key lesson take-away
- ◆ Conduct a *Web Quest* by searching online for “sources of highest interest rate savings accounts”

The lesson also contains 10 assessment questions (5 multiple choice and 5 True-False), learning extensions (i.e., suggested learning activities beyond the scope of the lesson plan), and references and resources.

### INTRODUCTION (Background for the Instructor)

When people *save money*, they *earn interest* and compound interest is their *best friend*. Interest is money that savers are paid by banks or credit unions to “rent” their deposited funds. Interest is like getting “free money” and interest rates vary by financial institution. Compound interest is interest earned on the original amount that people save/invest (called their principal), plus previously credited interest. As the American Savings Education Council notes in one of its publications, “this phenomenon goes on and on—packing your savings with power and moving you steadily toward your goals. Over time, the results can be dramatic.”

Compound interest works best over long time periods, especially in tax-deferred, growth investments, such as stock mutual funds in an individual retirement account (IRA) or 401(k). The longer money is invested, the more time compound interest has to work its magic and the less people need to save on their own. In tax-deferred accounts, investment earnings are not taxed until withdrawal, usually at retirement.

Compound interest has been called “the eighth wonder of the world” because of its tremendous ability to grow money over time. Much like the progression of questions, from \$100 to \$1 million, on the original television game show *Who Wants to Be a Millionaire?*, money will double slowly in the early rounds (decades) of investing until it grows to a larger sum. Later, money will grow faster because higher dollar amounts will be doubling after someone has been in the (investing) “game” for a while. Many people don’t realize the awesome power of compound interest and underestimate their ability to become millionaires during their working years without winning a state lottery or receiving some other type of windfall.

Unfortunately, compound interest can hurt people financially, as well as help them. When people *have outstanding debt*, they *pay interest*, instead of earning it, and the interest gets added to the amount that they owe. In this scenario, compound interest is their *worst enemy*. The lower the minimum payment on a credit card, calculated as a percentage of the outstanding balance, the higher the total cost of interest. For example, repaying a \$5,000 balance on an 18% APR (annual percentage rate) credit card with a minimum payment of 3% of the outstanding balance would cost \$4,567 in interest and take 16 years. A 6% payment (double the minimum) would cost \$2,975 in interest and take only 7 years to repay, a big difference!

Of all the credit card traps that are out there, and there are quite a few (e.g., late fees, over-the-limit fees, annual fees, transaction fees, penalty APRs, etc.), minimum payments are the most dangerous and costly. Making minimum payments has been described as “treading water.” You are not in trouble with creditors, as long as bills are paid on time, but you are not getting very far in paying off outstanding debt. Minimum payments also provide a false sense of security. Credit card users think everything is “fine” with their credit as long as minimum payments are being made. In reality, though, they could be taking on more debt than they can afford. At some point, making even minimum payments can become difficult.

Ideally, borrowers should pay their credit card bills in full, and incur no interest cost. Unfortunately, not everyone is able to do this due to high household expenses or unforeseen emergencies. Depending upon the amount owed, revolving an outstanding balance on a credit card can cost hundreds, even thousands, of dollars in extra interest. However, just an extra \$1 a day (\$30 a month) of additional debt repayment can have beneficial effects by lowering the amount of interest paid and the time that it takes to repay it. Some people add more to their debt balance each month than they pay off and get to a point where their payments stretch out almost indefinitely. This situation is known as “perma debt” (i.e., permanent debt) and the best way to overcome it is paying off debt as quickly as possible with larger payments. Some people also attack their perma-debt problem by refinancing or consolidating debt to take advantage of lower interest rates.

## **OBJECTIVES**

Students will be able to:

- ◆ Define interest and compound interest.
- ◆ Describe how compound interest can be a person’s best friend or worst enemy.
- ◆ Calculate the benefits and cost of compound interest using an online or cardboard calculator.
- ◆ Search online to identify financial institutions that pay the highest interest rates on savings accounts.

## **NEW JERSEY PERSONAL FINANCIAL LITERACY STANDARD**

- ◆ Standard 9.1.12.B8: Describe and calculate interest and fees that are applied to various forms of spending, debt, and saving.

See <http://www.state.nj.us/education/aps/cccs/career/FLFAQ.htm#gradcredit> and <http://www.state.nj.us/education/cccs/2014/career/91.pdf> for information about Standard 9.1

## TIME REQUIRED

45 to 180 minutes (depending upon student progress and content depth and number of activities used)

## MATERIALS

- ◆ YouTube Video: *Compound Interest Explained*: <https://www.youtube.com/watch?v=wf91rEGw88Q>
- ◆ YouTube Video: *Cut Credit Card Interest Costs by Exceeding Minimum Payments*:  
<https://www.youtube.com/watch?v=veeCia8QeZs>
- ◆ Cardboard financial calculators (*Credit Card Smarts* and *Why Save for Retirement?*); these can be ordered from Advantage Publications: <http://www.advantagepublications.com/>.
- ◆ Minimum Payment Calculators: <http://www.bankrate.com/calculators/credit-cards/credit-card-minimum-payment.aspx> and <http://www.nationwide.com/credit-card-minimum-payment-calculator.jsp>
- ◆ Savings Calculators: <http://apps.finra.org/Calcs/1/Savings> and <http://www.bankrate.com/calculators/savings/compound-savings-calculator-tool.aspx>
- ◆ *Smart Savings Soundbite* handout
- ◆ *Web Quest* handout
- ◆ *Compound Interest Quiz* (ASSESSMENT)

*Teachers are encouraged to use as many of the student learning activities as time permits to provide a fuller understanding of compound interest. The activities can also be used for extra credit assignments, homework, or after-school activities.*

## PROCEDURE

1. As an introductory activity about interest and compound interest, ask students whether they would lend money to a friend or sibling and, if so, would they expect to be paid back more than they lent because their money was unavailable for a period of time?

*Answers will vary but the key point is that students realize that interest is a sum of money that is paid for the use of someone else's money. Financial institutions (banks and credit unions) always charge interest when they make loans. They also pay interest when depositors put their money in a savings account.*

Then ask students to explain what compound interest is. When people *save money*, compound interest is interest paid on an initial deposit (principal), plus all previously accumulated interest. When people *owe money* on credit cards, they pay interest on the interest included in their outstanding balance.

2. **Activity 1:** Show the video *Compound Interest Explained* and ask students to explain key take-aways: <https://www.youtube.com/watch?v=wf91rEGw88Q>

*Answers will vary and may include the math example shown in the video, the comparison between simple interest and compound interest, and the effect of compounding over time.*

3. Share the information in the *Introduction* pertaining to the definitions of principal, interest, and compound interest and how compound interest can be someone's best friend or worst enemy.

4. **Activity 2:** Show the video *Cut Credit Card Interest Costs by Exceeding Minimum Payments* and discuss key take-aways: <https://www.youtube.com/watch?v=veeCia8QeZs>

*Answers will vary and may include the comparison of debt payments made by the characters Tom and Sarah, the time and money saved by paying more than minimum, and the analogy of debt to digging oneself*

5. **Activity 3:** Divide the class in half. Ask the students in Group #1 to use the *Credit Card Smarts* cardboard calculator or an online minimum payment calculator to create a table with 4 rows and 4 columns of data about credit card minimum payments (see sample template below). Ask the students in Group #2 to use the *Why Save for Retirement?* cardboard calculator or an online savings calculator to create a table with 4 rows and 4 columns of data about the growth of savings over time. Call the entire class back together and debrief the activity and what they learned.

Heading	Heading	Heading	Heading

For additional detail about this activity, see <http://rci.rutgers.edu/~boneill/assignments/sliderule1.html> and <http://rci.rutgers.edu/~boneill/assignments/sliderule2.html>

6. **Activity 4:** *Smart Summary Soundbite:* Distribute the handout and ask the students to write a message about compound interest that is informative, motivational, and no more than 15 words.

*Students' soundbites will vary and may include how compound interest can work for or against someone, the high cost of making minimum payments, and the growth of money that is saved over time.*

7. **Activity 5:** *Web Quest Activity:* Distribute the handout and ask students to use an online search engine (e.g., Google, Bing) and search for “sources of highest interest rate savings accounts.” Give them about 15 minutes to find, read, and summarize articles from reliable sources that are not selling financial products. The rationale for doing this activity is that, the higher the interest rate that is earned on one’s savings, the faster money will grow through the power of compound interest. Call the entire class back together and debrief the activity and what they learned.

