


LESSON 16.1 Repaying Loans

 **TEKS**
Personal financial literacy—8.12.A Solve real-world problems comparing how interest rate and loan length affect the cost of credit. Also 8.12.B, 8.12.E



ESSENTIAL QUESTION

How do you calculate the cost of repaying a loan?

Comparing Interest Rates

How much does it cost to borrow money? When you use a credit card or get a loan from a bank, the cost of borrowing the money depends on two factors. The first is the interest rate that you pay. The second is the time that you take to pay off the total amount.

Interest is the money that you pay to borrow money or use credit. The interest rate determines in part the cost of a loan or of purchases on a credit card.



EXAMPLE 1



 **TEKS** 8.12.A, 8.12.B

- A** In September, Alex charged his textbooks, clothes, and some downloads on his credit card. He received a bill from his credit card company for \$1000. The interest rate on his card is 21%. He is going to pay in 3 monthly payments. He wants to know how much this loan will cost him in interest.

Use an online calculator. Enter these numbers:

Loan amount: \$1000

Loan term: 3 months

Interest rate: 21% per year

The calculator converts to 0.25 year.

Click CALCULATE.

Monthly payment: \$345.07

What is Alex's total repayment?

$$\$345.07 \text{ monthly payment} \times 3 \text{ months} = \$1035.21$$

The credit card company loaned Alex \$1000, and he paid \$1035.21 back to the credit card company. What was the cost of this loan?

$$\text{Interest paid} = \$1035.21 - \$1000 = \$35.21$$

The cost of the loan

- B** Barry takes out a loan from his bank for \$1000 to buy a bicycle. The interest rate on his loan is 9%. He is going to pay the total amount in 3 monthly payments. Use an online calculator to find the cost of his loan.

What is Barry's total repayment and the cost of his loan?

$$\$338.35 \text{ monthly payment} \times 3 \text{ months} = \$1015.05$$

$$\text{Interest paid} = \$1015.05 - \$1000 = \$15.05$$

The cost of the loan



Math Talk



Mathematical Processes

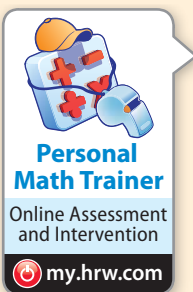
In addition to the interest you pay to borrow money, what other costs may there be when you take out a loan?

Reflect

- 1. What if?** If Alex had saved \$333.34 a month for 3 months, how much money would he have? If he had used his savings instead of his credit card, how much less would his purchases have cost him?

2. How much less did Barry's loan, at an interest rate of 9%, cost than Alex's loan at 21%?

3. Barry looks into the cost of repaying an easy access loan for \$1000. The up-front cost of the loan is \$3 for every \$20 borrowed, plus Barry will owe \$1000 at the end of the loan. How much will this loan cost Barry?



YOUR TURN

Use an online calculator to fill in the blanks for the easy access loans.

- | | |
|------------------------|------------------------|
| 4. Loan amount: \$5000 | Monthly payment: _____ |
| Loan term: 2 years | Total repayment: _____ |
| Interest rate: 7% | Interest paid: _____ |
| 5. Loan amount: \$5000 | Monthly payment: _____ |
| Loan term: 2 years | Total repayment: _____ |
| Interest rate: 21% | Interest paid: _____ |



Comparing Loan Lengths

You saw in Example 1 how the interest rate affects the cost of borrowing money. The time taken to repay the loan also affects the cost.

EXAMPLE 2



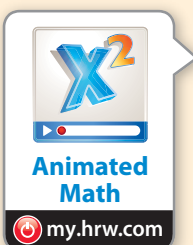
TEKS 8.12.A, 8.12.B

- A** Susan has a balance of \$1000 on her credit card. She stops using her card and pays the minimum monthly amount until the loan is paid off.

Use an online calculator. Enter these numbers:

Loan amount: \$1000
Loan term: 93 months
Interest rate: 18% per year

Click CALCULATE. Monthly payment: \$20.01



What is Susan's total repayment?

$$\text{\$20.01 monthly payment} \times 93 \text{ months} = \text{\$1860.93}$$

What was the cost of this loan?

$$\text{Interest paid} = \text{\$1860.93} - \text{\$1000} = \text{\$860.93} \quad \textit{The cost of the loan}$$

- B** Laura also has a balance of \$1000 at 18% interest on her credit card. She stops using her card. She wants to pay as much as she can each month to pay off the loan as quickly as she can.

