# Who Pays and Who Receives?

## Introduction

A wise person once said, "You can work for your money, or you can let your money work for you." You work for your money when you get a job and begin to earn regular paychecks. Your money works for you when you save and invest it wisely.

Saving is a good idea because the money you save earns interest. Did you ever stop to think about how much interest you can earn on your savings?

In this lesson you will learn about saving, and about the effects of simple and compound interest. You'll use a quick formula, called the Rule of 72, to calculate how long it takes to double your money. Finally, you will find out that three things affect how hard your money can work for you:

- the amount you save,
- the rate of interest,
- the length of time you leave money in an account.

As strange as it may seem, banks are businesses—just as grocery stores, gas stations, and theaters are businesses. Every business wants to please its customers and earn a profit. Without a profit, a company will lose money and have to shut down.

Banks earn profits by lending money to borrowers. The borrowers have to pay a price for the loan; that price is called interest.

Where do banks get the money they lend to borrowers? That's where you come in. Based in part on the amount of deposits you and others make, banks earn money by making loans of this money to borrowers. These loans are used by people to buy cars and houses, and by businesses to buy machines and buildings. The bank is paid interest by its borrowers, and in turn, the bank pays you interest for using your deposited money.

In order to make a profit, the bank charges more interest to borrowers than it pays to savers. For example, borrowers might pay 8 percent interest, and savers might earn 5 percent interest. The difference is the bank's markup. The bank uses its markup to pay its employees, buy computers, and pay other expenses of the firm. The bank's return for taking a risk—its profit—is also part of the markup. Banking, like other enterprises, can be a risky business; after all, customers might default on a loan, which means the customer does not repay the loan. An understanding of banks and interest is important; it can help you make wise saving and investing decisions now and in the future.

  

# Vocabulary

**Compound interest:** Interest computed on the sum of the principal and previously earned interest.

**Compounding:** The practice of leaving interest earned "on deposit" so that it too earns interest.

**Interest:** The price paid for using someone else's money.

**Interest rate:** The price paid for using someone else's money, expressed as a percentage.

**Principal:** The amount deposited in savings without including interest earned.

**Rule of 72:** A formula that can be used to calculate how long it takes for invested money to double.

**Simple interest:** Interest earned on the principal and paid out to a depositor.

EXERCISE 13.1A

NAME: _____ CLASS PERIOD: _____

# Simple Interest

**The Simple Interest Group will use this form. Your teacher will show you how to complete the form.**

| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| Deposit Cycle | Beginning Balance (G) from previous line | Deposited Amount | New Balance (B) + (C) | Rate of Interest | Interest earned and paid out (D) x (E) | Ending Balance (Same as D) |
| 1 | 0 | 10 | 10 | 20% | 2 | 10 |
| 2 | | 10 | | 20% | | |
| 3 | | 10 | | 20% | | |
| 4 | | 10 | | 20% | | |
| 5 | | 10 | | 20% | | |
| 6 | | 10 | | 20% | | |
| Total | | | | | | |

NAME: _____ CLASS PERIOD: _____

# Compound Interest

**The Compound Interest Group will use this form. Your teacher will show you how to complete the form.**

**Round decimals to the next-highest whole number.**

| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| Deposit Cycle | Beginning Balance (G) from previous line | Deposited Amount | New Balance (B) + (C) | Rate of Interest | Interest earned and left in account (D) x (E) | Ending Balance (D) + (F) |
| 1 | 0 | 10 | 10 | 20% | 2 | 12 |
| 2 | | 10 | | 20% | | |
| 3 | | 10 | | 20% | | |
| 4 | | 10 | | 20% | | |
| 5 | | 10 | | 20% | | |
| 6 | | 10 | | 20% | | |
| Total | | | | | | |

NAME: _____ CLASS PERIOD: _____

# Simple Interest: When and Why Would People Choose It?

Ms. Wirtz is a former magazine editor who retired at the age of 55. She has $60,000 in an account that earns 6 percent interest annually. Because she needs the interest for some of her living expenses, Ms. Wirtz has arranged to receive an interest check from the bank every quarter (four times a year). In this way, she has money to live on, and her $60,000 principal doesn't decrease. What is the amount Ms. Wirtz receives every quarter? The formula below shows how to calculate her simple interest and quarterly interest payments (note that the annual interest rate is expressed as a decimal).

**Principal x annual interest rate x time = simple interest ÷ 4 = quarterly payment**

Ms. Wirtz' annual interest and quarterly payment are shown in the first line of the grid on this page. Use the formula to calculate simple interest, interest rate, principal, and quarterly payments in the rest of the grid, and fill in the blank spaces.

| Principal | x | Interest Rate | x | Time | = | Simple Interest | ÷ 4 = | Quarterly Payment |
|---|---|---|---|---|---|---|---|---|
| $60,000 | x | 6% | x | 1 year | = | $3,600 | ÷ 4 = | $900 |
| $20,000 | x | 5% | x | 1 year | = | | ÷ 4 = | |
| | x | 10% | x | 1 year | = | $1,000 | ÷ 4 = | |
| $80,000 | x | | x | 1 year | = | $5,600 | ÷ 4 = | |
| $75,000 | x | 9% | x | 1 year | = | | ÷ 4 = | |
| $125,000 | x | 8% | x | 1 year | = | | ÷ 4 = | |
| $200,000 | x | | x | 1 year | = | $14,000 | ÷ 4 = | |
| $40,000 | x | | x | 1 year | = | | ÷ 4 = | $500 |
| | x | 4% | x | 1 year | = | | ÷ 4 = | $1,000 |
| $100,000 | x | | x | 1 year | = | | ÷ 4 = | $2,500 |

NOTE: People who hold certain interest-earning accounts, such as certificates of deposit, can have payments sent to them quarterly. That way they can use their interest for daily living expenses, travel, or other purchases. Even though they spend the interest, they maintain the principal.

