

How Does Money Grow Over Time?

Suggested Grade & Mastery Level

High School - all levels

Suggested Time

45-50 minutes

Teacher Background

Interest refers to the amount you earn on the money you put to work by saving or investing. Savings accounts, Individual Retirement Accounts (IRA), money market accounts, and Certificates of Deposit (CD) accumulate interest during the time you hold them.

There are two types of interest: **simple** and **compound**. With simple interest, the money your investment earns is based solely on the principal (your initial investment amount). For example, if you put \$1,000 in a savings account with an annual simple interest rate of 4%, you would have \$1,040 the first year, \$1,080 the second year, \$1,120 the third year and so on.

However, if you put \$1,000 in a CD providing an annual compound interest rate of 4%, you would have \$1,040 the first year, \$1,081.60 the second year, \$1,124.86 the third year, and so on. Unlike simple interest, compound interest is calculated on the principle amount **and** interest earned to that time. To calculate the second year's gains, multiply the previous year's total (\$1,040) by the interest rate (.04) and add the amount to the previous year's total (\$1,040). To calculate the compound interest over a number of years, make this calculation for each consecutive year.

To compute simple interest earnings, multiply the interest rate (.04) by the number of years and adding the result to the principle (\$1,000).

The Rule of 72 helps estimate how long it will take for your money to double if it is earning compound interest. To apply this rule, divide 72 by the interest rate your investment is earning (ignore the percentage). For example, if your investment were paying a 3% interest rate, you would double your investment in 24 years.

Vocabulary

401(k) plan: A retirement savings plan funded by employee contributions and (often) matching contributions from the employer. Contributions are taken from pre-tax salary and the funds grow tax-free until withdrawn.

Diversification: Spreading investment funds through a variety of savings and investments to reduce risk.

Interest: The fee charged for using another's money or credit. It is expressed as a percentage rate over a period of time. For example, "My bank now pays 5 percent interest per year on my savings account."

Individual Retirement Account (IRA): An individual retirement account (IRA) allows a person, whether covered by an employer-sponsored pension plan, 401 (k) or not, to save money for use in retirement, deferring taxes on the account's earnings until the person begins to withdraw from the account. Funds in an IRA may be invested in a broad variety of investment vehicles.

Certificate of Deposit (CD): A special form of deposit offered by banks that generally pays compound interest for a fixed period of time.

Compound Interest: Interest added to a principal at regular intervals so that each subsequent interest calculation is based on the original principal and the added interest. For example, if you have \$100 in a savings account that pays 5 percent interest; with interest you receive 5 percent interest or \$5 once—at the end of the year. If your bank pays compound interest each month, you will have \$105.12 at the end of the year.

Money Market Account: A special savings account that usually pays interest rates comparable to those offered by money market mutual funds. These accounts also offer check-writing privileges.

Principal: A sum of money owed as a debt or placed in a savings instrument, on which interest is calculated.

Rate of Return: Your annual income on an investment.

Rule of 72: A way to calculate how long it will take an investment to double given a specific interest rate. The formula is $72/\text{interest rate} = \text{length of time it takes (at a given interest rate) for an investment to double}$.

Savings Account: A deposit account at a bank or similar institution that earns interest.

Simple Interest: Interest calculated at regular intervals solely on principal. For example, if you have \$100 in a savings account that pays 5 percent interest annually at the end of 3 years you would have earned \$15.

Performance Objectives

Students will be able to:

- Define compound interest and explain the effect of compounding interest on a daily, monthly, quarterly, or annual basis.
- Investigate various investment and saving opportunities.
- Define and demonstrate comprehension of the following terms: saving, investing, compound interest, and diversification.

Subject Areas

Social Studies, Mathematics, Economics, English Language Arts, Technology, Business

Materials

- Activity Sheet 1: Saving for Retirement
- On-line financial calculators, examples: www.dinkytown.net, www.bankrate.com

Springboard Activity

Two recent college graduates are talking about saving. Each has the opportunity to create a saving plan that will help him in the future.

Bob wants to open an IRA (Individual Retirement Account) to save money for his retirement when he turns 62 in 40 years.

Sidney thinks a savings account is best. He thinks it is important to have access to his money over the years and will worry about retirement once his family is grown.

They sought help from a financial advisor to decide which account is best. They learned:

In an IRA, you can invest in a wide variety of stocks, mutual funds and other investments. Over the last 5 years the average rate of return on the IRA has been 5 % per year. The rate of return for an IRA is not guaranteed. They may earn 5% this year, 10% next year and then lose 5% the year after.

A Certificate of Deposit has a guaranteed interest rate, but you cannot use the money for the duration of the CD—which can range from six months to more than 10 years.

A regular savings account has a guaranteed interest rate. The interest rate is much lower than that of the CD, but you can withdraw the money at any time.