Use an online calculator. Enter these numbers:

Loan amount: \$1000

Loan term: 3 years

Interest rate: 18% per year

Click CALCULATE. Monthly payment: \$36.15

What is Laura's total repayment?

$$\text{\$36.15 monthly payment} \times 36 \text{ months} = \text{\$1301.40}$$

What was the cost of this loan?

$$\text{Interest paid} = \text{\$1301.40} - \text{\$1000} = \text{\$301.40} \quad \textit{The cost of the loan}$$

Reflect

- 6. What If?** If Susan had put \$20 in her savings account each month, how long would it take her to save a total of \$1000? Compare this to the time she took to pay off her credit card loan of \$1000.

- 7.** Laura paid off her debt in 36 months while Susan took 93 months to pay off her debt of the same amount. How much less did Laura pay in interest than Susan paid?

YOUR TURN

Use an online calculator to fill in the blanks.

- | | |
|-------------------------------|------------------------|
| 8. Loan amount: \$5000 | Monthly payment: _____ |
| Loan term: 2 years | Total repayment: _____ |
| Interest rate: 15% | Interest paid: _____ |
| 9. Loan amount: \$5000 | Monthly payment: _____ |
| Loan term: 4 years | Total repayment: _____ |
| Interest rate: 15% | Interest paid: _____ |

Guided Practice

1. Kyle is going to take out a loan for \$1500 for 2 years. He wants to know how much more it will cost him in interest if he uses his credit card, at 20% interest, instead of borrowing from the bank at 11% interest. Find the difference in the cost of these two choices. (Example 1)

Enter the numbers in an online calculator and fill in the blanks.

Credit Card

Loan amount: \$ _____

Loan term: _____ months

Interest rate: _____% per year

Monthly payment: \$ _____

\$ _____ \times 24 months =

Total repayment: \$ _____

Interest paid: \$ _____

Bank Loan

Loan amount: \$ _____

Loan term: _____ months

Interest rate: _____% per year

Monthly payment: \$ _____

\$ _____ \times 24 months =

Total repayment: \$ _____

Interest paid: \$ _____

Kyle would pay \$ _____ less in interest if he borrows from the bank than if he borrows using his credit card.

2. How much less will Kyle pay in interest if he borrows \$1500 at 11% for 1 year instead of for 2 years? (Example 2)

Monthly payment: \$ _____

\$ _____ \times _____ months = Total repayment: \$ _____

Interest paid: \$ _____

Kyle will pay \$ _____ less for a loan that lasts 1 year instead of 2.



ESSENTIAL QUESTION CHECK-IN

3. How do you calculate the cost of repaying a loan using an online calculator?

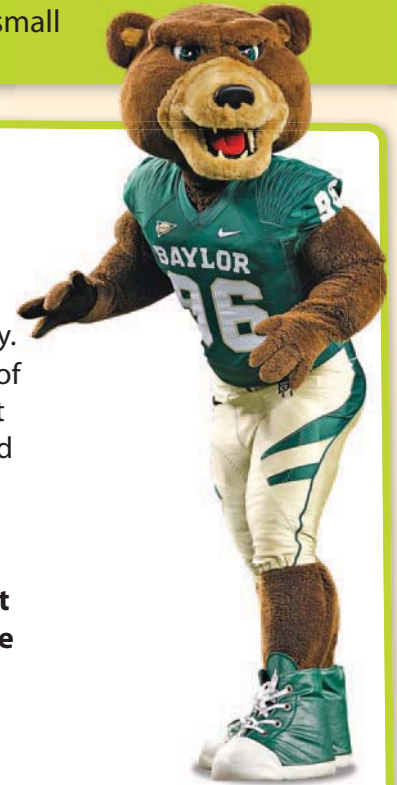
LESSON 16.2 Saving and Investing

TEKS Personal financial literacy—**8.12.D** Calculate and compare simple interest and compound earnings. Also 8.12.C.



ESSENTIAL QUESTION

How can you save money by investing small amounts of money regularly?



EXPLORE ACTIVITY 1 8.12.C, 8.12.D

Calculating Simple Interest

Interest is money paid by banks and others for the use of depositors' money. **Simple interest** is earned using the formula $I = Prt$, where I is the amount of interest, P is the principal, or the original amount deposited, r is the interest rate expressed as a decimal, and t is the time in years. Simple interest is paid at the end of the term based only on the principal at the beginning.

Adan makes regular deposits to a savings account to save money for college. He deposits \$1000 at the start of each year into an account that pays 4% simple interest at the end of each year. He does not deposit the interest.