*The information that students find will vary. Some may report names of specific financial institutions (e.g., Synchrony Bank and Ally Bank). Sources of highest interest rate savings accounts will probably include online banks (because they do not have the expenses of building and maintaining physical “brick and mortar” buildings and paying bank tellers) and credit unions (because they are member-owned businesses that do not have to generate a profit for shareholders as commercial banks do). Online banks provide 24/7/365 access to depositors’ money and are FDIC insured if a bank experiences financial difficulty.*

## CLOSURE

Ask students if they have any remaining questions about compound interest as either a friend or an enemy. Remind them that most millionaires grow their wealth slowly over two to four decades of regular saving and investing deposits. Compound interest is on their side. Conversely, having a lot of debt, to which compound interest is added, can be very costly and even negatively impact a person's physical health.

## GLOSSARY

**Annual Percentage Rate (APR)**- The total annual cost for a credit card, loan, or other type of credit. An APR includes interest, fees, and any other costs associated with a transaction.

**Compound Interest**- Interest that is credited daily, monthly, quarterly, semi-annually, or annually on both principal and previously credited interest.

**Credit Card Fees**- Amounts charged on a credit card, as either a flat dollar amount (e.g., \$25) or percentage, that are separate from the interest rate. Examples include an annual fee just to have certain credit cards, transaction fees for balance transfers and cash advances, and late and over-the-limit fees.

**Debt**- An outstanding sum of money (or other item of value) that is owed to a person, bank, creditor, government, or other entity with an obligation to pay it back.

**Interest (Borrowing)**- The cost for borrowing money, generally expressed as a percentage of the amount borrowed, such as 7% interest on a loan.

**Interest (Saving)**- The return on an investment, such as 5% earned on the amount invested in a bond.

**Minimum Payment**- The lowest amount of money that borrowers are required to pay monthly on their outstanding balance on a credit card to keep their account in good standing with creditors. Minimum payments are calculated as a percentage (e.g., 3%) of the outstanding balance.

**Outstanding Balance**- The unpaid amount on a loan or credit card that includes the amount of money borrowed plus interest, fees, and any other charges. In other words, it is debt that has not yet been repaid.

**Perma Debt**- The process of revolving a permanent balance on credit cards and, in the process, paying much more for goods and services due to compounding interest on the outstanding balance.

**Principal**- The amount of money originally borrowed or currently owed on a loan, excluding interest.

**Tax-Deferred Investment**- An investment where taxes on the amount of money earned (e.g., from dividends and capital gains) are postponed to a future date, typically during retirement.

**Web Quest**- A guided online inquiry process that requires learners to seek out and make sense of information that comes from the Internet.

## LEARNING EXTENSIONS

If time permits, the following activities can be used to extend the depth of this lesson:

- ◆ Invite a representative from a credit counseling agency as a guest speaker to discuss his or her experiences with debtors and to provide “real world” stories about unwise credit practices.
- ◆ Show the 40-minute video *Spent* that describes the challenges of American families living on the financial edge: <http://www.spentmovie.com/index.html>.
- ◆ Have students create personal investment growth scenarios for themselves using an online compound interest calculator: [http://www.moneychimp.com/calculator/compound\\_interest\\_calculator.htm](http://www.moneychimp.com/calculator/compound_interest_calculator.htm) or <http://www.investor.gov/tools/calculators/compound-interest-calculator>.
- ◆ Use one or more online tutorials that teach compound interest (recommended for Math teachers): <https://www.sophia.org/tutorials/compound-interest-practice>.
- ◆ Show the “Do It Yourself” video clip *Digging Out of Debt* from the PBS television feature *Your Life, Your Money*: <http://www.pbs.org/your-life-your-money/>.
- ◆ Have students write 140 character Twitter messages describing what they learned about compound interest as both a friend and an enemy (**Note:** even if school regulations prohibit social media message delivery by students, the process of writing the tweets is educational).

