

Lesson 3.1.4: Why Banks Pay YOU

Targets:

1. I understand how to calculate simple interest and compound interest.
2. I understand how to write an equation for simple interest and compound interest.
3. I understand the difference between simple interest and compound interest.

Warm Up:

Write down an answer to the following questions. If you don't know, make your best guess:

1. Why do people borrow money from a bank (why do people get loans)?
2. Why do banks let people borrow money?
3. How do banks have money to lend?
4. Why would a bank pay YOU to hold your money for you?

Bottom Line:

Practice 1: Intro to Simple Interest

Banks originally computed simple interest, and that is the type of interest that we will study in this example. Simple interest is calculated at the end of each year on the original amount either borrowed or invested (the principal).

Kyra has been babysitting since 6th grade. She has saved \$1,000 and wants to open an account at the bank so that she will earn interest on her savings. Camas Bank pays simple interest at a rate of 10%. If Kyra doesn't add any money to her account, how much money will Kyra have after 1 year? After 2 years? After 5 years?

Practice 2

Raoul needs \$200 to start a snow cone stand for his summer job. He borrows the money from a bank that charges 4% simple interest per year.

- How much will he owe if he waits 1 year to pay back the loan? If he waits 2 years? 3 years? 4 years? 5 years?
- Write a formula for the amount he will owe after t years.

Practice 3: Intro to Compound Interest

In the 1600s, banks realized that there was another way to compute interest and make even more money on the money they loaned out. With compound interest, banks calculate the interest for the first period, add it to the total, and then calculate the interest on the total for the next period, and so on.

Lets say you invest \$1000 in a savings account and it collects 10% interest compounded each year. This recursive formula describes compound interest: $A(n) = A(n - 1) + 0.1 \cdot A(n - 1)$

- Look at the table below. Use the first two rows as an example and fill in the rest of the table.

Year	Recursive Formula	Factored Formula	Pattern	Total Money
Year 1	$1000 + 0.1(1000)$	$1000(1 + 0.1)$ or $1000(1.1)$	1100	1100
Year 2	$1100 + 0.1(1100)$	$1100(1.1)$	$[1000(1.1)](1.1)$	1210
Year 3				
Year 4				
Year 5				

- Write an explicit formula for the sequence you found in your table.

Practice 4

You just graduated high school and you decide you are going to go to college. You don't have enough money to pay for your first year, so you borrow \$3500. The good news is, you don't have to pay back your loan until you stop going to school (this could be 1 year, 2 years, 4 years, maybe even 8 years). However, the company who is lending you the money still charges 6.8% interest each year compounded yearly, even while you are still in school.

- a. How much will you owe on just this loan if you stop going to school...
 - i. After 1 year? (you quit early)
 - ii. After 2 years? (you get your Associates degree)
 - iii. After 3 years? (you get your Bachelor's early)
 - iv. After 4 years? (you get your Bachelor's on time)
 - v. After 5 years? (you take an extra year to get your Bachelor's)
- b. Write an explicit formula that you can use to calculate for any number of years.
- c. How much money will you owe on this single loan if you go to school for 11 years (the typical length of college for a doctor)?
- d. How much will the loan company make just by letting you use the money for 11 years?

Vocabulary

Write a definition for the following terms. Use the formulas from the warm up as examples.

1. **Simple Interest**
 - a. Definition:
 - b. Example of Equation:
 - c. Type of Equation:
2. **Compound Interest**
 - a. Definition:
 - b. Example of Equation:
 - c. Type of Equation:

Practice 5

You have \$200 to invest for 10 years

- a. Would you rather invest your money in a bank that pays 7% simple interest or in a bank that pays 5% interest compounded annually?

- b. What are two things you could change in the problem that would make you change your answer?

Exit Ticket

You decide to have a yard sale to save up some money to buy a car. You earn \$800 and decide to put the money in a bank for a while. Calculate the amount of money you will have if:

- a. Cool Bank pays simple interest at a rate of 4%, and you leave the money in for 3 years.

- b. Hot Bank pays an interest rate of 3% compounded annually, and the you leave the money in for 5 years.

- c. What bank option is better if...
 - i. You need your money quickly?

 - ii. You leave the money in the bank long term?

- d. After how many years doe the bank from part ii. become the better option?