Basic Math and Definitions

Effective math skills help you to provide superior member service, and are a core competency of your job.

Few assets are more important to members than the money they deposit in their credit union. They want to be assured that their savings are handled professionally and calculated accurately. For a number of members—and many Americans for that matter—basic mathematics is a mystery bringing back painful memories of school days. Some members even suffer from math anxiety, which is an emotional reaction to mathematics and financial matters based on a past unpleasant experience.

With a mastery of basic math skills, you can help members understand how dividends on their share savings accounts are calculated. And you can explain account features that affect dividend calculations. Effective math skills help you to provide superior member service and are a core competency of your job. You can also help members achieve peace of mind about their money deposited at the credit union.

In this course different formulas and calculations are given to help you understand how your credit union's computer system automatically processes transactions and calculates dividends. Although you can rely on the system to accurately process transactions, there are times when you'll need to make a manual correction or explain a calculation to a member. Computers can do astonishing things, of course, but people are needed to ensure their accuracy.

This chapter, *Basic Math and Definitions*, provides a foundation for this course. In this chapter we cover standard terms, practices, and legal requirements concerning share account calculations. Understanding the math of share accounts helps you to respond to member questions and concerns, including:

- How do I choose the account that earns me the most dividends?

Objectives

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

1. Convert percentages to decimals;
2. Calculate annual rates of return and annualized rates of return;
3. Define basis points and calculate *basis points* in a dividend rate change;
4. Describe account features that affect dividend calculations: open-end or fixed term, fixed or variable dividend rates, and dividend period;
5. Explain the difference between accrued and credited dividends;
6. Define *compounding* and explain how it can increase the amount earned on a share account;
7. Calculate the average daily balance of a share account;
8. Explain how the Truth-in-Savings Act affects dividend calculations.

Few assets are more important to members than the money they deposit in their credit union. They want to be assured that their savings are handled professionally and calculated accurately.

- What rate will I earn on my deposit?
- Why did I earn a smaller dividend than I expected?
- Is my balance large enough to avoid paying a fee?

Dividends or Interest?

Interest is the price paid for the use of money, usually recorded as a percentage. Credit unions call the interest paid on a share savings account a *dividend.* Most credit union accounts pay dividends to accountholders. Why do credit unions call the interest earned on share savings accounts *dividends* instead of what banks refer to as *interest*?

In most cases, the terms mean the same thing—they underline the difference between banks and credit unions. Credit unions are member-owned, financial cooperatives. A member's deposit represents an ownership in the credit union. Dividends paid to the member are considered to be earnings on the member-owner's investment. Each member is equal to any other member; he or she has one vote in the elections of directors, who represent the members' interests and hire a CEO.

A savings deposit at a bank has no ownership rights for the customer. A bank is owned by investors who own shares of stock in the bank corporation. Unlike credit unions, the more money invested in the bank's stock, the more influence and votes a shareholder has in the bank. The returns that the stockholders receive are called dividends. A bank pays interest to depositors and dividends to stockholders—both groups want to get the highest rate of return possible.

Credit unions pay dividends on shares and members want a good return, but also want the credit union to be responsive to the needs of the members. Member service is more important to the credit union mission than profits. To summarize:

- **Dividends** are the return a credit union pays to a member-owner for the use of money he or she deposits to a share savings account.
- **Interest** is the return that a bank pays to a depositor-customer for use of money he or she deposits to a bank savings account.

Communicating Dividend Rates

When members ask questions about dividend rates or how they are calculated, you have several ways to answer them. The next section discusses converting percentages and decimals, expressing dividends and other investment income as a rate of return, and using basis points to describe changes in dividend rates.

Converting Percentages and Decimals—It's Easy

Percentages are part of the common language of all financial institutions, including credit unions. Most of the important information you communicate to members about dividend rates will be in the form of percentages. But to perform calculations, you'll need to convert percentages to decimal numbers. This is easy to do!

Here's how it works: To convert a percentage to decimal number, you

simply move the decimal point two places to the left and drop the % sign or the word percent. Sometimes you may need to add or drop zeros if they aren't needed. By using decimals, we can perform a calculation for almost any situation that involves percentages. Figure 1.1 shows examples of percentages expressed as decimals.