### ASSESSMENT: *Compound Interest Quiz*

Instructors are encouraged to use the questions below for content review or as a pre-and/or post-test to determine gains in student knowledge about compound interest after teaching this lesson.

Correct answers to the multiple choice and True-False questions are shown in boldface type.

#### Multiple Choice Questions

1. The charge paid by people for the use of borrowed money is called
  - a. Principal
  - b. Interest**
  - c. Line of credit
  - d. Compound interest
  
2. The process of earning interest on previously credited interest is called
  - a. Compounding**
  - b. Rounding
  - c. Accumulation
  - d. Installment savings

3. An example of a tax-deferred savings product is
  - a. A credit union share account
  - b. A certificate of deposit
  - c. An individual retirement account**
  - d. A municipal bond
  
4. The original amount of money that people save or invest is known as
  - a. Interest
  - b. Principal**
  - c. Compound interest
  - d. Seed money
  
5. The biggest credit trap for most people that costs them a lot of money is
  - a. Late fees
  - b. Over-the-limit fees
  - c. Penalty APRs
  - d. Minimum payments**

### True-False Questions

1. Owing outstanding debt decreases the amount of money that people have available to spend or save in the future. **(TRUE: When people owe monthly payments on outstanding debt, such as loans or credit cards, that money is already “spoken for” and is, thus, unavailable for other purposes, including ongoing household expenses and saving for future financial goals)**
  
2. The longer it takes for people to pay off a debt, the less interest they pay. **(FALSE: The longer it takes to repay a debt, the more interest that is paid. This is because payments are spread over a longer time period and the interest that is repaid in each payment is less than would be the case for payments on shorter term debt; e.g., a 6-year car loan versus a 3-year car loan)**
  
3. Compound interest works especially well with tax-deferred investments. **(TRUE: With tax-deferred investments, such as IRAs and 401(k) and 403(b) plans, investment earnings can grow free of tax liability, often for several decades. Taxes are owed on investment earnings only at the point of withdrawal, which is typically in retirement)**
  
4. Some people barely make a dent in their outstanding debt balance and monthly credit payments become a permanent fixture in their financial lives. **(TRUE: This situation is referred to as “perma-debt.” It occurs when people add more to their outstanding debt balance each month than they repay and interest continues to accrue on the unpaid balance)**
  
5. Borrowers are considered “in good standing” with creditors as long as they make at least the minimum required payment by the due date. **(TRUE: Borrowers will not incur any penalty fees (e.g., late fee) or high penalty APRs if they make at least the minimum required payment on time by the due date. They will, however, pay a lot of interest because compound interest is their enemy and interest charges increase the amount that they owe. In addition, minimum payments can provide a false sense of security about a borrower’s overall financial health by masking a high debt burden)**

## REFERENCES AND RESOURCES

*Comparing Simple and Compound Interest* (Inspire Financial Learning.CA): <http://www.inspirefinanciallearning.ca/index.php/teachers/teaching/by-grades/grade-11/comparing-simple-and-compound-interest/>

*Compound Interest Basics* (Khan Academy): <https://www.khanacademy.org/economics-finance-domain/core-finance/interest-tutorial/compound-interest-tutorial>

*How to Teach Kids Compound Interest* (video): <https://www.youtube.com/watch?v=evDHk7g8SOM>

*Interest and Bank Accounts* (Scholastic): <http://www.scholastic.com/browse/lessonplan.jsp?id=1563>

*Investing For Your Future* (eXtension): <http://www.extension.org/pages/10984/investing-for-your-future#.VWUF5U3bKM8>

*Money Math: Lessons for Life* (Center for Entrepreneurship and Economic Education): [https://www.treasurydirect.gov/indiv/tools/tools\\_moneymath.pdf](https://www.treasurydirect.gov/indiv/tools/tools_moneymath.pdf).

*Simple and Compound Interest* (Texas Council on Economic Education): <http://economicstexas.org/wp-content/uploads/2013/06/Grade-7-Lesson-5-r.pdf>.