NAME: _____ CLASS PERIOD: _____

# Racing Toward a Goal

Eight members of the Slug Hill Stock Car Team have challenged each other to begin a savings plan. They know that by making annual deposits and not withdrawing any money, their interest will compound and they will reach their goals. They also know that three things affect how their savings will grow:

- How much they deposit
- What the interest rate is
- How long the money remains on deposit

Even though they will all reach their goal, they will not do so at the same time. Select one of the drivers on the next page and, using the calculation sheet on page 100, calculate how long it will take the driver to reach the goal. Complete the table and fill in the blanks in the box at the bottom of page 100.

Compare your results with those of other team (class) members to determine the order in which the drivers reach the finish line. Enter the overall results in the list below.

1st Place _____

2nd Place _____

3rd Place _____

4th Place _____

5th Place _____

6th Place _____

7th Place _____

8th Place _____

EXERCISE 13.3

**Driver A**

Annual Deposit = $2,000
Interest Rate = 6%
Goal = $40,000

**Driver B**

Annual Deposit = $2,000
Interest Rate = 10%
Goal = $29,000

**Driver C**

Annual Deposit = $3,000
Interest Rate = 6%
Goal = $41,000

**Driver D**

Annual Deposit = $3,000
Interest Rate = 10%
Goal = $61,000

**Driver E**

Annual Deposit = $4,000
Interest Rate = 6%
Goal = $35,000

**Driver F**

Annual Deposit = $4,000
Interest Rate = 10%
Goal = $26,000

**Driver G**

Annual Deposit = $5,000
Interest Rate = 6%
Goal = $52,000

**Driver H**

Annual Deposit = $5,000
Interest Rate = 10%
Goal = $42,000

NAME: _____ CLASS PERIOD: _____

# Calculation Sheet for Racing Toward a Goal

| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| Year | Beginning Balance (column G of previous year) | Annual Deposit | New Balance (B) + (C) | Interest Rate | Interest Earned (D) x (E) | Ending Balance (D) + (F) |
| 1 | 0 | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| 12 | | | | | | |
| 13 | | | | | | |
| 14 | | | | | | |

Note: Round cents to the nearest whole number.

Driver _____ wants to save $ _____
(insert letter)

It will take _____ years to achieve the goal.

NAME: _____ CLASS PERIOD: _____

# Checking Out the Rule of 72: Does It Work?

**The Rule of 72 provides a way of estimating how long it takes for money to double. Test the Rule of 72 by completing the following exercise.**

The formula for the Rule of 72 is to divide 72 by the interest rate (expressed in percentage terms). This gives you the approximate number of years it takes to double an investment earning at that interest rate.

**72 ÷ interest rate = number of years until money doubles**

How would this formula work? Begin with $100,000. With a partner and an on-line calculator, figure out how long it takes for this $100,000 to become $200,000 at these interest rates: 2%, 3%, 4%, 6%, 8%, 9% and 12%.

Use this website, or a similar one: http://www.1728.com/compint.htm

Follow these procedures when using the online calculator:

**Solve for YEARS**

| | |
|---|---|
| Input *principal* (do not use commas): | 100000 |
| Input *total* (do not use commas): | 200000 (double the principal) |
| Input *interest rate* (do NOT use decimals): | 2 or 3 or 4 and so on |

Click on CALCULATE

You will get an answer in years.

Does the number of years multiplied by the interest rate equal about 72?

Complete this form, using the calculator on the web site.

| A | B | C | D | E |
|---|---|---|---|---|
| Principal | Double the Principal | Interest Rate Percentage | No. of years for money to double (from Web Calculator) | Does Column C x Column D = approximately 72? |
| $100,000 | $200,000 | 2 | | |
| $100,000 | $200,000 | 3 | | |
| $100,000 | $200,000 | 4 | | |
| $100,000 | $200,000 | 6 | | |
| $100,000 | $200,000 | 8 | | |
| $100,000 | $200,000 | 9 | | |
| $100,000 | $200,000 | 12 | | |

NAME: _____ CLASS PERIOD: _____

# Factors That Affect How Money Grows

Three factors affect how money grows in an account:

- Amount of deposit,
- Interest rate,
- Length of time the money remains on deposit.

Demonstrate these three factors by completing the grid. When you finish, make a generalization about the three factors that affect how money grows.

**Beginning values:**
Amount $5,000
Interest rate 5%
Time 5 years

**Change only the amount:**
**Amount $10,000**
Interest rate 5%
Time 5 years

**Change only the interest rate:**
Amount $5,000
**Interest rate 10%**
Time 5 years

**Change only the time:**
Amount $5,000
Interest rate 10%
**Time 10 years**

| Year | Year Start Balance | Interest Rate | Interest Earned | Year End Balance |
|---|---|---|---|---|
| 1 | $5,000 | 5% | | |
| 2 | | 5% | | |
| 3 | | 5% | | |
| 4 | | 5% | | |
| 5 | | 5% | | |
| 1 | $10,000 | 5% | | |
| 2 | | 5% | | |
| 3 | | 5% | | |
| 4 | | 5% | | |
| 5 | | 5% | | |
| 1 | $5,000 | 10% | | |
| 2 | | 10% | | |
| 3 | | 10% | | |
| 4 | | 10% | | |
| 5 | | 10% | | |
| 1 | $5,000 | 5% | | |
| 2 | | 5% | | |
| 3 | | 5% | | |
| 4 | | 5% | | |
| 5 | | 5% | | |
| 6 | | 5% | | |
| 7 | | 5% | | |
| 8 | | 5% | | |
| 9 | | 5% | | |
| 10 | | 5% | | |