- A** How much interest does Adan's account earn the first year?

$$I = Prt$$

Use the formula for simple interest.

$$I = 1000 \times \boxed{} \times 1 = \boxed{}$$

Substitute and simplify.

Adan's account earns _____ the first year.

- B** Complete the table to show how the interest earned grows over time.

Deposit phase	Beginning balance for new phase	Amount deposited	New balance	Amount of interest earned (at 4%)
1	\$0	\$1000	\$1000	\$40
2	\$1000	\$1000	\$2000	\$80
3	\$2000	\$1000	\$3000	\$120
4	\$3000	\$1000		
5		\$1000		
6		\$1000		
7		\$1000		
8		\$1000		
9		\$1000		
10		\$1000		

EXPLORE ACTIVITY 1 (cont'd)**Reflect**

1. How much interest did Adan's account earn from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10? How do these values compare? Explain.

2. What was the total amount saved from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10? Include the amount contributed and the interest.

EXPLORE ACTIVITY 2

TEKS 8.12.C, 8.12.D

Calculating Compound Interest

Compound interest is interest paid not only on the principal but also on any interest that has already been earned. Every time interest is calculated, the interest is added to the principal for future interest calculations. The calculation can be made more than once a year, but in this lesson only interest compounded annually will be found.

The formula for compound interest is $A = P(1 + r)^t$, where P is the principal, r is the interest rate expressed as a decimal, t is the time in years, and A is the amount in the account after t years if no withdrawals were made.

Lilly makes regular deposits to a savings account to save money for retirement. She deposits \$1000 each year, and her account earns interest compounded annually at a rate of 4%.

- A** How much interest does Lilly earn the first year?

$$A = P(1 + r)^t \quad \text{Use the formula for compound interest.}$$

$$A = 1000 \times \left(1 + \boxed{}\right)^1 \quad \text{Substitute.}$$

$$A = \boxed{} \quad \text{Simplify.}$$

So, Lilly's account earns _____ - \$1000 = _____ the first year.

- B** Complete the table to show how the amount in the account accumulates over time. Round all values to the nearest cent.

Year	Beginning balance for new year	Amount deposited	New balance	Amount of interest earned (at 4%)	Ending balance
1	\$0	\$1,000	\$1,000	\$40	\$1,040
2	\$1,040	\$1,000	\$2,040	\$81.60	\$2,121.60
3	\$2,121.60	\$1,000	\$3,121.60		
4		\$1,000			
5		\$1,000			
6		\$1,000			
7		\$1,000			
8		\$1,000			
9		\$1,000			
10		\$1,000			

Reflect

- 3.** How much interest did Lilly's account earn from the initial deposit to the end of year 5? from the start of year 6 to the end of year 10?

- 4.** Compare the interest earned during the two five-year periods. Explain the difference.

- 5.** Compare the final balance in this Explore Activity to the total amount deposited and earned in interest in Explore Activity 1 (see Reflect question 2). What can you conclude?



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Comparing Simple and Compound Interest

In this example, you will compare simple and compound interest in a situation where no additional deposits are made.

EXAMPLE 1



TEKS 8.12.D

Suppose you have two savings accounts, both with a principal of \$100 and an interest rate of 5%, but one earns simple interest and one earns interest compounded annually. Which account will earn more interest after 10 years?

STEP 1

Find the amount of simple interest earned in 10 years.

$$I = Prt$$

Use the formula for simple interest.

$$I = 100 \times 0.05 \times 10$$

Substitute 100 for P , 0.05 for r , and 10 for t .

$$I = 50$$

Simplify.

The account earning simple interest will earn \$50.

STEP 2

Find the amount of interest compounded annually earned in 10 years.

$$A = P(1 + r)^t$$

Use the formula for compound interest.

$$A = 100(1 + 0.05)^{10}$$

Substitute 100 for P , 0.05 for r , and 10 for t .

$$A = 162.89$$

Simplify. Round to the nearest cent.

Subtract the principal of \$100 to find the interest earned, \$62.89.

The account earning interest compounded annually will earn \$62.89.

STEP 3

Compare the interest earned in each account.

The account that earns interest compounded annually earns \$62.89, which is \$12.89 more than the \$50 of simple interest earned.



YOUR TURN

6. Marlena saved \$50 in an account earning 3.5% simple interest. How much more interest would her account earn in 10 years if her account earned interest compounded annually instead of simple interest?



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