Figure 1.1

Converting Percentages into Decimals

Percentage		Decimal
10.25%	=	0.1025
4.50%	=	0.0450
3.00%	=	0.0300
0.25%	=	0.0025

The opposite is also true. A decimal can be expressed as a percentage by moving the decimal point to the right two places and adding the % sign or the word percent. Figure 1.2 shows decimals expressed as percentages.

Figure 1.2

Converting Decimals into Percentages

Decimal		Percentage
0.1025	=	10.25%
0.0450	=	4.50%
0.0300	=	3.00%
0.0025	=	0.25%

Dividends and Investment Income as Rates of Return

A **rate of return** expresses the number of dollars earned annually as a percentage of the amount invested. When a member considers an investment from outside the credit union, she is told that the amount she plans to invest is expected to earn $X over a specific period of time. The member then tries to determine what the rate of return would be. In another situation, she may have invested an amount for a certain period of time and is now trying to determine what the rate of return was.

It's important to explain to members that the rate of return is guaranteed in certain credit union accounts, such as certificates of deposit. In investments, such as stocks or mutual funds, the rate of return is not guaranteed. It's a basic rule of investing that the past performance of stocks or a mutual fund doesn't guarantee future earnings. In fact, this statement is written on all stock offerings.

Here's how it works: A rate of return is calculated based on the dollar amount invested and the dollar amount earned. Divide the amount of the *annual* earnings by the amount invested to get the annual rate of return as shown in this formula:

$$\frac{\text{annual earnings}}{\text{amount invested}} = \text{rate of return}$$

For example: Linda invested $1,000 and earned $100 over 1 year. The calculation for the rate of return is:

$$\frac{\text{annual earnings}}{\text{amount invested}} = \frac{\$100}{\$1{,}000} = 0.10 = \text{10 percent rate of return}$$

Linda's investment of $1,000 for one year earned $100. Her annual rate of return was 10 percent, as this calculation shows.

For accurate comparisons, a rate of return calculation takes into consideration how long the funds have been invested. For example, if Linda is considering an investment that has earned 15 percent over five years, how does

she know if that was a good return compared with other investments that advertise a shorter time period? Linda needs to know an annual rate of return for the investment choices. As a credit union representative, you'll be asked to calculate and explain the annual rate of return for members.

For this reason, rate of return calculations, such as those for share savings accounts, are computed on a period of a year and the result is expressed as an annual rate of return. For example, if a $1,000 investment earned $100 in 1 year, then the annual rate of return is 10 percent. When members can compare investment options by looking at annual rates of return, then they are making comparisons based on the same time period.

Annualized Rate of Return

Some investments may have a time period of less than one year. How can we compare the rate of return on this kind of investment with others having a longer time period? For example, after 1 month we might want to know how much an account will earn if the next 11 months go the same as the first month. In this case, we're talking about an ***annualized* rate of return**, instead of an *annual* rate of return, because we're projecting the results as if they occurred over a full year's time.

Here's how it works: To understand the annualized rate of return, let's assume that Linda's annual earnings on her savings are 12 times the amount earned in the first month. If Linda earned $2 in the first month on an investment of $300, we would calculate the annualized rate of return this way: multiply 1 month's earnings by 12; then divide the resulting amount by the investment, which is $300. The following example illustrates Linda's $300 savings deposit for 1 month, multiplied by 12, to get an annualized return.

$$\frac{\text{annual earnings}}{\text{amount invested}} = \frac{\$2 \times 12}{\$300} = \frac{\$24}{\$300} = 0.0800 = 8.00 \text{ percent rate of return}$$

Linda's annualized rate of return is 8 percent.

The following activity is similar to the previous example; the only differ-

Activity 1.1

Calculating the Annualized Rate of Return

Linda deposits $200 into a share account and earns a total of $12 over six months. Assuming the account earns the same amount in the last half of the year, what is the account's annualized rate of return? Write your calculations in the space provided.

Answer appears in appendix B.

Basis points are a type of financial shorthand; they are a convenient way to talk to fellow employees about rate changes. Many members, though, are unfamiliar with basis points and may not understand their meaning.

ence is that this time, Linda deposits $200 into a share account. Activity 1.1 gives you practical experience in calculating the annualized rate of return.