*The High Cost of Credit Card Minimum Payments* (eXtension): <http://www.extension.org/pages/25259/the-high-cost-of-credit-card-minimum-payments#.VWUFe03bKM8>

*Tips for Teaching Students About Saving and Investing* (U.S. Securities and Exchange Commission): <https://www.sophia.org/tutorials/compound-interest-practice>

*Understanding the Cost of Credit and Your Minimum Payments* (CARE): <http://care4yourfuture.org/understanding-cost-credit-and-your-minimum-payment>

*What Happens If I Only Make the Minimum Payment on My Credit Card?* (NerdWallet): <http://www.nerdwallet.com/blog/tips/credit-score/minimum-payment-credit-card/>.

*What Is Simple And Compound Interest and How Can I Make It Work For Me?* (Alabama Learning Exchange): [http://alex.state.al.us/lesson\\_view.php?id=28517](http://alex.state.al.us/lesson_view.php?id=28517)

*What is the Minimum Payment on a Credit Card?* (Ready for Zero): <http://blog.readyforzero.com/what-is-the-minimum-payment-on-a-credit-card/>

*When Will I Be a Millionaire?* (calculator): <http://money.cnn.com/calculator/pf/millionaire/>

*Why Save?* (Council for Economic Education): [http://www.councilforeconed.org/lesson-resources/lessons/sample-lessons/lej\\_hs\\_lesson1.pdf](http://www.councilforeconed.org/lesson-resources/lessons/sample-lessons/lej_hs_lesson1.pdf).



# Smart Summary Soundbite

A local television station is doing a feature story to encourage its viewers to reduce debt and save money for their future. They are having a contest to find the best “sound bite” (i.e., a short phrase that is easy to remember) about compound interest that they can use in their savings campaign. Criteria for the sound bite contest are as follows:

- No more than 12 words
- Motivational
- Must include the words “interest” or “compound interest”
- Easy to understand
- Broad appeal to diverse audiences

Write a short phrase or slogan to persuade people to reduce debt and/or save money. To get started, think about your own feelings regarding money. What would motivate you to want to pay off debt quickly and start saving?



## Web Quest: High Interest Savings Accounts

Compound interest is your best friend when you earn interest on your savings. It is even a better friend when you earn the best available interest rate. In this activity, you will conduct an online search to identify financial institutions that pay the highest interest rates to maximize the power of compound interest.

### Instructions:

1. Go to an online search engine (e.g., Google, Bing) and search for “sources of highest interest rate savings accounts.”
2. Read three articles (not paid advertisements) that describe ways to earn a higher interest rate on savings.
3. When you are done reading, complete the table below by listing three key pieces of information that you found.
4. Be prepared to discuss the information that you found with the entire class.

Information Source	Advice About Earning a Higher Interest Rate on Savings

# *Compound Interest Quiz*

## **Multiple Choice Questions:**

**Circle the correct answer from among the four answers provided.**

1. The charge paid by people for the use of borrowed money is called
  - a. Principal
  - b. Interest
  - c. Line of credit
  - d. Compound interest
2. The process of earning interest on previously credited interest is called
  - a. Compounding
  - b. Rounding
  - c. Accumulation
  - d. Installment savings
3. An example of a tax-deferred savings product is
  - a. A credit union share account
  - b. A certificate of deposit
  - c. An individual retirement account
  - d. A municipal bond
4. The original amount of money that people save or invest is known as
  - a. Interest
  - b. Principal
  - c. Compound interest
  - d. Seed money
5. The biggest credit trap for most people that costs them a lot of money is
  - a. Late fees
  - b. Over-the-limit fees
  - c. Penalty APRs
  - d. Minimum payments

## **True-False Questions:**

**Mark "T" for True or "F" for False in the space before each question.**

- \_\_\_\_\_ 1. Owing outstanding debt decreases the amount of money that people have available to spend or save in the future.
- \_\_\_\_\_ 2. The longer it takes for people to pay off a debt, the less interest they pay.
- \_\_\_\_\_ 3. Compound interest works especially well with tax-deferred investments.
- \_\_\_\_\_ 4. Some people barely make a dent in their outstanding balance and monthly credit payments become a permanent fixture in their financial lives.
- \_\_\_\_\_ 5. Borrowers are considered "in good standing" with creditors as long as they make at least the minimum required payment by the due date.

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