



## MIDDLE SCHOOL | UNIT 4 Using Credit Wisely

# Title Interest Adds Up

### LEARNING OBJECTIVES

Students will:

- **discuss** the relationship between credit scores and interest rates.
- **determine** the monthly payment, total interest paid, and the total loan cost of mortgages given different interest rates.
- **create** scatter plots and determine lines of best fit to determine relationships.

### Content Area

Math

### Grades

6–8

### Overview

*How much interest will you pay for a loan?* Students learn that higher interest rates lead to greater total loan amounts. The activity begins with students playing a game of “I Have, Who Has” which they later discover is about credit scores. They discover that people with better credit pay less for loans. Students then calculate loan costs using an online mortgage calculator. After discussing the results, they create a scatter plot of their data to determine the relationship and line of best fit of their data. The activity concludes with students learning steps they can take to build good credit and pay less in interest in the future.

### Themes

**Personal Finance:** Interest, loans, credit scores

**Math:** Percent calculations, scatter plots, line of best fit

### Common Core Math Standards

**MP1** Make sense of problems and persevere in solving them.

**MP2** Reason abstractly and quantitatively.

**6.RP.A.3.C** Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

**7.RP.A.2.A** Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

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**7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems by reasoning about the quantities.

### Connect

#### How does this connect to the student?

The interest rates a person pays when borrowing money is proportional to their credit score. Students may be encouraged to build good credit if they understand the financial implications of having poor credit (paying much more over the course of a lifetime to borrow money).

#### How does this connect to careers?

**Loan Officer:** When a person or business wishes to get a loan, they often meet with the loan officer at a financial institution. This person evaluates the person's (or business's) credit and determines whether to lend them money. The loan officer also determines how much interest the client will be charged based on their creditworthiness.

#### How does this connect to the world?

Credit is not only for individuals. Businesses, cities, states, and even countries borrow money and develop their own credit history. When someone refers to the credit rating of a government entity, they are usually referring to the rating of that government's sovereign bond. Instead of being given a number like a credit score, these bonds are rated with a letter scale where AAA is highest, and BBB is lowest. In between ratings include AA+, AA, AA-, A+, A, A-, and BBB+.

### Key Terms

**Personal Finance:** interest rate, financial institution, creditworthiness, credit score, credit report, loan, mortgage, term, amortization, principal

**Math:** interest, rate, inversely proportional, percent, scatter plot

### Prepare

**Background:** Many interest calculations that students perform are based on interest that is earned (i.e., in a savings account). It is equally important that students understand that interest is also frequently paid by consumers when they borrow money in the form of a loan or the use of a credit card. In this activity, students will examine the impact that **interest rates** (the percentage charged for borrowing money) have on the overall amount paid for a loan. The goal is for students to understand that even a seemingly small difference in interest rates can make a big difference in how much a consumer pays over the life of a loan.

Students should understand that interest rates are set by **financial institutions** (banks, credit unions, and others that lend money to consumers). Rates often vary somewhat from one financial institution to another in order to be competitive. However, the same financial institution may offer one person a lower or higher interest rate than another. This is usually for one of two reasons. First, interest rates on certain types of loans or credit will be higher than others. The rate charged for car loans, home loans (mortgages), and credit cards will all be different. Each has a different amount of risk involved because of the type of collateral or lack thereof. Second, interest rates also depend on the **creditworthiness** of the borrower.

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Creditworthiness is an indication of how much risk is involved with lending money to a borrower based on his or her past borrowing behaviors. Creditworthiness is indicated numerically by a person's **credit score**—generally a number from 300 to 850 with lower numbers indicating higher levels of risk. Credit scores are based on information in a person's **credit report**. These reports have information on people's past and current **loans** (money that is borrowed and paid back) including their payment history and outstanding balances. People who are considered less creditworthy have poor credit reports and lower credit scores. They will also be charged higher interest rates by financial institutions to make up for the fact that there is a higher chance that the person will fail to pay back the loan.

In this activity, students will not make actual interest rate calculations as these are rather complex for middle school students. Instead, they will use an online calculator to compare interest rates and the total amount a person will pay in interest over the course of a loan. After gathering this data, students will draw conclusions about the relationship between interest rates and total loan amounts.