Basis Points Are a Financial Shorthand

Basis points are a financial shorthand; they are a convenient way to talk to fellow employees about rate changes. Many members, though, are unfamiliar with basis points and may not understand their meaning. It's a good idea to continue to use percentages with members—decimals and fractions are more difficult to understand. Some members, however, may be familiar with the concept of basis points.

A ***basis point*** equals 1/100 of one percent, and 1 percent has 100 basis points. If a dividend rate was lowered one percentage point from 5 percent to 4 percent, it has decreased 100 basis points. As a percentage, one basis point is expressed as 0.01 percent. As a decimal, a basis point is expressed as 0.0001.

If your credit union increases a dividend rate from 4.25 percent to 4.75 percent, this is an increase of 50 basis points.

Activity 1.2 gives you an opportunity to practice communicating dividend rate changes as basis points. As you can see from doing these exercises, basis points are easy to understand and a helpful tool for your professional development.

Now Featuring … Account Features

Share accounts have different features that affect how the dividends are calculated. In the following section, we cover the features that affect dividend calculations. It's a good idea to understand the features of a share account as members will ask you questions about the various features and how they affect their rate of return. We discuss the following:

- Open-end and fixed-term accounts;
- Fixed and variable dividend rates;
- Dividend period.

Open-End and Fixed-Term Accounts

Open-end and fixed-term accounts are easy to remember, since their definition is found within their name.

Open-end accounts, as the name implies, have no preset time period.

Activity 1.2

Rate Changes as Basis Points

Express the following dividend rate changes in terms of basis points.

From 3.50 to 5.00 percent: _____

From 4.20 to 4.10 percent: _____

From 5.00 to 7.25 percent: _____

From 1.90 to 3.00 percent: _____

Answers appear in appendix B.

They have an open end. The member can hold the account indefinitely. Some examples include regular share accounts, share draft accounts, and money market accounts.

Fixed-term accounts, also as the name implies, are share accounts that have a pre-arranged date where the account is closed or renewed—a fixed term. Share certificate accounts are examples, where a member will deposit in a share certificate for a set period of time, say one year.

In explaining the features of a share account to members, remember that dividend rates are expressed on an annualized basis. So, if a member wants a certificate of deposit for 9 months, the dividend rate will be based on a 12-month calculation. If you need to review annualized rates of return, turn to the section on this subject earlier in this chapter.

Fixed and Variable Dividend Rates

A **fixed dividend rate** means that the credit union pays the same rate on the share savings account until the pre-arranged end of the term. Or the member will get an advance notice that the rate is going to change. A share certificate is an example of a fixed-rate account, and it's typically the only fixed-rate account offered by credit unions.

If the credit union doesn't promise to keep the account's rate at the same level, that account has a **variable dividend rate**. Most accounts with variable dividend rates allow the credit union to set the dividend rate at whatever level the credit union chooses.

Some credit unions offer money market accounts that tie dividend rates to the same rate as the average rate of return paid on money market mutual fund investments, or some other external index that is typically published by government agencies or can be found in newspapers.

Calculating dividends on an account with a variable dividend rate may take a little more time than a fixed dividend rate since you'll need to know the dates the dividend rate changed and the rate to which it changed.

Dividend Period

To review, dividends are expressed on an annualized basis so that members can compare various rates. But since members may deposit their savings for less than a year or more than a year, dividends are calculated for specific time periods.

The **dividend period** is the time period during which a share account dividend is calculated and is usually monthly, quarterly, semi-annual, or annual. The dividend time period is for calculation purposes; members get paid for all of the time their funds are on deposit.

If a member opens an account in the middle of a dividend period, he receives full credit for the days his money is on deposit. The dividend is simply calculated for the days until the end of the period, and then calculated on the regular period after that. For instance, if the member opens an account on January 15, the dividend is calculated and credited for the days until January 31 and then on the calendar months after that time.

The dividend periods are calculated

Savings can grow magically! This is a key concept to recognize because the magic of compounding is a powerful motivator for members to save.

for the following times:

- **Monthly**—calculated over a calendar month.
- **Quarterly**—calculated over a quarter of the year: January–March, April–June, July–September, and October–December.
- **Semiannual**—calculated from the beginning of January through the end of June and from the beginning of July through the end of December.
- **Annual**—calculated from the beginning of January through the end of December.