ASK

- Which savings plan seems to be the best?
- Which one will earn each college graduate the most money in 40 years at age 62?

Discuss the various answers offered by the students; then take a class vote.

Procedure

Distribute **Activity Sheet 1: Saving for Retirement**.

Explain that financial planners use a formula to calculate compound interest rates on savings investments, but this formula does not take into account interest rate changes that may occur over time.

The students can help the two recent graduates by calculating their money based on what they know now.

Explain that interest is computed by: the amount of investment + earned interest x the interest rate = the interest earned:

For example: Year 1: $\$1,000 \text{ investment} + \$0 \times 3\% = \$30 \text{ (interest)} + \$1,000 = \$1,030$;
Year 2= $\$1,030 \text{ (balance)} \times 3\% = \$30.90 + \$1,030 = \$1,060.90$.

Novice Level:

Divide the class into SMG teams. Have the students complete the Activity Sheet 1: Saving for Retirement. Demonstrate how to calculate compound interest on a \$1,000 CD invested over 5 years (22 - 26).

Explain how the calculations were made. After completing those calculations, read the table to review the 40-year investment results.

Discuss the results. Then read the table on Activity Sheet 1 for scenario two and scenario three.

Apprentice Level:

Have teams complete the calculations for the savings account, CD, and IRA over 5 years (22 - 26). After they complete the calculations, have them read the table to review the 40-year investment results. Discuss the results.

Discuss the factors that impact on the rate of return on each account.

ASK

- Recently we discussed risk tolerance. How does risk tolerance relate to your decision on which type of investment or saving to choose?

Master Level:

Have individual teams work to complete the calculations for the savings account, CD and IRA over 5 years (22 - 26). When the calculations are completed, have them read the table to determine the 40-year investment strategy. Discuss the results.

Discuss the factors that impact on the rate of return on each account.

Have students discuss the advantages and disadvantages of saving money in a bank and investing in a company's stock. Working as a class to create a list of possible investments that might provide an investor with a growth rate of 3%. Do the same for investments with a rate of return of 5%, 8% and 10%.

Grand Master Level:

Have individual teams work to complete the calculations for the savings account, CD and IRA over 5 years (22 - 26). When the calculations are completed, have them read the table to determine the 40-year investment strategy. Discuss the results.

Discuss the factors that impact on the rate of return on each account.

Have students discuss the advantages and disadvantages of saving money in a bank and investing in a company's stock. In teams, have the students develop a portfolio of bank savings and stocks showing the percentage of each type of investment and the expected return. Have students research various options using a variety of sources, including print and online, to determine where they would obtain consistent returns.

Have the teams present their portfolios, including their charts of past and possible future returns.

Assessment

ASK

- What questions would you ask a financial planner before you invest \$1,000 in a savings plan?

Application

Novice Level:

We will be investing our funds in the SMG.

ASK

- What do you need to consider before you make an investment in a savings account?
- What are the long-term benefits of a savings account?
- What are the short-term drawbacks of savings accounts?

Apprentice Level:

Teacher plays an investment broker; the students are investors. Have the student investors ask investment questions. The types of questions they ask will demonstrate their level of comprehension. (Examples: What is the expected rate of return on my investment? How safe is my investment? Is the investment FDIC insured? How long will I have to leave my investment in the account?)

Master Level:

Students are the investment brokers; the teacher is the investor. Ask investment questions of the student brokers. Have them use their charts to demonstrate the best investment options for the teacher.

Note: To give sound investment advice the student brokers must determine the teacher's risk tolerance level.

Grand Master Level:

Organized in SMG teams, have students play investment advisors helping a client convert his retirement savings from a bank account into an IRA.

Their client:

Is 25 years old

Is financially stable

Intends to work for the next 40 years

Has saved \$5,460.

Using the Internet, newspapers, or other available resources, have students develop a portfolio of three stocks, taking their client's risk tolerance into account in their decisions.

Have the students calculate the estimated total value of the stocks when their client is ready to retire, based on the stocks' performance over the last 5 years and assuming that performance remains steady over the next 40 years.

Have the students calculate how much money the client would have if he left his money in the bank until retirement if the bank paid a consistent 4% per year interest rate compounded annually.

Have the students calculate how long it would take for the client's money to double in the portfolio vs. in the bank account. (Rule of 72)

Enrichment Activity

Have students prepare personal financial plans that include savings accounts and stocks. Assume they will contribute \$2,000 per year to these investments for five years. Five years after they make their final contribution, they will use their money to buy a house. Use a 3% yearly interest rate for savings and a 10% yearly return on stocks. Have students use on-line calculators to compute totals.

Have students prepare a report explaining how they divided the funds between savings and stocks and what factors influenced their decision—including their individual risk tolerances based on what kind of job they think they will have, whether they will have a family and when they will retire.

Have them calculate the amount of money they can expect to get from each when they are ready to buy their house.