## Materials

- **I Have, Who Has Activity Handout**—one copy cut into cards
- **Credit Card**—for display purposes only
- **Credit Score Ranges Student Handout**—one copy per student or electronic copy for display
- **Interest Rates: A Comparison Student Capture Sheet**—one copy per student
- **Interest Rates: A Comparison Student Answer Key**—one copy for reference
- **Steps to Building Good Credit Student Handout**—one copy per student or electronic copy for display
- **Computer and internet access**
- [What is Credit, and How do You Use It? Unit 4 Student Video](#)
- **Calculators (optional)**—one per student

## Engage

- Distribute cards from the **I Have, Who Has Activity Handout** to seven students. Keep the teacher card for yourself. Explain that you will begin the activity by reading the teacher card, “I have 520. Who has the highest a person can get—850?” Direct the student with the “I have 850” card to come to the front of the class and read it aloud. As students come to the front of the room, they should line up in order from least to greatest.
- Once you and the student volunteers are lined up in order (300, 400, 520, 579, 600, 700, 750, 850), ask students if they have any idea what these numbers might represent. Record student ideas for reference later.

## Teach

- Play the video [What is Credit, and How do You Use It?](#)
- Reference the list of student ideas gathered earlier. If anyone said credit scores, congratulate them. If not, explain that the numbers represented the range of possible credit scores—300 to 850.
- Display or distribute **Credit Score Ranges Student Handout** for students. Facilitate a brief discussion of the graph and chart. What do students notice about the distribution of the scores within the U.S. population? Where on the chart do the scores from the opening activity fall?
- Let students know that credit scores are an indication of how much risk a bank or other financial institution is taking when lending that person money. People with high scores generally pay their bills on time and don't borrow more than

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they can afford to pay back. Therefore, people with poor borrowing habits are charged higher interest rates. Explain that interest rates and credit scores are **inversely proportional** (if one is high, the other is low). Challenge students to explain why financial institutions charge people with high (good) credit scores a lower interest rate and vice versa.

- Inform students that they will be investigating the impact that interest rates have on the amount a person will pay for a loan on a house, also known as a **mortgage**. Distribute one **Interest Rates: A Comparison Student Capture Sheet** to each student.
- Direct students to determine a reasonable house price for this activity and decide the **term** (or duration) of the loan—either 15 or 30 years. If desired, students can look online to determine prices of homes in their area. Allow students to calculate their own down payment based on an amount or percentage of their choosing or assign a standard amount such as 20% to all students.
- Give students an example mortgage such as the one from the answer key (\$200,000 home price, \$40,000 down payment, \$160,000 mortgage, and 30-year term). Invite students to guess how much the monthly mortgage payment would cost and how much interest they will pay over the course of the loan. Let students know that they won't be doing the actual calculations. Instead they will use an online calculator.
- Demonstrate the use of an online mortgage calculator that shows the **amortization** (payment breakdown of interest paid, principal paid, and loan balance over the life of the loan) such as [this one](#) from Bankrate. Remind students that **principal** is the original amount of the loan or how much they originally borrow. If desired, show the full amortization schedule.
- Invite students to complete their worksheet using an online calculator. Students may need to complete their own calculations to determine the total cost of the mortgage (total principal paid plus the total interest paid). Discuss the results of their calculations. Are they surprised by the total amount of the loan? How would the amount they pay in interest differ if they were offered the lowest interest rate versus the highest interest rate? At what interest rate do they pay as much or more in interest than they would in principal? (Student answers will vary. If desired, show sample answers from the **Interest Rates: A Comparison Answer Key**.)
- Challenge students to describe the relationship they see between the interest rate and the interest paid using mathematical terms. Do they think the relationship is linear or another shape? How could they determine if the relationship is linear?
- Challenge students to create scatter plots using their data and develop a line of best fit. Ask students which two values would be most important to compare. If desired, students can create more than one scatter plot (i.e., interest rate versus monthly payment, interest rate versus total interest paid, or interest rate versus total cost of the mortgage). Graphs can be created by hand or using technology. Compare and discuss the results. Samples answers are shown in **Scatter Plots and Lines of Best Fit Answer Key**.

## Conclude

- Remind students that they have the power to influence the interest rates they will be offered some day on a loan. Display and discuss **Steps to Building Good Credit Student Handout**.
- Direct students to submit an exit ticket answering the question: What impact could a good credit score have on my financial future?

