

Earning Simple Interest

SUBMITTED BY: Nina Hoe, University of Pennsylvania

SUBJECT(S): Computation

GRADE LEVEL(S): 9, 10, 11, 12

≡ OVERVIEW:

This lesson begins with a whole class discussion about interest earned and interest paid on loans. Students are introduced to the concepts of simple interest, principal and loans. They will explore the concept both from the perspectives of earning interest and paying interest, computing interest earned on savings and interest paid on loans. If time allows, students will read the Wharton Global Youth Program (WGYP) Kiva article and talk about interest rates for microfinance. The lesson finishes with students discussing things for which they might take out a loan, and understanding the advantages and disadvantages of leaving money in an account.

≡ RELATED ARTICLES:

- [“Your Money: 3 Questions for CNote’s Yuliya Tarasava”](#)
- [“The Rising Costs of a U.S. College Education”](#)
- [“The Ins and Outs of Interest — from a Student Loan Survivor”](#)
- [“The Fed Revealed: The Dangers of Monetary Policy”](#)
- [“Payday Loans and the Perils of Borrowing Fast Cash”](#)
- [“Olivia Mitchell on Why Young Consumers Should Just Say No to Spending”](#)
- [“Kiva: Improving People’s Lives One Small Loan at a Time”](#)
- [“British Couponer Extraordinaire: Jordon Cox Is a Savings Sensation”](#)
- [“A Trip to the Bank, Lollipops and World Savings Day”](#)
- [“9 Insights About Negative Interest Rates”](#)

Objectives/Purpose: Students learn how to compute simple interest earned and paid. Students model interest earnings through graphical representations. Students develop an understanding of the effect of time on the principal.

Standards:

- *WGYP:*
- Mathematical Foundations
- Number Relationships
- Patterns, Functions, and Algebra
- Problem Solving

Common Core:

A-SSE.1. Interpret expressions that represent a quantity in terms of its context

A-CED.1. Create equations and inequalities in one variable and use them to solve problems.

Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.

F-IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Other Resources/Materials:

Calculators

If computers are available in class, Microsoft Excel can be used to demonstrate the calculation of interest and principal.

Activity:

Student Worksheet

Whole Class Discussion:

In a previous lesson we learned about saving money. One of the benefits of saving money is that if you have a bank account and deposit that money into an account, the bank will pay you more money, called **interest**, for being able to use your money. Essentially, the bank pays you in order to borrow your money.

Also, if you need to borrow money that you do not have, you will be charged interest.

Discuss:

1. What is a loan?
2. What does it mean to loan someone money or to be a lender?
3. What does it mean to receive money from a lender or to be a borrower?
4. What is the purpose of a loan? Why do people receive or take out loans?

Use student definitions of a loan to articulate a succinct definition from which students can work.

Example: A loan is a type of debt, typically a sum of money that is borrowed and is expected to be paid back (in most cases) with interest. A loan involves a lender, who provides the money, and the borrower, who uses the money and then pays it back to the lender over a specified term or period of time. The initial amount of loaned from the lender to the borrower is the **principal**.

Play the WGYG glossary: [Mortgage Loan](#)

“A mortgage loan is a loan used to buy a home. The home is a security for the loan, and acts as a guarantee that the loan will be repaid. Sally recently took out a mortgage loan of \$200,000 to purchase her first home.”

1. What is interest?

Play the [WGYG Glossary: Interest Rate](#)

“The price a borrower pays for the use of money they do not own. Interest rates are normally expressed as a percentage rate over the period of one year. If the bank were to lower the interest rate from 8 percent to 7 percent on a loan of \$100,000, the average interest payment will decrease from \$8000 to \$7000.”

Interest is money paid regularly at a particular rate for the use of money lent, or for delaying the repayment of debt. Interest rates may range significantly, from 0% to much higher.

Interest rates are closely tied to the amount of time that it takes the borrower to pay the money back. Discuss why it is advantageous to pay money back sooner rather than later.

$$I = P \cdot r \cdot t$$

Where **I** is the interest earned or owed in dollars, **P** is the principal amount deposited, lent, or borrowed, **r** is the interest rate (the percent) in decimal form, and **t** is the time in years that the money is in the account, lent, or that the borrower takes to pay back the loan.