Calculating Share Dividends

Members frequently ask how dividends are calculated. The following three concepts are helpful for you to understand. They include:

- Accrued and credited dividends;
- Dividend compounding;
- Average account balance.

Accrued and Credited Dividends

In the previous section we discussed how credit unions calculate dividends over a dividend period then credit them to a share account. **Accrued dividends** are dividends that a member has earned during a dividend period, but have not been posted to the member's account.

At the end of the dividend period the system credits the dividend to the share account. A **credited dividend** is an accrued dividend that is posted to the member's share account and is available to the member.

The difference between accrued and credited dividends is essential for you to know. Accrued dividends do not show up on the member's account statement; they become part of the member's share account balance when the computer credits them to the account.

Dividend Compounding—Do You Believe in Magic?

Compounding has been called magic. Share savings accounts that pay compound dividends grow rapidly as dividends are paid on both the original principal and the earnings. Or, another way of understanding compounding is that dividends are paid on dividends. Savings can grow magically! This is a key concept to recognize because the magic of compounding is a powerful motivator for members to save.

Simple interest is interest that is paid on the principal but not on the interest earned. For example: Jerry deposits $100 in a share account for one year at 4 percent. At the end of the year, he receives $4. In contrast, **compound interest** is interest that is paid on the principal *and* the dividends earned.

Review: Remember, to put this in a credit union context, just substitute the word *dividend* for the word interest. To review the similarities between dividend and interest, turn to the beginning of this chapter. For purposes of this lesson, we'll refer to *compound interest* as *compounding*.

Compounding frequencies tell how often a member's dividend earnings start to earn dividends of their own. Compounding frequencies can be daily, monthly, quarterly, semi-annual, or annual. To illustrate: Jerry deposits

Compounding has been called magic. Share savings that pay compound dividends grow rapidly as dividends are paid on both the principal and the earnings.

that same $100 in share account for one year at 4 percent. Jerry earns $4 for the first year:

$$\$100 + \$4 = \$104$$

Since the dividends are compounded annually on both the principal and the dividends earned in previous years, Jerry earns dividends on a $104 balance in the second year. So Jerry earns $104 times 0.04, or $4.16, the second year ($4.16 the second year, compared to $4 the first year).

As the balance grows, Jerry has the opportunity to earn a higher amount because the compounded earnings are included in the dividend calculation. Remember that compounding is one of the greatest incentives for members to save—magic in the making! It's critical that you understand compounding and that you are able to explain it.

Complete activity 1.3 to explain the magic of compounding to Dennis, who is new to the idea.

Average Daily Balance

Nobody wants to be considered average, right? Well, that may be the case for abilities and looks, but average is a necessary part of financial calculations. An **average** is the middle of a group of different values. Many credit unions pay dividends over a period of time—a month or a quarter—based on a member's account balance during the period.

Here's how it works: The average daily balance is equal to the sum of the daily balances, divided by the number of days in the period. Here's the formula for the average daily balance:

$$\frac{\text{sum of daily balances}}{\text{number of days in period}} = \text{average daily balance}$$

Figure 1.3 gives an example of how to calculate an average daily balance that uses one month as the period. Let's assume that Linda deposits $500 on October 1, withdraws $300 on October 6, and deposits $55 on October 20. You can see from the example that each balance amount is multiplied by the number of days at that amount, and then divided by the total number of days to get the average daily balance of $269.68.

In activity 1.4, Linda opens a share account with a $200 deposit. Read the

Activity 1.3

The Magic of Compounding

Determine how your credit union calculates compounding for its regular share accounts. Does it use a daily, monthly, quarterly, semi-annual, or annual frequency?

_____

Using what you just learned about compounding, practice explaining compounding to Dennis, who is unfamiliar with the magic of compounding. Based on what you just learned, what are the points that you are going to cover to explain compounding?

_____

_____

_____

Answers appear in appendix B.

Figure 1.3

Average Daily Balance

Account history for October 1 to October 31:

Date	Transaction	Amount	Balance
10/1	Opening deposit	$500	$500
10/6	Withdrawal	($300)	$200
10/20	Deposit	$55	$255

Calculation of total daily balances in the dividend period:

10/1–10/5	5 days x $500 =	$2,500
10/6–10/19	14 days x $200 =	$2,800
10/20–10/31	12 days x $255 =	$3,060
Totals	31 days	$8,360

$\frac{\$8,360}{\text{31 days in October}}$ = $269.68 average daily balance

remainder of the activity and calculate the average daily balance using the tools you just learned. Make sure to include your calculations in the activity box.