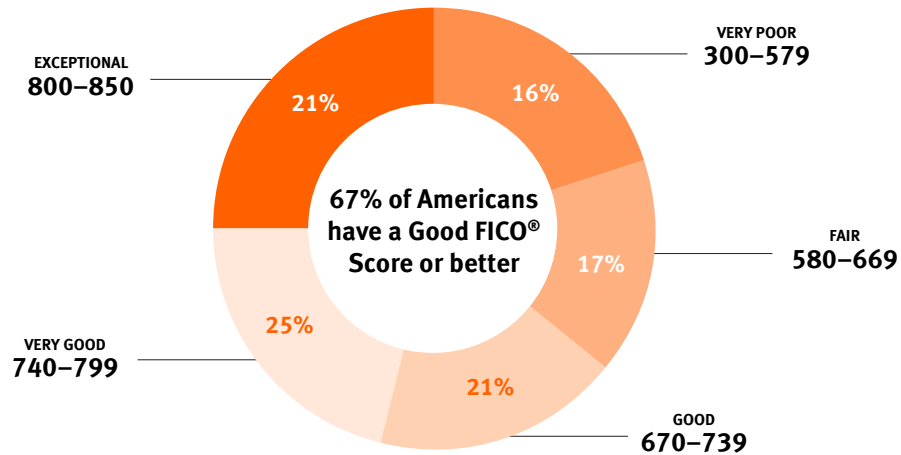
## Extend

- **Mathematics:** Further explore a complete amortization table. Challenge students to graph the data over time to show how the amount of principal which is owed decreases over the length of the loan.
- **Mathematics:** Credit scores aren't the only thing that influence a person's ability to receive a loan. A person's "debt to income" ratio is also important. Direct students to investigate what is meant by a debt-to-income ratio and prepare and exchange sample debt-to-income ratio problems with classmates.
- **Research:** Invite students to conduct research to compare interest rates on various types of loans from a variety of financial institutions. Why do they think the rates vary from one financial institution to another?
- **Research:** Direct students to research credit reports and credit scores. What information is found on a credit report? How are credit scores derived?
- **Guest Speaker:** Invite a loan officer or the manager of a local financial institution to visit your class and further discuss elements of creditworthiness. If possible, ask them to explain and provide samples of calculations they perform when determining whether to loan money to an individual. Ask the speaker to also discuss what information people need to provide when applying for a loan.

# I Have, Who Has Activity

**Directions:** Print one copy and cut into cards for use in the activity.

<p><b>(Teacher card)</b></p> <p>I have <b>520</b>.</p> <p>This is the highest score you can get. Who has 850?</p>	<p>I have <b>300</b>.</p> <p>This is considered a fair score. Who has 600?</p>
<p>I have <b>600</b>.</p> <p>This is thought to be a good score. Who has 700?</p>	<p>I have <b>850</b>.</p> <p>One point higher and this score would be fair instead of very poor. Who has 579?</p>
<p>I have <b>579</b>.</p> <p>This is the lowest score you can get. Who has 300?</p>	<p>I have <b>750</b>.</p> <p>This is another very poor score. Who has 520?</p>
<p>I have <b>700</b>.</p> <p>This is considered a very poor score. Who has 400?</p>	<p>I have <b>400</b>.</p> <p>This is a very good score. Who has 750?</p>



Credit Score	Rating	% of People	Impact
300-579	Very Poor	16%	Credit applicants may be required to pay a fee or deposit, and applicants with this rating may not be approved for credit at all.
580-669	Fair	17%	Applicants with scores in this range are considered to be subprime borrowers.
670-739	Good	21%	Only 8% of applicants in this score range are likely to become seriously delinquent in the future.
740-799	Very Good	25%	Applicants with scores here are likely to receive better than average rates from lenders.
800-850	Exceptional	21%	Applicants with scores in this range are at the top of the list for the best rates from lenders.

Source: *What is a Good Score?* from [Experian](#).

# Interest Rates: A Comparison

**Directions:** Complete the top section of the worksheet with reasonable amounts for each category. Complete the chart using an online mortgage or amortization calculator.

<p><b>Purchase Price of the House</b> How much does the house cost that you wish to buy?</p>	
<p><b>Down Payment Amount</b> How much will you pay now for the house (usually between 15 and 25 percent of the purchase price)?</p>	
<p><b>Mortgage Amount</b> How much will you be borrowing to purchase the house (the purchase price minus the down payment)?</p>	
<p><b>Mortgage Term</b> How long will it take you to pay back your loan? (15 or 30 years)</p>	

Interest Rate	Monthly Payment	Total Principal Paid	Total Interest Paid	Total Cost of the Mortgage (Total Principal + Total Interest)
3.85%				
4.50%				
4.99%				
5.65%				
6.89%				
8.23%				



# Interest Rates: A Comparison | Answer Key

ANSWER KEY

**Directions:** Complete the top section of the worksheet with reasonable amounts for each category. Complete the chart using an online mortgage or amortization calculator.

