

Basic Lending Concepts and Calculations

Importance of Loan Math Skills

“Don’t calculators and computers do all the math?” If that’s the thought in your mind, here are a few ways loan math skills can help you:

1. Explain computer calculations and loan terms to members.

Learning how to calculate interest and other charges for different types of loans can help you provide better member service. When you know how payments are determined and what factors can change the interest and payments on loans and credit, you can answer member questions knowledgeably. Simply saying, “The computer does that” does not inspire confidence. Saying, “Let me show you how that works” gains members’ trust and respect.

2. Process manual adjustments.

At times, you may need to make a manual adjustment to a loan, such as adjusting a loan payment to correct a misapplied payment. A knowledge of loan and credit calculations allows you to accomplish this task quickly and accurately.

3. Work effectively with loan ratios and make loan decisions.

Learning how to calculate ratios, as well as their purpose, helps you understand how and why loan decisions are made. If you are responsible for loan decisions, you’ll gain a deeper under-

Objectives

Upon completion of this chapter, you will be able to:

1. List four reasons math skills are important for credit union employees;
2. Compare and contrast key features of open-end credit and closed-end credit;
3. Define *finance charge* and *annual percentage rate (APR)* according to the Truth-in-Lending Act;
4. Describe techniques for converting percentages to decimals, rounding numbers, and counting days when calculating interest;
5. Explain techniques for helping members understand calculations.

standing of how to analyze ratios so you can make good decisions.

4. **Help members shop for loans and credit.** Credit unions are known for their consumer-oriented products and services, and competitive rates and fees on loans. However, members don’t always know how to comparison shop for loans or credit accounts. A low rate at another lender may look appealing, but hidden costs may increase the overall cost of the loan. You can help members find out the true cost of credit and make smart

comparisons. In the process, you'll learn more about your credit union's competition and how you can sell your credit union's loan benefits.

Saying "Let me show you how that works" gains the member's trust and respect.

Interest Calculations

Before we dig into the details of various math processes, let's take a broader view of how loan type affects calculations. The type of loan—whether a loan or credit account is open-end or closed-end—can have a significant effect on how the interest is calculated.

Closed-end credit is a one-time extension of credit. Examples are a 60-month automobile loan or a 30-year mortgage loan. With this type of account:

- Each loan is considered a separate

transaction with a definite term, or ending date.

- The number of payments and end date for the loan are calculated at the beginning of the loan.
- The interest rate may be fixed for the term or it may vary according to market conditions.

With **open-end (or revolving) credit** the member makes a one-time application to access an approved credit limit on an ongoing, or revolving, basis. Examples are credit card and home equity line-of-credit (HELOC) accounts with open-end credit:

- The credit union sets a credit limit that is the maximum amount the member can have outstanding on the account.
- The credit union calculates an

Activity 1.1

Classifying Your Credit Union's Loans and Credit by Type



Find out which of your credit union's loans are closed-end and which are open-end. List the types.

Closed-end

Open-end

The Truth-in-Lending Act was enacted to help consumers shop for credit.

interest charge on the unpaid balance. On some accounts, the interest rate varies according to market conditions, which can complicate the calculations.

- The balance can vary frequently, so it may be difficult to explain to members how the interest was calculated.

In chapters 2 and 3 of this module we review typical interest and payment calculations for closed-end credit accounts. In chapter 4 we describe typical calculations for open-end credit accounts.

Complete activity 1.1 to learn more about your credit union's open- and closed-end loans.

How the Truth-in-Lending Act Affects Loan Disclosures and Member Education

The federal Truth-in-Lending Act (implemented by Regulation Z) is an important law to understand because it significantly affects how your credit union discloses interest rates and fees to members. Before this law was enacted, consumers sometimes found that loans from different lenders were difficult to compare. Interest calculation methods differed and fees might not be clearly disclosed. The law's intent is to require uniformity in how lenders present certain information so that consumers can compare the cost of credit plans offered by different lenders.

Regulation Z sets different disclosure requirements depending on whether the loan is open-end or closed-end. More information on these requirements is covered in chapters 2, 3, and 4.

Two basic concepts apply to all loan disclosures: finance charge and annual percentage rate. Let's discuss them here.

Finance Charge

Regulation Z requires lenders to disclose the finance charge to the consumer. A **finance charge** is the total cost of consumer credit expressed as a dollar amount. Certain items, such as loan interest, points, and loan origination fees, must be included in the finance charge. However, Regulation Z specifically excludes a number of items from the finance charge, such as credit card annual fees and loan application fees that are charged whether or not credit is actually extended. When computing the finance charge on a loan, you must ensure that only the correct items are included for that loan.

Annual Percentage Rate

Regulation Z requires lenders to disclose total finance charges associated with a loan as both a dollar amount and an annual percentage rate (APR). **Annual percentage rate (APR)** is a measure of the cost of credit, expressed as a yearly percentage rate. It's calculated from an equation based on the amount financed, the finance charge, and the term of the loan.

The APR is not the same as the interest rate, except when simple interest is the only cost of credit included in the finance charge. Some types of loans, such as real estate loans, typically include other charges as part of the finance charge. This causes the APR to be higher than the stated interest rate and can be confusing to a member.

However, APR is the key to comparing the real cost of different loans. To explain APR to a member, you need to understand what charges are included in the calculation.

Basic Techniques for Loan Calculations

Before we go further in this module, let's look at some basic techniques that apply to many calculations. They include:

- converting percentages and decimals;
- rounding numbers;
- counting days for calculating loan interest.

Converting Percentages and Decimals

Throughout this module, you perform calculations that are based on interest rates expressed as percentages, such as 9 percent interest on a loan. However, to perform most of the calculations, we convert percentages to decimal numbers.

Here's how it works: To convert a

percentage to a decimal number,

- Move the decimal point two places to the left and drop the % sign or word *percent*. For example, 125 percent becomes 1.25.
- At times, you need to add zeroes as “place holders” or drop zeroes when they're not needed. For example, 2 percent becomes 0.02. Or, 30 percent becomes 0.3.
- The decimal point may not always appear and you need to know where it is “understood.” For example, in 42 percent, no decimal point appears, but its placement is “understood” to be after the 2.

Here are more examples:

$$15 \text{ percent} = 0.15$$

$$6\% = 0.06$$

$$9.1\% = 0.091$$

$$5.25\% = 0.0525$$

At times, calculations may require you to convert a decimal number to a percentage. To do this, move the decimal point two places to the right and add a % sign or the word *percent*.

Activity 1.2

Converting Percentages and Decimals



Convert the following percentages to decimals.

25 percent = _____

$$8\% = \underline{\hspace{2cm}} \quad 0.035\% = \underline{\hspace{2cm}}$$

$$23.4\% = \underline{\hspace{2cm}} \quad 1.50\% = \underline{\hspace{2cm}}$$

7.25% = _____

Convert the following decimals to percentages.

$$0.45 = \underline{\hspace{2cm}} \quad 0.087 = \underline{\hspace{2cm}}$$

$$0.09 = \underline{\hspace{2cm}} \quad 0.638 = \underline{\hspace{2cm}}$$

$$2.4 = \underline{\hspace{2cm}} \quad 0.05 = \underline{\hspace{2cm}}$$

Answers appear in appendix B.

Here's how it works:

0.23 = 23 percent

0.04 = 4%

3.3 = 330%

0.044 = 4.4 percent

Complete activity 1.2 to practice converting percentages and decimals.

Rounding Numbers

Ever had a calculation turn out with an answer such as \$14.5948573635241637494905? It's pretty tough to pay that amount to a member so that's why we "round" numbers. **Rounding** usually refers to simplifying numbers by expressing a number that includes a fraction as a whole number, such as simplifying $31\frac{1}{4}$. The usual rules for rounding numbers are:

- If the fraction is less than $\frac{1}{2}$, then the number is rounded down to the next lowest whole number. For example, $31\frac{1}{4}$ is rounded down to 31. Or, if the number is $52\frac{1}{2}$, then it's rounded down to 52.
- If the fraction is equal to $\frac{1}{2}$ or higher, then the number is rounded up to the next highest number. If the number is $73\frac{3}{4}$, then it is rounded up to 74. If the number is $26\frac{1}{2}$, then it is rounded up to 27.

Rounding applies to numbers that include decimal fractions as well. The rules for rounding decimals are more complex because you first must choose the desired number of decimal places. This depends on the situation.

A situation you may be familiar with is rounding numbers on a tax return. Federal and state governments allow taxpayers to round dollar and

cent amounts to the nearest whole dollar, with the rule that \$0.50 or more is rounded up to the next whole dollar. Amounts that are \$0.49 or less are rounded down. Therefore, taxpayers can enter a number such as \$57.32 as \$57 or \$10,013.89 as \$10,014. With this system, the calculations on the tax return are easier to calculate for both taxpayers and the government.

When dealing with money calculations at a credit union, you'll typically round to two decimal places—to the nearest cent. For example, if the result of your calculation is \$23.14739, you need to round the number to two decimal places to arrive at a number that makes sense as money.

In general, only round numbers after you have calculated the final number in an equation. For example, if you convert a loan percentage rate to a decimal, such as 5.39 percent to 0.0539, use all the decimal places to calculate the interest. Then, round the interest dollar amount last.

Here's how to round numbers to two decimal places:

First, look at the number and find the digit that is in the third decimal place.

- If the digit in the third decimal place is 5 or higher, increase the digit in the second decimal place by one.
- If the digit in the third decimal place is 4 or lower, don't change the digit in the second decimal place.

Then, drop any numbers in excess decimal places.

Here's how it works: For the number \$23.14739, the digit in the third

To figure out which days to count when calculating interest, ask yourself, “Who is holding the money at midnight on each day?”

decimal place is 7 and the digit in the second decimal place is 4. The number 4 is rounded up to 5 and the resulting number is \$23.15. Here are more examples:

Starting Number	Digit in the Third Decimal Place	Rounded Number
33.148	8 (rounds up)	33.15
5.5819	1 (rounds down)	5.58
897.935	5 (rounds up)	897.94
63.89943	9 (rounds up)	63.90
8.99930	9 (rounds up)	9.00

Complete activity 1.3 to practice rounding numbers.

Counting Days for Calculating Loan Interest

A third basic concept is how to count days when figuring loan interest. For example, if Jack, a member, receives the money for a loan on August 4 and repays the whole balance on August 12, how many days of interest should Jack pay?

To calculate which days to count, first ask yourself, “Who is holding the money at midnight on each day?”

If the answer is the member, then the member pays interest for that day.

If the answer is the credit union,

then the member does not pay interest for that day.

Here’s how it works: Let’s go back to the example of Jack’s loan that was disbursed on August 4 and repaid on August 12. Here’s who holds the money on each day at the end of the day:

- August 4: member
- August 5: member
- August 6: member
- August 7: member
- August 8: member
- August 9: member
- August 10: member
- August 11: member
- August 12: credit union

Jack, the member, pays interest for eight days, by counting August 4 to 11. The credit union receives the payment on August 12. It could lend the money that same day to another member who would pay interest for August 12. Even if Jack paid the loan one minute before the credit union closes on August 12, he does not pay interest for that day.

Complete activity 1.4 to practice counting days when calculating loan interest.

Activity 1.3

Rounding Numbers



Round the following fractions and decimals. Round decimals to two places.

- | | |
|-----------------|-------------------|
| 1 1/2 = _____ | 23.642764 = _____ |
| 3 3/4 = _____ | 0.095112 = _____ |
| 53 1/3 = _____ | 0.85609 = _____ |
| 1.03478 = _____ | 42.993987 = _____ |
| 0.42879 = _____ | 3.997212 = _____ |

Answers appear in appendix B.

Tips for Explaining Loan and Credit Calculations to Members

An important reason for learning business math for loans and credit is to explain calculations to members. These techniques can be helpful when making explanations:

- **Find out the member's true need.**

Ask follow-up questions to ensure you clearly understand what the member wants. Does the member think the credit union has incorrectly credited a payment or made a calculation error? Does the member simply want an explanation of how a calculation is done? Is the member evaluating your program against your competition in terms of rate or cost?

- **Check that you have all the information.**

Do you understand the credit union's calculation method? If not, who else in the credit union can explain it to you or help you with the member? Does your computer system or Web site include loan calculators to help you show the member how the calculation is done? Do you have all the num-

bers to plug into a formula or other calculation? If the member is rate shopping, can he or she give you all the numbers about the competition so that you can produce a meaningful comparison? If you don't have all the competitors' information, can you call the competitor to find out what you need?

- **Walk the member through the calculation step by step, preferably with the result on paper.**

The member may be able to follow your steps on a computer screen or calculator, but you'll be more credible if the member walks away with the computation on paper. Write down the critical steps or give the member a paper tape from a calculator or printout from a computer program. A Truth-in-Lending disclosure form may assist you with the explanation.

- **Use a hypothetical example if the member is asking a general information question rather than inquiring about a specific transaction.** Examples are a powerful way to make a complex explanation easy to understand.

Activity 1.4

Counting Days for Calculating Loan Interest



1. If a member receives the money for a loan on September 9 and repays the whole balance on September 17, how many days of interest should the member pay?

2. If a member receives the money for a loan on January 18 and repays the whole balance on February 5, how many days of interest should the member pay?

3. If a member receives the money for a loan on June 25 and repays the whole balance on August 5, how many days of interest should the member pay?

Answers appear in appendix B.

Walk the member through the calculation step by step.

- **If the member questions the accuracy of a computer calculation, make sure you can reproduce the answer on your calculator or computer program.** This shows that the computer follows the credit union’s rules, not the other way around. Your credibility will soar if you can explain how the computer does the calculation.
- **As you are explaining the calculation, take the member through the calculation slowly so that he or she can mentally process it.** For many people, math calculations require significant concentration to understand each step.
- **Check the member’s facial expressions, gestures, and body posture for clues to his or her state of mind.** Does the member appear to be focusing attention on your explanation? Do the member’s facial expressions show understanding or confusion?
- **Ask the member questions during your explanation to verify understanding.** Calculate an additional example if the member needs reinforcement. To be prepared to answer members’ questions, have your tools and

resources ready:

- ◆ Determine what loan calculators are available on your computer system or Web site.
- ◆ Work through several examples on each calculator so that you can clearly explain them to members.
- ◆ Determine how to angle your computer screen so the member can see your actions.
- ◆ Print out the results of calculations so you see how the information is presented on paper.
- ◆ Mentally practice your verbal explanations.
- ◆ Be familiar with the competition’s loan rates and calculation methods through brochures, Web sites, and phone calls. Compare these methods to your credit union’s methods.

Complete activity 1.5 to prepare yourself for explaining calculations to members.

Key Concepts

Learning how to calculate interest and other charges for different types of loans can help you provide better member service. Saying, “Let me show you how that works” gains the mem-

Activity 1.5

Preparing to Explain Calculations to Members



What loan calculators are available on your credit union’s computer system or Web site?

Obtain copies of credit union documents that disclose interest rates and calculations according to Truth-in-Lending requirements. Keep these documents available as you work through this module so you can compare them to the course descriptions.

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To convert a percentage to a decimal number, move the decimal point two places to the left and drop the % sign or word *percent*.

To convert a decimal number to a percentage, move the decimal point two places to the right and add a % sign or the word *percent*.

Rounding usually refers to simplifying numbers by expressing a number that includes a fraction or decimal as a whole number. If the fraction is less than $\frac{1}{2}$ or the decimal is less than 0.5, then the number is rounded down to the next lowest whole number. If the fraction is equal to $\frac{1}{2}$ or higher or the decimal is equal to 0.5 or higher, then the number is rounded up to the next highest number.

To figure out which days to count when calculating interest on a loan, ask yourself, Who is holding the money at midnight on each day?

When explaining calculations to members, walk the member through the calculation step by step. Ask the member questions during your explanation to verify understanding.

PLAY PAGE



Practice conversions, rounding, and counting days for interest calculations.

Reminder:

To access the Play Page, go to <http://training.cuna.org/playpage/index.html> or go to www.cuna.org and type "Play Page" into the Search Box. Select the title of this module, and then the chapter you want to review.