Effect of Truth-in-Savings Act on Savings Calculations

The federal Truth-in-Savings Act was passed to help consumers compare share and deposit accounts offered by credit unions and other financial institutions. One of the goals of the Act is to enable consumers to choose the best option when comparing different institutions or different accounts at one institution.

The law requires financial institutions to disclose fees, account rates, and other account terms before an account is opened and whenever a customer or member requests information. Credit unions must also provide certain information on any periodic statements they send to members. The Act places restrictions on dividend calculation methods, as well as how to determine account balances to calcu-

Activity 1.4

Calculating an Average Daily Balance

Linda opens a share account with a $200 deposit on the first day of the month. The other account activity during the 30-day month consists of a $100 deposit on the 11th day and a $200 deposit on the 25th day. What was the member's average daily balance during the month?

_____

_____

_____

_____

_____

_____

_____

Answer appears in appendix B.

The federal Truth-in-Savings Act was passed to help consumers compare share and deposit accounts offered by credit unions and other financial institutions.

late dividends. The National Credit Union Administration (NCUA) and banking regulators implement the act.

Review

Few assets are more important to members than the money they deposit in their credit union. They want to be assured that their savings are handled professionally and calculated accurately. With a mastery of basic math skills, you can help members understand how their share savings accounts are calculated; you can also explain account features that affect dividend calculations.

Why do credit unions call the interest earned on share savings accounts dividends while banks refer to earnings as interest? In most cases, the terms mean the same thing, but they underline the difference between banks and credit unions. Credit unions are member-owned, financial cooperatives where a member's deposit represents an ownership in the credit union. Dividends paid to the member are considered to be earnings on the member-owner's investment.

Percentages are part of the common language of financial institutions. Most of the important information you communicate to members about dividend rates is in percentages. To convert a percentage to decimal number, you move the decimal point two places to the left and drop the % sign or the word percent.

A rate of return is calculated based on the dollar amount invested and the dollar amount earned. It's worth explaining to members that the rate of return is guaranteed in certain credit union accounts, such as certificates. In investments, such as stocks or mutual funds, the rate of return is not guaranteed. An annualized rate of return is a projection, as if the return occurred over a full year's time.

Basis points are a type of financial shorthand; they are a convenient way to talk to fellow employees about rate changes. Many members, though, are unfamiliar with basis points and may not understand their meaning. It's a good idea to use percentages with members—decimals and basis points are more difficult to understand. A basis point equals 1/100 of 1 percent and 1 percent has 100 basis points.

Open-end accounts have no preset time period. They have an open end. The member can hold the account indefinitely. **Fixed-term accounts** are share accounts that have a pre-arranged date when the account is closed or renewed—a fixed term. A share certificate account is an example, where a member deposits money in a share certificate for a set period of time, say 1 year.

A **fixed dividend rate** means that the credit union pays the same rate on the account through the pre-arranged end of the term. An account rate that can be changed during the term of the account is a **variable dividend rate**.

The **dividend period** is the period for which a share account dividend is calculated. The dividend period for share accounts is usually monthly, quarterly, semiannual, or annual. **Accrued dividends** are dividends a member has earned during a dividend

period, but have not been posted to the member's account. A **credited dividend** is an accrued dividend that is posted to the member's share account and is available to the member.

Compounding has been called magic because share savings that pay compound dividends grow rapidly because dividends are paid on both the principal and the earnings. They can grow magically! This is a key concept to recognize because the magic of compounding is a powerful motivator for members to save. The average daily balance is equal to the sum of the daily balances, divided by the number of days in the period.

The federal Truth-in-Savings Act was passed to help consumers compare deposit and share accounts offered by credit unions and other financial institutions. One of the goals of the act is to allow consumers to choose the best option when comparing different institutions or different accounts at one institution.

Congratulations! You have just completed the first chapter, *Basic Math and Definitions*. You now have a solid foundation to continue the remaining chapters.

PLAY PAGE

Access an online PDF of the Key Share and Deposit Account Equations workbook.

We suggest that you print this guide and use it as you complete this module and help members with their questions and concerns.

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