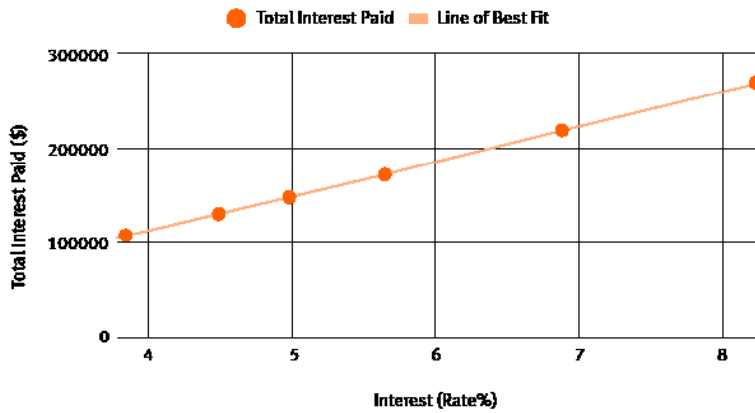
**SAMPLE STUDENT ANSWERS SHOWN—Actual student responses will vary.**

<b>Purchase Price of the House</b> How much does the house cost that you wish to buy?	<b>\$200,000</b>
<b>Down Payment Amount</b> How much will you pay now for the house (usually between 15 and 25 percent of the purchase price)?	<b>\$40,000 (20%)</b>
<b>Mortgage Amount</b> How much will you be borrowing to purchase the house (the purchase price minus the down payment)?	<b>\$160,000</b>
<b>Mortgage Term</b> How long will it take you to pay back your loan? (15 or 30 years)	<b>30 years</b>

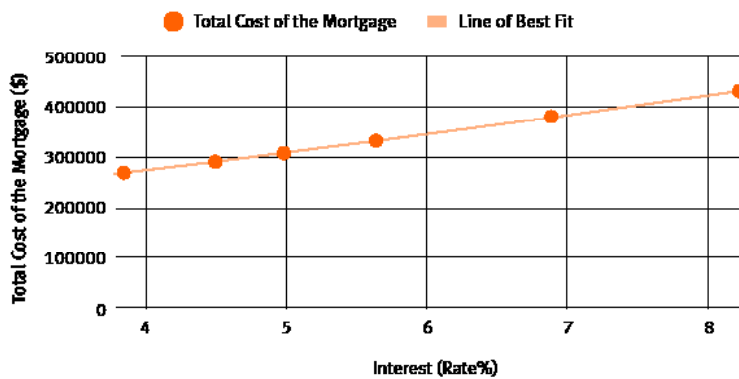
Interest Rate	Monthly Payment	Total Principal Paid	Total Interest Paid	Total Cost of the Mortgage (Total Principal + Total Interest)
3.85%	<b>\$750.09</b>	<b>\$160,000.00</b>	<b>\$110,033.54</b>	<b>\$270,033.54</b>
4.50%	<b>\$810.70</b>	<b>\$160,000.00</b>	<b>\$131,850.74</b>	<b>\$291,850.74</b>
4.99%	<b>\$857.94</b>	<b>\$160,000.00</b>	<b>\$148,857.32</b>	<b>\$308,857.32</b>
5.65%	<b>\$923.58</b>	<b>\$160,000.00</b>	<b>\$172,487.81</b>	<b>\$332,487.81</b>
6.89%	<b>\$1,052.69</b>	<b>\$160,000.00</b>	<b>\$218,968.49</b>	<b>\$378,968.49</b>
8.23%	<b>\$1,199.78</b>	<b>\$160,000.00</b>	<b>\$271,919.96</b>	<b>\$431,919.96</b>

The following sample scatter plots and lines of best fit were prepared using the data from the sample answers and the Scatter Chart option in Google Sheets.

**Scatter Plot Comparing Interest Rate and Total Interest Paid**



**Scatter Plot Comparing Interest Rate and Total Cost of the Mortgage**



**Scatter Plot Comparing Interest Rate and Monthly Payment**