You can earn interest in a savings account, but also through a **Certificate of Deposit**. According to [Wikipedia](#), “CDs are similar to savings accounts in that they are insured and thus virtually risk-free; they are “money in the bank” (CDs are insured by the Federal Deposit Insurance Corporation (FDIC) for banks or by the National Credit Union Administration (NCUA) for credit unions). They are different from savings accounts in that the CD has a specific, fixed term (often three months, six months, or one to five years), and, usually, a fixed interest rate. It is intended that the CD be held until maturity, at which time the money may be withdrawn together with the accrued interest.”

1. What are the advantages of a CD over a regular savings account? What are the disadvantages?

Small Group/Pair Activity:

Earning Interest

1. If you deposit \$100 into an account that earns 2% interest for 1 year
 1. How much interest will you earn? **(\$2)**
 2. How much money will you have total? **(\$102)**

2. Find the amount of time it will take to earn \$10 in simple interest if you deposited \$100 into an account that earns 2% interest. (**$\$10 = \$100 \cdot .02 \cdot t$ à $t = 5$ years**)

3. You have \$600 in a savings account and the bank is offering an interest rate of 2.7%.
 1. Write a simple interest equation that represents this situation and simplify it. (**$I = \$600 \cdot 0.027 \cdot t$**)
 2. In your equation, identify the **independent** and **dependent** variables. (***independent = time, dependent = Interest***)
 3. Using this equation, calculate how long you would need to keep your money in the account to earn \$145.80 in interest. (**9 years**)
 4. Calculate how long you would need to keep your money in the account to double your savings. (**37 years**)

4. You put \$300 dollars of birthday money into a savings account with an interest rate of 3.2%,
 1. how much interest will you earn after:

Time spent in account (years)	Interest earned
1	\$9.60
2	\$19.20
5	\$48
10	\$96
20	\$192
50	\$480

2. In the space below, graph the interest earned. Put time on the x-axis and the interest earned on the y-axis. Be sure to label the graph and axes.

[Before you graph, make sure to identify:

Variable quantity:

Lower Bound:

Upper Bound:

Interval: _____]

3. Draw a line to connect the points you have graphed.
4. In a sentence, describe what happens to your savings throughout this time period. **(Increases at a steady rate of \$9.60 per year.)**

5. You put \$5,000 into a CD that pays 4% for 1-year. Calculate the interest. **(\$200)**

Paying Interest

6. If you borrow \$10,000 for a one-year term to buy a car and the simple, annual interest rate is 5%:

1. How much money will you pay in interest? **(\$500)**
2. How much money will you pay to the lender in total after one year? **(\$10,500)**

7. If you borrow the same amount of money, \$10,000, at the same annual interest rate of 5% but want to pay it back over a term of two years and the total principal is due at the end of year two,

1. How much money will you pay in interest over the term of the loan? **(\$1,000)**
2. At the end of the two years, how much money will you end up paying back to the lender? **(\$11,000)**
 1. How much interest will be accrued during the first year? **(\$500)**
 2. How much interest will be accrued during the second year? **(\$500)**
3. What are the advantages and disadvantages of a loan with a term of one year compared to a term of two years? **(You owe more in the end, but you have more time to pay it back.)**

8. What is something that you might want to take out a loan to buy? (*Sample answers: start a business, attend school, buy a car, buy a house, etc.*) **(Answers will vary.)**
- What is the estimated principal you will need to borrow? (students may use the internet to estimate the cost of buying a specific car or starting a small business)
 - Investigate some common interest rates for this loan (use computer or the teacher can provide this).
 - How long are you likely to need to pay this money back?
 - Calculate the simple interest owed associated with paying this loan over the course of: One year, Two years, Five years, Ten years

Extending the Activity:

- Have students read the article [“Kiva – Improving Peoples’ Lives, One Loan at a Time.”](#)
- Discussion questions:
 - What is the interest rate on Kiva loans?
 - Why do you think the loan structure is set up this way?

Tying It All Together:

- Have students discuss their answers to problem 6.
- How do people decide how long they will take to pay back a loan? Review the advantages and disadvantages to taking more or less time to pay back a loan?
- How long do people leave money in a bank account? Discuss the advantages and disadvantages to leaving money in an account for more or less time.
- Why choose a CD?

What Worked and What I Would Do Differently: