Consumer Credit

Live within your income, even if you have to borrow money to do so.

What do you think humorist Josh Billings meant in his quote?

Credit is a promise to pay in the future for goods and services you purchase today. When you think of consumer credit, you might think of loans and credit cards. Most people use credit. Using credit has advantages and disadvantages. Credit lets you enjoy purchases while you are paying for them. However, if you use credit irresponsibly, you may find yourself with debt that you cannot afford to pay. Being in debt is not a problem as long as you can make punctual payments to eliminate the debt. Imagine your life without credit. If you had to save several years to buy a car, what would you use for transportation during the years you were saving? If you had to save for many years to purchase a home, where would you live while you were saving? Credit provides you with a way to increase your standard of living, as long as your purchases are made with careful financial planning.

Really?

The use of credit cards is incredibly prevalent in today's society. Those little plastic cards are everywhere!

- There are almost a billion MasterCard and Visa credit and debit cards in use in the United States.
- In 2006, Visa cardholders made more than $1,000,000,000,000 in purchases!
- Today's consumer owes money, on average, to 13 different lending institutions, including credit cards and loans!
- There are over 1 billion Visa cards used internationally!
- More than half of the United States population has at least two credit cards!

Clearly the small plastic card plays a major role in how you will conduct your financial life. A discussion about the credit card industry requires frequent use of numbers in the billions and trillions!

Really!

4-1 Introduction to Consumer Credit

Objectives

- Become familiar with the basic vocabulary of credit terms.

- Become familiar with types of lending institutions.

- Compute finance charges for installment purchases.

Key Terms

- credit
- debtor
- creditor
- asset
- earning power
- credit rating
- credit reporting agency
- FICO score
- installment plan
- down payment
- interest
- finance charge

WHAT DO YOU NEED TO KNOW BEFORE USING CREDIT?

Goods and services can be purchased in one of two ways. The first is "buy now, pay now," and the second is "buy now, pay later." If you purchase something that you do not pay for immediately, you are using **credit**. People who use credit are called **debtors**. Every time you use electricity, you are using credit, because you use the electricity and do not pay for it until the monthly bill arrives. People who use credit cards or take out loans are also using credit. Organizations or people that extend credit to consumers are called **creditors**.

There are advantages to using credit. You can shop without carrying large amounts of cash. You do not have to wait until you can pay in full to purchase something. Credit allows you to get use out of something while still paying for it. There are also disadvantages to using credit. Creditors charge interest on all purchases. Some people also feel that there is a tendency to overspend when using credit.

Any type of credit is based on honesty. Creditors need to be sure that they will be paid back before they extend credit. They will have you fill out an application for credit and will check your financial history. This history includes three basic items.

- **Assets** Assets are everything you own—your home, car, bank accounts, and other personal possessions.

- **Earning Power** Earning power is your ability to earn money now and in the future. Creditors want to make sure you have enough income to repay the debt.

- **Credit Rating** A credit rating is your credit "report card." Every time you use credit, the creditor reports how well you met your financial obligations to a credit reporting agency.

A **credit reporting agency** compiles records on all users of credit. These records are used by creditors before they issue credit to a consumer. The best way to start a good credit history is to open savings and checking accounts, pay all your bills on time, and successfully handle all your credit transactions.

Consumers are given credit scores based on these three criteria. The most popular score is the **FICO score**, named for its creator, Fair, Isaac and Company. The scores, which range from 300 to about 850, summarize the probability that debtors will repay their debts. A higher score indicates a better credit rating. A person with a score near 800 is less of a risk to a creditor than a person with a score near 500. The FICO score is widely accepted by creditors as a reliable way to judge credit worthiness. Gender, race, religion, nationality, and marital status do not affect credit scores.

Any transaction involving credit is a legal contract obligating you to make timely payments. To use credit responsibly, you need to know the language of credit, and the laws that protect creditors and debtors.

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Skills and Strategies

Some stores offer creditworthy customers the convenience of paying for merchandise or services over a period of time. This is an **installment plan**. The customer pays *part* of the selling price at the time of purchase. This is the **down payment**. The scheduled payments, or installments, are usually made on a monthly basis. Installment buyers are charged a fee. This fee is the **interest**, or **finance charge**, and is added to the cost.

EXAMPLE 1

Heather wants to purchase an electric guitar. The price of the guitar with tax is $2,240. If she can save $90 per month, how long will it take her to save up for the guitar?

SOLUTION   If Heather saves for the guitar, she is not using credit. But she will also not have use of the guitar while she is saving for it.

Divide 2,240 by 90. Round. $2{,}240 \div 90 \approx 24.9$

It will take Heather 25 months to save for the guitar.

■ CHECK YOUR UNDERSTANDING

If Heather's guitar costs x dollars and she could save y dollars per month, express algebraically the number of months it would take Heather to save for the guitar.

EXAMPLE 2

Heather, from Example 1, speaks to the salesperson at the music store who suggests that she buy the guitar on the installment plan. It requires a 15% down payment. The remainder, plus an additional finance charge, is paid back on a monthly basis for the next two years. The monthly payment is $88.75. What is the finance charge?

SOLUTION   Find the down payment by taking 15% of $2,240.

Multiply $2,240 by 0.15. $0.15(2,240) = 336$

Heather pays the store $336 at the time of purchase.

She now has to make two years (24 months) of monthly payments of $88.75. The sum of the monthly payments is found by multiplying the number of payments by the monthly payment amount.

Multiply $88.75 by 24. $24(88.75) = 2,130$

The sum of the monthly payments is $2,130.

Add down payment plus sum of payments. $336 + 2,130 = 2,466$

The total cost is $2,466.

The finance charge is the extra money Heather paid for the use of credit. To find the finance charge, subtract the price of the guitar from the total cost.

Total cost − purchase price $2,466 − 2,240 = 226$

Heather paid a finance charge (interest) of $226. That is the "fee" she paid for not having to wait two years to start using the guitar.

■ CHECK YOUR UNDERSTANDING

Assume the original price of the guitar was p dollars, and Heather made a 20% down payment for a one-year installment purchase. The monthly payment was w dollars. Express the finance charge algebraically.

EXAMPLE 3

Carpet King is trying to increase sales, and it has instituted a new promotion. All purchases can be paid on the installment plan with no interest, as long as the total is paid in full within six months. There is a $20 minimum monthly payment required. If the Schuster family buys carpeting for $2,134 and makes only the minimum payment for five months, how much will they have to pay in the sixth month?

SOLUTION   This is a common business practice today. It is almost like a discount, except instead of saving money off the purchase price, the customer saves the finance charge.

If the Schusters pay $20 for five months, they will have paid a total of $100. Subtract to find what they owe in the sixth month.

Purchase price − amount paid $2,134 − 100 = 2,034$

They will have to pay $2,034 in the sixth month. If this is not paid in full, there will be a finance charge imposed.

Credit Scores

Credit scores change as new data about a person's credit becomes available. FICO scores higher than 700 signify a good credit rating and those above 770 are considered excellent.

Any person with a credit score below 600 is considered a significant risk to the creditor. Individuals with scores at 700 or greater qualify for the best interest rates available.

EXAMPLE 4

Mike has a credit rating of 720. Tyler has a credit rating of 560. Mike and Tyler apply for identical loans from Park Bank. Mike is approved for a loan at 5.2% interest, and Tyler is approved for a loan that charged 3 percentage points higher because of his inferior credit rating. What interest rate is Tyler charged?

SOLUTION   Add 3% to 5.2%.

$$3\% + 5.2\% = 8.2\%$$

Tyler will pay 8.2% interest for the same loan.

While the arithmetic in this problem may have been simplistic, the message is important: Credit scores will affect the interest you pay on loans. If you are a good credit risk, you will save money when you borrow money.

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If you consider that Mike and Tyler took out loans for $3,000 to be paid back over 3 years, you can use the simple interest formula ($I = prt$) to get an idea of impact a credit score can have on the cost of a loan.

Mike's loan $I = 3{,}000 \times 0.052 \times 3 = 468$

Tyler's loan $I = 3{,}000 \times 0.082 \times 3 = 738$

In the end Tyler's loan will have cost him almost $300 more than Mike's loan for the same amount over the same period of time.

Applications

1. Interpret the quote in the context of what you learned.

Solve each problem. Round monetary amounts to the nearest cent.

2. Monique buys a $4,700 air conditioning system using an installment plan that requires 15% down. How much is the down payment?

3. Craig wants to purchase a boat that costs $1,420. He signs an installment agreement requiring a 20% down payment. He currently has $250 saved. Does he have enough for the down payment?

4. Jean bought a $1,980 snow thrower on the installment plan. The installment agreement included a 10% down payment and 18 monthly payments of $116 each.
   a. How much is the down payment?
   b. What is the total amount of the monthly payments?
   c. How much did Jean pay for the snow thrower on the installment plan?
   d. What is the finance charge?

5. Linda bought a washer and dryer from Millpage Laundry Supplies for y dollars. She signed an installment agreement requiring a 15% down payment and monthly payments of x dollars for one year.
   a. Express her down payment algebraically.
   b. How many monthly payments must Linda make?
   c. Express the total amount of the monthly payments algebraically.
   d. Express the total amount Linda pays for the washer and dryer on the installment plan algebraically.
   e. Express the finance charge algebraically.

6. Zeke bought a $2,300 bobsled on the installment plan. He made a $450 down payment, and he has to make monthly payments of $93.50 for the next two years. How much interest will he pay?

7. Gary is buying a $1,250 computer on the installment plan. He makes a down payment of $150. He has to make monthly payments of $48.25 for $2\frac{1}{2}$ years. What is the finance charge?

8. Mazzeo's Appliance Store requires a down payment of $\frac{1}{3}$ on all installment purchases. Norton's Depot requires a 30% down payment on installment purchases. Which store's down payment rate is lower?

9. Ari purchased a microwave oven on the installment plan for m dollars. He made a 20% down payment and agreed to pay x dollars per month for the two years. Express the finance charge algebraically.

10. Adam bought a $1,670 custom video game/sound system on a special no-interest plan. He made a $100 down payment and agreed to pay the entire purchase off in $1\frac{1}{2}$ years. The minimum monthly payment is $10. If he makes the minimum monthly payment up until the last payment, what will be the amount of his last payment?

11. Max created a spreadsheet for installment purchase calculations.

	A	B	C	D	E	F	G	H
1	Purchase Price	Down Payment Percentage as a Decimal	Down Payment	Monthly Payment	Time in Years	Time in Months	Total of Monthly Payments	Finance Charge
2	$1,200	0.20	f.	$ 97.01	1	j.	n.	s.
3	$1,750	0.10	g.	$ 71.12	2	k.	p.	t.
4	$1,340	0.15	h.	$ 77.23	1.5	l.	q.	u.
5	$ 980	0.10	i.	$165.51	0.5	m.	r.	v.

    a. Write a spreadsheet formula to compute the down payment in cell C2.

    b. Write a spreadsheet formula to compute the time in months in cell F2.

    c. Write a spreadsheet formula to compute the total of monthly payments in cell G2.

    d. Write the spreadsheet formula to compute the finance charge in cell H2.

    e. Use your answers to a–d to fill in the missing entries f–v.

12. A *layaway* plan is similar to an installment plan, but the customer does not receive the merchandise until it is paid for. It is held in the store for a fee. If you purchased a $1,700 set of golf clubs on a nine-month layaway plan and had to pay a monthly payment of $201, what is the sum of the monthly payments? What was the fee charged for the layaway plan?

13. A *deferred payment plan* is also similar to an installment plan, except there are very low monthly payments until the end of the agreement. At that point, the entire purchase must be paid in full. If it is not paid, there will be high finance charges. Often, there is no interest—stores use no-interest deferred payment plans to attract customers. Many times there is also no down payment.

    a. Chris purchases a living room furniture set for $4,345 from Halloran Gallery. She has a one-year, no interest, no money down, deferred payment plan. She does have to make a $15 monthly payment for the first 11 months. What is the sum of these monthly payments?

    b. How much must Chris pay in the last month of this plan?

    c. What is the difference between the layaway plan in Exercise 12 and the deferred payment plan?

14. Audrey purchases a riding lawnmower using the 2-year no-interest deferred payment plan at Lawn Depot for *x* dollars. There was a down payment of *d* dollars and a monthly payment of *m* dollars. Express the amount of the last payment algebraically.

15. Some stores offer a *rent-to-own* plan. The customer makes a down payment, receives the merchandise at time of purchase, and makes monthly payments. The sum of the monthly payments is lower than the cost of the item. When the last payment is made, customers make a choice. They can purchase the item and apply their payments towards the cost. They can return the item, which means they rented it for a certain period of months.

    a. Sharon bought a $2,100 high-definition television set (HDTV) on a six-month rent-to-own plan. The down payment was 10%. What was the dollar value of the down payment?

    b. Her monthly payments were $75 per month. If she decides not to buy the HDTV after the six months, what was her cost to rent it?

16. Bernie bought a refrigerator at a special sale. The refrigerator regularly sold for $986. No down payment was required. Bernie has to pay $69 for the $1\frac{1}{2}$ years. What is the average amount Bernie pays in interest each month?

17. Lillian purchased a guitar from Smash Music Stores. It regularly sold for $670, but was on sale at 10% off. She paid 8% tax. She bought it on the installment plan and paid 15% of the total cost with tax as a down payment. Her monthly payments were $58 per month for one year.

    a. What is the discount?

    b. What is the sale price?

    c. What is the sales tax?

    d. What is the total cost of the guitar?

    e. What is the down payment?

    f. What is the total of the monthly payments?

    g. What is the total she paid for the guitar on the installment plan?

    h. What is the finance charge?

18. The following inequalities give information on your credit scores. Let x represent your credit score.
- If $x > 700$, your credit score is excellent.
- If $680 < x < 700$, your credit score is good.
- If $620 < x < 680$, your credit score should be watched carefully.
- If $580 < x < 620$, your credit score is low
- If $x < 580$, your credit score is poor.

If Mary Ann's credit score is low, but she receives 40 points for paying off some delinquent debts, is it possible that her credit rating is now good? Explain.

19. Samantha's grandfather is debt-free—he bought his car and his house without taking out a loan. He saved and paid cash. He wanted to take out a loan to buy Samantha a car for college graduation. The bank turned him down. Explain why.

20. Bianka has a credit line of $8,000. She had a previous balance of $567.91 and made a payment of $1,200. Her total purchases are $986.79, and she has been charged a $10.00 finance charge. What is her available credit?

> *Lend money to an enemy, and thou will gain him, to a friend, and thou will lose him.*
>
> **Benjamin Franklin,** American Statesman, and Inventor

Loans 4-2

Key Terms

- promissory note
- principal
- annual percentage rate
- cosigner
- life insurance
- prepayment privilege
- prepayment penalty
- wage assignment
- wage garnishment
- balloon payment
- lending institution
- collateral

Objectives

- Read monthly payments from a table.
- Compute monthly payments using a formula.
- Compute finance charges on loans.

WHAT INFORMATION DO YOU NEED TO KNOW BEFORE TAKING OUT A LOAN?

Whenever you borrow money, you must sign an agreement, called a **promissory note**, which states the conditions of the loan. Your signature is your promise to pay back the loan as outlined in the agreement. Always read an entire promissory note carefully before signing it.

The amount you borrow is the **principal**. The interest rate you pay is given per year and is the **annual percentage rate (APR)**. The promissory note contains information that the creditor is required to state, as stipulated in the *Truth in Lending Act*. This includes the principal, APR, monthly payment, number of payments that must be made, finance charge, due dates for each payment, and fees for late payments.

Not all loan agreements are the same, so each promissory note describes the features of that particular loan. Become familiar with the terms given below.

- **Cosigner** This person agrees to pay back the loan if the borrower is unable to do so. People without an established credit rating often need a cosigner.

- **Life Insurance** A creditor often requires a borrower to have life insurance that will cover the loan in the event the borrower dies before the loan is paid.

- **Prepayment Privilege** This feature allows the borrower to make payments before the due date to reduce the amount of interest.

- **Prepayment Penalty** This agreement requires borrowers to pay a fee if they wish to pay back an entire loan before the due date.

- **Wage Assignment** This is a voluntary deduction from an employee's paycheck, used to pay off debts. If a debtor's employer and the creditor agree, loans can be paid off using this form of electronic transfer.

- **Wage Garnishment** This is an involuntary form of wage assignment, often enforced by court order. The employer deducts money from the employee's paycheck to pay the creditor.
- **Balloon Payment** The last monthly payment on some loans can be much higher than the previous payments. These high payments are called balloon payments.

Organizations that extend loans are called **lending institutions**. Lending institutions are businesses that make profit by charging interest. There are many types of lending institutions.

- **Banks** Most consumers apply for loans at banks. *Savings banks* offer good interest rates but require loan applicants to have good credit ratings. *Commercial banks* are banks used by businesses, so they have large amounts of money to lend. They also require a good credit rating.
- **Credit Unions** A credit union provides financial services for its members only. Members may work in the same office, be in the same profession, or live in the same apartment complex. Members deposit money in a credit union account. This money is made available to members who apply for loans from the credit union, usually at an interest rate that is lower than a bank can offer.
- **Consumer Finance Companies** These businesses primarily lend money to people with poor credit ratings, who cannot get a loan anywhere else. High interest are charged rates for this service.
- **Life Insurance Companies** Life insurance companies make loans to their policyholders. The amount that can be borrowed is based on the amount of life insurance purchased and the length of time the policy has been held. The interest rate is good because the life insurance company is not taking a tremendous risk because if the loan is not paid back, it can be deducted from the life insurance benefit when it is paid.

- **Pawnshops** Pawnshops are known for small, quick loans. A customer who needs money leaves a personal belonging, called **collateral**, with the pawn broker in exchange for the loan. Most loans are 30-, 60-, or 90-day loans. When the debtor returns with the principal plus interest, the collateral is returned.

You may have seen *loan sharks* in the movies. Loan sharks charge extremely high interest rates and do not formally check your credit rating. Loan sharking is illegal.

Regardless of where you shop for a loan, the *Equal Credit Opportunity Act* requires a creditor to treat you fairly. If your application is turned down, you are protected by the *Fair Credit Reporting Act* which says that the lender must give you the reason in writing for the loan denial. Always compare the terms of the loan and the annual percentage rates when shopping for a loan.

Monthly loan payments are computed using a formula. Payment information is often arranged in tables to make it easy for customers.

Table of Monthly Payments per $1,000 of Principal

Rate	1 yr	2 yr	3 yr	4 yr	5 yr	10 yr	Rate	1 yr	2 yr	3 yr	4 yr	5 yr	10 yr
6.50%	86.30	44.55	30.65	23.71	19.57	11.35	10.00%	87.92	46.14	32.27	25.36	21.25	13.22
6.75%	86.41	44.66	30.76	23.83	19.68	11.48	10.25%	88.03	46.26	32.38	25.48	21.37	13.35
7.00%	86.53	44.77	30.88	23.95	19.80	11.61	10.50%	88.15	46.38	32.50	25.60	21.49	13.49
7.25%	86.64	44.89	30.99	24.06	19.92	11.74	10.75%	88.27	46.49	32.62	25.72	21.62	13.63
7.50%	86.76	45.00	31.11	24.18	20.04	11.87	11.00%	88.38	46.61	32.74	25.85	21.74	13.78
7.75%	86.87	45.11	31.22	24.30	20.16	12.00	11.25%	88.50	46.72	32.86	25.97	21.87	13.92
8.00%	86.99	45.23	31.34	24.41	20.28	12.13	11.50%	88.62	46.84	32.98	26.09	21.99	14.06
8.25%	87.10	45.34	31.45	24.53	20.40	12.27	11.75%	88.73	46.96	33.10	26.21	22.12	14.20
8.50%	87.22	45.46	31.57	24.65	20.52	12.40	12.00%	88.85	47.07	33.21	26.33	22.24	14.35
8.75%	87.34	45.57	31.68	24.77	20.64	12.53	12.25%	88.97	47.19	33.33	26.46	22.37	14.49
9.00%	87.45	45.68	31.80	24.89	20.76	12.67	12.50%	89.08	47.31	33.45	26.58	22.50	14.64
9.25%	87.57	45.80	31.92	25.00	20.88	12.80	12.75%	89.20	47.42	33.57	26.70	22.63	14.78
9.50%	87.68	45.91	32.03	25.12	21.00	12.94	13.00%	89.32	47.54	33.69	26.83	22.75	14.93
9.75%	87.80	46.03	32.15	25.24	21.12	13.08	13.25%	89.43	47.66	33.81	26.95	22.88	15.08

EXAMPLE 1

What is the monthly payment for a $4,000 two-year loan with an APR of 8.50%?

SOLUTION The table lists monthly costs per $1,000 borrowed. Divide the amount you want to borrow by 1,000. Look across the row labeled 8.50% and down the column labeled 2 yr. The monthly cost per thousand dollars borrowed is $45.46. You are borrowing 4 sets of $1,000, so the table amount must be multiplied by 4.

$$45.46 \times 4 = 181.84$$

The monthly payment is $181.84.

■ CHECK YOUR UNDERSTANDING

Juan is borrowing $41,000 for 5 years at an APR of 6.5%. What is the monthly payment?

EXAMPLE 2

What is the total amount of the monthly payments for a $4,000, two-year loan with an APR of 8.50%?

SOLUTION There are 12 months in a year, so the borrower will make 24 monthly payments in two years. Use the monthly payment from Example 1, $181.84.

Multiply monthly payment by 24. $181.84 \times 24 = 4,364.16$

The total amount of monthly payments is $4,364.16.

EXAMPLE 3

Find the finance charge for a $4,000, two-year loan with an 8.5% APR?

SOLUTION   Use the total amount of monthly payments from Example 2 and subtract the borrowed amount.

$$4,364.16 - 4,000 = 364.16$$

The finance charge for this loan is $364.16.

EXAMPLE 4

Mark bought a new car. The total amount he needs to borrow is $28,716. He plans on taking out a 4-year loan at an APR of 5.12%. What is the monthly payment?

SOLUTION   Mark must use the monthly payment formula.

Monthly Payment Formula

$$M = \frac{p\left(\frac{r}{12}\right)\left(1 + \frac{r}{12}\right)^{12t}}{\left(1 + \frac{r}{12}\right)^{12t} - 1}$$ where M = monthly payment
p = principal
r = interest rate
t = number of years

Substitute $p = 28,716$, $r = 0.0512$, and $t = 4$.

$$M = \frac{28,716\left(\frac{0.0512}{12}\right)\left(1 + \frac{0.0512}{12}\right)^{12(4)}}{\left(1 + \frac{0.0512}{12}\right)^{12(4)} - 1}$$

Simplify the exponent to make calculator entry easier.

$$M = \frac{28,716\left(\frac{0.0512}{12}\right)\left(1 + \frac{0.0512}{12}\right)^{48}}{\left(1 + \frac{0.0512}{12}\right)^{48} - 1}$$

Use your calculator. Enter in one keystroke sequence, but work slowly and carefully. Round to the nearest cent.

```
(28716(.0512/12)
(1+.0512/12)^48)
/((1+.0512/12)^4
8-1)
```

The monthly payment is $662.87.

Applications

1. Interpret the quote in the context of what you learned, and on your general experiences.

2. Arrange the following lending institutions in descending order according to their APRs for a $10,000, two-year loan.

East Meadow Savings	$9\frac{1}{2}\%$
Clinton Park Credit Union	9%
Tivoli Trust	$9\frac{3}{8}\%$
First Bank of Rhinecliff	9.45%
Columbia Consumer Finance Corp.	$9\frac{9}{16}\%$

3. How many more monthly payments are made for a five-year loan than for a two-year loan?

4. How many monthly payments must be made for a $2\frac{1}{2}$-year loan?

5. Bart needs to borrow $7,000 from a local bank. He compares the monthly payments for a 9.75% loan for three different periods of time.
   a. What is the monthly payment for a one-year loan?
   b. What is the monthly payment for a three-year loan?
   c. What is the monthly payment for a five-year loan?

6. Rachel has a $10,000, three-year loan with an APR of 7.25%.
   a. What is the monthly payment?
   b. What is the total amount of the monthly payments?
   c. What is the finance charge?

7. Melissa wants to check the accuracy of the finance charge on her promissory note. She has a $6,000, four-year loan at an APR of 10%.
   a. What is the monthly payment?
   b. What is the total amount of the monthly payments?
   c. What is the finance charge?

8. The policy of the Broadway Pawnshop is to lend up to 35% of the value of a borrower's collateral. John wants to use a $3,000 ring and a $1,200 necklace as collateral for a loan. What is the maximum amount that he could borrow from Broadway?

9. Juliana is taking out an $8,700, $3\frac{1}{2}$-year loan with an APR of 9.31%. What will be the monthly payment for this loan?

10. Lavonda took out a $7,500 loan with an APR of 6.875% and agreed to paid it back monthly over six years. How many monthly payments did she make?

11. Solomon is taking out a $15,320, two-year loan with an APR of 10.29%. What will be the finance charge for this loan to the nearest dollar?

12. Reggie needs a quick x-dollar loan, just until his next payday in two weeks to take advantage of a sale on ski equipment. The bank would take too long in paperwork, so he goes to a pawnshop. The pawnshop will only lend him 25% of the value of his collateral. Express algebraically the amount of collateral Reggie must use for this loan.

13. Olivia is considering membership to the Regional Teachers Credit Union so that she can save money on a loan. The credit union will lend her $8,000 for three years at 8.25% APR. The same loan at her savings bank has an APR of 10.5%. How much would Olivia save in finance charges if she joined the credit union and took out her loan there? Round to the nearest ten dollars.

14. Rob wants to purchase a $5,000 drum set. The music store offers him a two-year installment agreement requiring $800 down and monthly payments of $202.50. Rob has a poor credit rating.
   a. What is his interest on this installment agreement?
   b. Instead of using the store's installment plan, Rob can borrow $5,000 at an APR of 13% from a local consumer finance company. What would be the monthly payment for this loan using the table?
   c. How much interest would the finance company charge?
   d. Should Rob use the installment plan or borrow the money from the finance company?

15. Lee wanted to compute the monthly payment on a 2-year, $8,400 loan at an APR of 7%. She entered the keystrokes on her calculator at the right. The display gives an answer of 48, which Lee knows is incorrect. Explain what was incorrectly entered.

> 8400(.07/12)(1+.07/12)^24/(1+.07/12)^24-1

16. A loan used for buying a home is called a *mortgage*. The Fortunato family is buying a $430,000 home. They are taking out a 30-year mortgage at a rate of 8%.
   a. Compute the monthly payment.
   b. Find the total of all of the monthly payments for the 30 years.
   c. What is the finance charge?
   d. Which is greater, the interest or the original cost of the home?

17. The following spreadsheet can be used to compute monthly payments given the APR, principal, and length of the loan.

	A	B	C	D	E
1	Principal	Interest Rate as a Decimal	Time in Years	Time in Months	Monthly Payment
2	11,000	0.08	3	c.	f.
3	900	0.0677	0.5	d.	g.
4	2,500	0.11	1	e.	h.

   a. Write the spreadsheet formula to compute cell D2.
   b. Write the spreadsheet formula to compute cell E2.
   c-h. Use your spreadsheet to fill in the missing entries.

Loan Calculations and Regression

4-3

Key Terms
- monthly payment calculator
- natural logarithm
- cubic function
- cubic regression equation

Objectives
- Calculate the present value of a single deposit investment.
- Calculate the present value of a periodic deposit investment.

HOW CAN YOU CALCULATE AND MODEL LOAN COMPUTATIONS?

Before taking out a loan, you need a complete picture of what your payment responsibilities will be over the life of the loan. Part of the monthly payment decreases your principal and part is the finance charge or interest.

In a savings account, the interest is an amount of money that you get from the bank as a compensation for keeping your money there. For loans, interest is the amount of money that you have to give to the bank as a fee for using their money.

There are many **monthly payment calculators** available on the Internet that can give you a summary of the loan balance over the lifetime of the loan and on a monthly or yearly basis.

Examine the summary statement of a loan calculator for a $100,000 loan with an APR of 7.5% for a period of 15 years, taken out in January 2010. Notice the interest you must pay is more than half the amount that was borrowed.

You can get a better idea of how your monthly payment is allocated by looking at a payment schedule for the first year of the loan. Notice, as the months pass, the principal that is paid off by your monthly payment of $927.01 increases as the interest amount decreases. Pick any month. The sum of the *principal paid* and the *interest paid* will always be approximately equal to your monthly payment. But, in the beginning of the loan, more goes to paying the bank interest than paying off the principal.

Loan Amount	Interest Rate	Term	Start Date
$ 100,000	7.5 %	15 years	Jan 2010

Payments & Interest	
Your Monthly Payment	$ 927.01
Total Interest Paid (life of loan)	$ 66,862.22

Payment Schedule for 2010			
Month	Principal Paid	Interest Paid	Loan Balance
Jan 2010	$ 302.01	$ 625.00	$ 99,697.00
Feb 2010	$ 303.90	$ 623.11	$ 99,394.09
Mar 2010	$ 305.80	$ 621.21	$ 99,088.29
Apr 2010	$ 307.71	$ 619.30	$ 98,780.58
May 2010	$ 309.63	$ 617.38	$ 98,470.94
Jun 2010	$ 311.57	$ 615.44	$ 98,159.38
Jul 2010	$ 313.52	$ 613.50	$ 97,845.86
Aug 2010	$ 315.48	$ 611.54	$ 97,530.38
Sep 2010	$ 317.45	$ 609.56	$ 97,212.94
Oct 2010	$ 319.43	$ 607.58	$ 96,893.50
Nov 2010	$ 321.43	$ 605.58	$ 96,572.08
Dec 2010	$ 323.44	$ 603.58	$ 96,248.64

Skills and Strategies

Here you will learn how to use formulas and regression analysis to make loan calculations in order to make wise credit decisions.

EXAMPLE 1

Determine the total interest owed on a 5-year $10,000 loan at 6% APR.

SOLUTION

Use the monthly payment formula.

$$M = \frac{p\left(\frac{r}{12}\right)\left(1 + \frac{r}{12}\right)^{12t}}{\left(1 + \frac{r}{12}\right)^{12t} - 1}$$

Substitute $p = 10,000$, $r = 0.06$, and $t = 5$.

$$M = \frac{10,000\left(\frac{0.06}{12}\right)\left(1 + \frac{0.06}{12}\right)^{12(5)}}{\left(1 + \frac{0.06}{12}\right)^{12(5)} - 1}$$

Use your calculator. Enter in one keystroke sequence. Think about the order of operations to determine where parentheses are needed.

$$M = 193.3280$$

The monthly payment is approximately $193.33.

Multiply the amount of the monthly payments by the number of monthly payments to find the total of the monthly payments.

$$193.33 \times 60 = 11,599.80$$

The total of the monthly payments is $11,599.80.

Keep in mind that this is not the exact amount. The amount of the monthly payment was rounded to the nearest cent, or two decimal places, but in reality, banks keep decimal amounts when performing calculations.

To find the interest you must pay, subtract the loan principal from the total payback.

$$11,599.80 - 10,000 = 1,599.80$$

The interest on a $10,000 loan at 6% APR taken out for 5 years is approximately $1,599.80.

■ **CHECK YOUR UNDERSTANDING**

Hannah is taking out a 4.3% loan to purchase an $18,000 car. The length of the loan is 8 years. How much will she pay in interest?

EXAMPLE 2

Claude wants to borrow $25,000 to purchase a car. After looking at his monthly budget, he realizes that all he can afford to pay per month is $300. The bank is offering a 5.9% loan. What would need to be the length of his loan be so that he can stay within his budget?

SOLUTION To solve this problem, it is necessary to perform some algebraic manipulations on the monthly loan payment formula.

To find the length of the loan given the amount of the monthly payment, you need to solve for the exponent t. To solve for an exponent, you need to understand the concept of a **natural logarithm**. In Lesson 3-6, you learned about the constant e. Examine the following equation.

$$y = e^x$$

To find the value of x when given a particular y, use the following algebraic transformation.

$$x = \ln y$$

This is read as "x equals the natural logarithm of y" or "when e is raised to the exponent x, the resulting value is y."

Before the use of calculators, people used a logarithm table to determine the exponent values. Now, graphing calculators have a natural logarithm key [LN]. For example, consider the following equation.

$$130 = e^x$$

To solve for x, that is, to find the exponent to which you need to raise e to get 130, you need to use the [LN] key and then enter 130 into the calculator. The result is approximately 4.9.

The development of the loan length formula is beyond the scope of this course. That formula requires the use of the natural logarithm in order to solve for the exponent t.

Loan Length Formula

$$t = \frac{\ln\left(\frac{M}{p}\right) - \left(\ln\left(\frac{M}{p} - \frac{r}{12}\right)\right)}{12\ln\left(1 + \frac{r}{12}\right)}$$

where M = monthly payment
p = principal
r = interest rate
t = number of years

Substitute $p = 25,000$, $M = 300$, and $r = 0.059$.

$$t = \frac{\ln\left(\frac{300}{25,000}\right) - \left(\ln\left(\frac{300}{25,000} - \frac{0.059}{12}\right)\right)}{12\ln\left(1 + \frac{0.059}{12}\right)}$$

Calculate to the nearest hundredth of a year. $t \approx 8.96$

Claude would need to take out a loan for about 9 years.

■ **CHECK YOUR UNDERSTANDING**

In Example 2, what impact would an increase in the monthly payment of $50 have on the length of the loan?

EXAMPLE 3

Year	Loan Balance
2010	$ 96,248.64
2011	$ 92,206.05
2012	$ 87,849.63
2013	$ 83,155.00
2014	$ 78,095.92
2015	$ 72,644.09
2016	$ 66,769.01
2017	$ 60,437.85
2018	$ 53,615.17
2019	$ 46,262.84
2020	$ 38,339.72
2021	$ 29,801.51
2022	$ 20,600.46
2023	$ 10,685.11
2024	$ 0.00

This lesson opened with a discussion about a $100,000 loan with an APR of 7.5% taken out in January 2010 for a period of 15 years. Examine the table of decreasing loan balances over the 15-year period. Use regression to determine a curve of best fit for this data.

SOLUTION   Use the statistics features on your graphing calculator to make a scatterplot of the ordered pairs (x, y) where x equals the year number and y equals the loan balance.
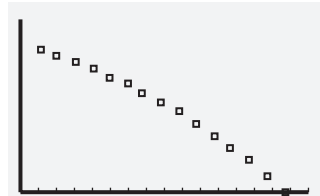
To simplify the data entry process, rather than using the actual years, let year 2010 be year 1, 2011 be year 2, and so on.
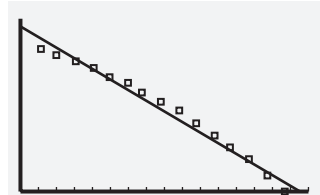
Use the Linear Regression feature to determine the linear regression equation, $y = -6{,}777.54x + 110{,}001.04$, with numbers rounded to the nearest hundredth. Notice that the line doesn't follow the shape of the points.

To get a more accurate regression equation, use the Quadratic Regression feature to find a second degree regression function in the form $y = ax^2 + bx + c$. It has the shape of a parabola. While the scatterplot may not look completely parabolic, the points might best fit on part of a parabola.
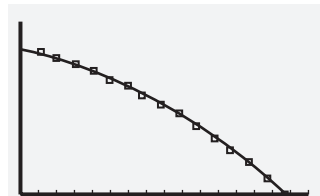
The quadratic regression equation is $y = -251.10x^2 - 2{,}760.02x + 98{,}618.06$, with numbers rounded to the nearest hundredth.

For even more accuracy, you can use the Cubic Regression feature to determine a third degree regression equation of the form $y = ax^3 + bx^2 + cx + d$. This function is known as a **cubic function**. The **cubic regression equation** is $y = -6.23x^3 - 101.67x^2 - 3{,}747.49x + 100{,}142.23$, with numbers rounded to the nearest hundredth.
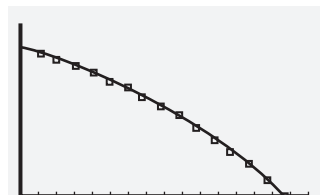
It appears that this regression equation approaches the shape of the points better than the quadratic or the linear equations. While the cubic above may not yield the exact equation to determine loan balances through the life of the loan, it does yield fairly accurate amounts.

■ CHECK YOUR UNDERSTANDING

Use the linear, quadratic, and cubic regression equations determined in Example 3 to compare the computed loan balances when $x = 2$ with the loan balance amount given in the chart for 2011.

Applications

1. How might the quote apply to what you have learned?

2. What is the total interest on a ten-year 6.1% loan with a principal of $32,000?

3. Jamie wants to borrow $15,000 from South Western Bank. They offered her a 4-year loan with an APR of 5.5%. How much will she pay in interest over the life of the loan?

4. Charlie and Kathy want to borrow $20,000 to make some home improvements. Their bank will lend them the money for 10 years at an interest rate of $5\frac{3}{4}$%. How much will they pay in interest?

5. Devon is considering taking out a $7,000 loan. He went to two banks. Stevenson Trust Company offered him an 8-year loan with an interest rate of 8.6%. First National Bank offered him a 5-year loan with an interest rate of 10%. Which loan will have the lower interest over its lifetime?

6. A bank offers a $25,000 loan at an interest rate of 7.7% that can be paid back over 2 to 10 years.
   a. Write the monthly payment formula for this loan situation. Let t represent the number of years from 2 to 10 inclusive.
   b. Write the total interest formula for this loan situation. Let t represent the number of years from 2 to 10 inclusive.
   c. Construct a graph. Let the independent variable represent years and the dependent variable represent the interest paid.
   d. Use your graph to estimate the interest for a $6\frac{1}{2}$-year loan.

7. Jennifer wants to borrow $20,000. Her bank offers a 7.1% interest rate. She can afford $500 a month for loan payments. What should be the length of her loan to the nearest tenth of a year?

8. Louis wants to take out a $14,000 loan with a 6.8% APR. He can afford to pay no more than $400 per month for loan payments. What would be the length of his loan? Round to the nearest tenth of a year.

9. Use your answer and the loan information from Exercise 8 to determine what effect a $50 decrease in Louis' monthly payment would have on the length of his loan.

10. Dave wants to borrow $22,000 from First Finance Bank. The bank will give him a 15-year loan at an interest rate of 4.85%. How much will he pay the bank in interest over the life of the loan? Round to the nearest hundred dollars.

Year	Principal Paid	Interest Paid	Loan Balance
0			$ 10,000.00
1	$ 680.52	$ 775.41	$ 9,319.48
2	$ 737.01	$ 718.92	$ 8,582.47
3	$ 798.18	$ 657.75	$ 7,784.29
4	$ 864.43	$ 591.50	$ 6,919.86
5	$ 936.17	$ 519.76	$ 5,983.69
6	$ 1,013.88	$ 442.05	$ 4,969.81
7	$ 1,098.03	$ 357.90	$ 3,871.78
8	$ 1,189.16	$ 266.77	$ 2,682.62
9	$ 1,287.86	$ 168.07	$ 1,394.76
10	$ 1,394.76	$ 61.18	$ 0.00

11. Use the given yearly payment schedule.
   a. What is the loan amount?
   b. What is the length of the loan?
   c. What is the monthly payment?
   d. What is the total interest paid?
   e. Construct a scatterplot using the data points (year, loan balance).
   f. Write a linear regression equation that approximates the year/loan balance relationship. Round to nearest hundredth.
   g. Write a quadratic regression equation that approximates the year/loan balance relationship. Round to nearest hundredth.
   h. Write a cubic regression equation that approximates the year/loan balance relationship. Round to the nearest hundredth.

12. Use the given payment schedule.

Yearly Payment Schedule			
Year	Principal Paid	Interest Paid	Loan Balance
			$ 35,000.00
2010	$ 773.32	$3,291.90	$ 34,226.68
2011	$ 850.08	$ 3,215.15	$ 33,376.60
2012	$ 934.44	$ 3,130.78	$ 32,442.16
2013	$ 1,027.18	$ 3,038.04	$ 31,414.97
2014	$ 1,129.13	$ 2,936.10	$ 30,285.84
2015	$ 1,241.19	$ 2,824.03	$ 29,044.65
2016	$ 1,364.38	$ 2,700.85	$ 27,680.27
2017	$ 1,499.79	$ 2,565.44	$ 26,180.48
2018	$ 1,648.64	$ 2,416.59	$ 24,531.84
2019	$ 1,812.26	$ 2,252.96	$ 22,719.57
2020	$ 1,992.13	$ 2,073.10	$ 20,727.45
2021	$2,189.84	$ 1,875.39	$ 18,537.61
2022	$ 2,407.18	$ 1,658.05	$ 16,130.43
2023	$ 2,646.08	$ 1,419.14	$ 13,484.34
2024	$ 2,908.70	$ 1,156.53	$ 10,575.64
2025	$ 3,197.38	$ 867.84	$ 7,378.26
2026	$ 3,514.72	$ 550.51	$ 3,863.54
2027	$ 3,863.54	$ 201.69	$ 0.00

   a. What is the loan amount?
   b. What is the length of the loan?
   c. What is the approximate monthly payment rounded to the nearest cent?
   d. What is the total interest paid over the life of the loan?
   e. Construct a scatterplot using the data points (year, loan balance).
   f. Write a linear regression equation that approximates the year/loan balance relationship. Round to the nearest hundredth.
   g. Write a quadratic regression equation that approximates the year/loan balance relationship. Round to the nearest hundredth.
   h. Write a cubic regression equation that approximates the year/loan balance relationship. Round to the nearest hundredth.

Credit Cards 4-4

Key Terms

- credit card
- impulse buying
- revolving charge account
- charge card
- Truth-in-Lending Act
- Fair Credit Billing Act
- Fair Debt Collection Practices Act
- debit card
- Electronic Funds Transfer Act
- average daily balance
- mean

Objectives

- Become familiar with the basic vocabulary of credit cards.
- Compute an average daily balance.

WHAT DO I NEED TO KNOW TO USE CREDIT CARDS?

Plastic credit cards were introduced in the 1950s. A **credit card** is a plastic card that entitles its holder to make purchases and pay for them later. The issuer of the card has given the person whose name is on the account a line of credit The account holder of a credit card has signed an agreement to pay for any purchase made using the card.

Credit cards are so prevalent today that they seem more popular than cash. Businesses that honor credit cards think that consumers spend more money when they just have to sign their names. It is mentally different than removing cash from your wallet when paying for something. The use of credit cards probably increases impulse buying. **Impulse buying** is when a consumer purchases something to which they suddenly were attracted to and had no intention of buying. The convenience of using credit cards also can attract new customers to stores that accept them. Consumers enjoy many advantages when using a credit card.

- There is no need to carry large sums of cash.
- Responsible use of a card helps a credit rating (FICO score).
- Customers receive or have access to a written record of all purchases.
- Some cards have rewards programs such as frequent flyer miles.

There are two types of credit card accounts. The most commonly used is the **revolving charge account**. This means that the entire bill does not have to be paid in full each month. There is a minimum monthly payment, and there is a finance charge the month following any month the bill is not paid in full. Customers have the convenience of stretching out payments over as many months as they choose. However, the interest costs for doing this are relatively high. Popular revolving charge accounts include Visa, MasterCard, American Express, and Discover Card.

A **charge card** is a special type of credit card. It allows the cardholder to make purchases in places that accept the card. The monthly bill for all purchases must be paid in full. There is no interest charged. Popular charge cards used today include Diner's Club and certain types of American Express cards. Most people informally use the words *charge card* and *credit card* interchangeably.

Using credit cards is both a convenience and a responsibility. There is a temptation to overspend, and the card also can be lost. The **Truth-in-Lending Act** protects you if your card is lost or stolen. If this happens, notify the creditor who issued the card immediately. You may be partially responsible for charges made by unauthorized users of cards you lose. The maximum liability is $50. You are not responsible for any charges that occur after you notify the creditor.

If the card number, and not the actual card, is stolen, you are not responsible for any purchases. It is the responsibility of the person selling the merchandise to make sure the purchaser is actually the card owner.

Cardholders receive a monthly statement of their purchases, and any payments they made to the creditor. The **Fair Credit Billing Act** protects you if there are any errors in your monthly statement.

It is your responsibility to notify the creditor about the error. You do not have to pay the amount that is disputed or any finance charge based on that amount, until the problem is cleared up.

If you find yourself unable to meet payments required by a creditor, notify that creditor immediately. The **Fair Debt Collection Practices Act** prohibits the creditor from harassing you or using unfair means to collect the amount owed. As you can see, you need to be knowledgeable to responsibly use credit and charge cards.

Another type of plastic card is known as a debit card. A **debit card** is not a credit or charge card, because there is no creditor extending credit. If you open a debit account, you deposit money into your account, and the debit card acts like an electronic check. You are deducting money directly from your account each time you make a purchase using the debit card.

You cannot make purchases that exceed the balance in your debit card account. Keeping a record of your debit card activity is exactly like keeping the check register you learned about in Lesson 3-1. The **Electronic Funds Transfer Act** protects debit card users against unauthorized use of their cards. They are not responsible for purchases made with a lost or stolen card after the card is reported missing.

Most debit cards carry the Visa or MasterCard logo and the holder can choose, at the time of a purchase, if the purchase acts as a debit card purchase or a credit card purchase. At some retailers, when you use a debit card you are charged a fee, similar to the fees charged at an ATM.

Revolving credit cards can have high interest rates, so it is important to verify that the finance charge on your monthly statement is correct.

EXAMPLE 1

Frank lost his credit card in a local mall. He notified his creditor before the card was used. However, later in the day, someone found the card and charged $700 worth of hockey equipment on it. How much is Frank responsible for paying?

SOLUTION   By the Truth in Lending Act, Frank is responsible for zero dollars, because he reported it lost before it was used.

■ **CHECK YOUR UNDERSTANDING**

Carrie's credit card was stolen. She didn't realize it for days, at which point she notified her creditor. During that time, someone charged $2,000. How much is Carrie responsible for paying?

EXAMPLE 2

Credit card companies issue a monthly statement, therefore APR (annual percentage rate) must be converted to a monthly percentage rate. If the APR is 21.6%, what is the monthly interest rate?

SOLUTION   To change to a monthly interest rate, divide the APR by 12.

$$21.6 \div 12 = 1.8$$

The monthly APR is 1.8%. This is the percent that will be used to compute the monthly finance charge.

■ **CHECK YOUR UNDERSTANDING**

If a monthly statement shows a monthly interest rate of x percent, express the APR algebraically.

The **average daily balance** is the average of the amounts you owed each day of the billing period. It changes due to purchases made and payments made.

EXAMPLE 3

Rebecca did not pay last month's credit card bill in full. Below a list of Rebecca's daily balances for her last billing cycle.

For seven days she owed $456.11.
For three days she owed $1,177.60.
For six days she owed $990.08.
For nine days she owed $2,115.15.
For five days show owed $2,309.13.

Find Rebecca's average daily balance.

SOLUTION   The average daily balance is an arithmetic average. The arithmetic average is also called the **mean**. To find this average, you add the balances for the entire billing period, and divide by the number of days.

Add the number of days in the list to find the number of days in the cycle.

$$7 + 3 + 6 + 9 + 5 = 30$$

There were 30 days in Rebecca's billing cycle.

To find the sum of the daily balances, multiply the number of days by the amount owed. Then add these products.

$$
\begin{aligned}
7(456.11) &= 3{,}192.77 \\
3(1{,}177.60) &= 3{,}532.80 \\
6(990.08) &= 5{,}940.48 \\
9(2{,}115.15) &= 19{,}036.35 \\
5(2{,}309.13) &= 11{,}545.65 \\
\hline
\text{Total} \qquad & 43{,}248.05
\end{aligned}
$$

Divide the total by 30, and round to the nearest cent.

$$43{,}248.05 \div 30 \approx 1{,}441.60$$

The average daily balance is $1,441.60.

■ **CHECK YOUR UNDERSTANDING**

Last month, Paul had a daily balance of x dollars for 6 days, y dollars for 12 days, w dollars for q days, and d dollars for 2 days. Express the average daily balance algebraically.

Finance charges are not charged if, in the previous month, the revolving credit card bill was paid in full. If you pay your card in full every month, you will never pay a finance charge.

EXAMPLE 4

Rebecca (from Example 3) pays a finance charge on her average daily balance of $1,441.60. Her APR is 18%. What is her finance charge for this billing cycle?

SOLUTION   Finance charges are computed monthly, so the 18% APR must be divided by 12 to get a monthly percentage rate of 1.5%. Take 1.5% of the average daily balance to get the finance charge.

Change 1.5% to an equivalent decimal, multiply, and round to the nearest cent.

$$0.015(1{,}441.60) \approx 21.62$$

The finance charge is $21.62.

■ **CHECK YOUR UNDERSTANDING**

Steve owes a finance charge this month because he didn't pay his bill in full last month. His average daily balance is d dollars and his APR is p percent. Express his finance charge algebraically.

Life was a lot simpler when what we honored was father and mother rather than all major credit cards.

Robert Orben, American Comedy Writer

1. Interpret the quote in the context of what you learned.

2. Janine's credit card was stolen, and the thief charged a $44 meal using it before she reported it stolen. How much of this is Janine responsible for paying?

3. Dan's credit card was lost on a vacation. He immediately reported it missing. The person who found it days later used it, and charged $x worth of merchandise on the card, where $x > \$200$. How much of the $x is Dan responsible for paying?

4. Felix and Oscar applied for the same credit card from the same bank. The bank checked both of their FICO scores. Felix had an excellent credit rating, and Oscar had a poor credit rating.
   a. Felix was given a card with an APR of 12%. What was his monthly percentage rate?
   b. Oscar was given a card with an APR of 15%. What was his monthly payment?
   c. If each of them had an average daily balance of $800 and had to pay a finance charge, how much more would Oscar pay than Felix?

5. Vincent had these daily balances on his credit card for his last billing period. He did not pay the card in full the previous month, so he will have to pay a finance charge. The APR is 19.2%.

   nine days @ $778.12
   eight days @ $1,876.00
   four days @ $2,112.50
   ten days @ $1,544.31

   a. What is the average daily balance?
   b. What is the finance charge?

6. Express the average daily balance algebraically given this set of daily balances.

   x days @ y dollars w days @ d dollars

   r days @ q dollars m days @ p dollars

7. Suzanne's average daily balance for last month was x dollars. The finance charge was y dollars.
   a. What was the monthly percentage rate?
   b. What was the APR?

8. Jared's average daily balance for last month was $560. The finance charge was $8.12.
   a. What was the monthly percentage rate?
   b. What was the APR?

9. Helene's credit card has an APR of 16.8%. She never pays her balance in full, so she always pays a finance charge. Her next billing cycle starts today. The billing period is 30 days. Today's balance is $712.04. She is only going to use the credit card this month to make a $5,000 down payment on a new car.

   a. If she puts the down payment on the credit card today, what will her daily balance be for each of the 30 days of the cycle?

   b. Find her average daily balance for the 30-day period if she puts the down payment on the credit card today.

   c. Find the finance charge for this billing period based on the average daily balance from part a.

   d. Find her average daily balance for the 30-day period if she puts the down payment on the credit card on the last day of the billing cycle.

   e. Find the finance charge on the average daily balance from part d.

   f. How much can Helene save in finance charges if she makes the down payment on the last day, as compared to making it on the first day?

10. Gino has a debit card. The account pays no interest. He keeps track of his purchases and deposits in this debit card register. Find the missing entries a–f.

NUMBER OR CODE	DATE	TRANSACTION DESCRIPTION	PAYMENT AMOUNT		✓	FEE	DEPOSIT AMOUNT		$ BALANCE 778.19
	8/4	Baseball Bat	$ 92	19					92.19
									a.
	8/5	Gas	51	00					51.00
									b.
	8/7	Deposit					400	00	400.00
									c.
	8/7	Gas	25	00					25.00
									d.
	8/7	Dinner at Spooner's On the Beach	71	12					71.12
									e.
	8/11	Books for Fall Semester	491	51					491.51
									f.

11. Ron did not pay his credit card bill in full last month. He wants to pay it in full this month. On this month's bill, there is a mistake in the average daily balance. The credit card company lists the average daily balance on his bill as $510.50. Ron computed it himself and found that it is $410.50.

   a. The APR is 18%. What finance charge did the credit card company compute on Ron's bill?

   b. If Ron's average daily balance is correct, what should the finance charge be?

12. The terms of Medina's credit card state that the APR is 12.4%, and if a payment is not received by the due date, the APR will increase by w%. The credit card company received Medina's payment three days after the due date in February. Write the interest rate, in decimal form that she will be charged in March, assuming she carried a balance from February.

13. Express the missing entries in the debit card register algebraically.

NUMBER OR CODE	DATE	TRANSACTION DESCRIPTION	PAYMENT AMOUNT	✓	FEE	DEPOSIT AMOUNT	$ BALANCE
	12/3	Arloff's Gifts	$ x				
							a.
	12/6	Bonnie's Boutique	z				
							b.
	12/7	Gas	y				
							c.
	12/11	Cable TV	v				
							d.
	12/12	Deposit				r	
							e.
	12/14	Gas	g				
							f.

14. Jill's credit card was stolen. The thief charged a $900 kayak on the card before she reported it stolen.

   a. How much of the thief's purchase is Jill responsible for?

   b. Jill's average daily balance would have been $1,240 without the thief's purchase. What was the sum of her daily balances for the 30-day billing period? Explain.

   c. The thief's purchase was on her daily balances for 10 out of the 30 days during the billing cycle. What was the sum of Jill's daily balances with the thief's purchase included?

   d. What was the average daily balance with the thief's purchase included?

15. Kristin's credit rating was lowered, and the credit card company raised her APR from 12% to 13.2%. If her average daily balance this month is x dollars, express algebraically the increase in this month's finance charge due to the higher APR.

16. It is important to check your credit card bill each month. In the next lesson, you will carefully examine a credit card statement and learn how to look for errors. Most people would notice a major, expensive purchase that they did not make. A smaller, incorrect charge of $6 for example, might go unnoticed unless the entire statement was checked with a calculator. If one million credit card holders were each over-charged $6 each month for five years, what would be the total amount that debtors were overcharged, not including the extra finance charges?

17. Naoko has these daily balances on his credit card for September's billing period. He paid his balance from the August billing in full.

   two days @ $99.78
   fifteen days @ $315.64
   eleven days @ $515.64
   two days @ $580.32

   a. His APR is 15.4%. How much is the finance charge on his September bill?

   b. Does the credit card company need to calculate his average daily balance? Explain.

   c. Naoko calculated his average daily balance to be $377.85. Is he correct? If not, what was his average daily balance?

   d. What mistake did Naoko make when calculating this average daily balance?

4-5 Credit Card Statement

Objectives

- To identify and use the various entries in a credit card statement.

Key Terms

- billing cycle
- credit card statement
- account number
- credit line
- available credit
- billing date
- payment due date
- transactions
- debit/credit
- previous balance
- payments/credits
- new purchases
- late charge
- finance charge
- new balance
- minimum payment
- average daily balance
- number of days in billing cycle
- APR
- monthly periodic rate

WHAT INFORMATION DOES A CREDIT CARD STATEMENT GIVE YOU?

Credit cards can be used when making purchases in person, by mail, by phone, online, and more. In most situations you get a receipt for each transaction, but it can be difficult to keep track of the transactions over a billing cycle.

A **billing cycle** is a predetermined amount of time set by the credit card company that is used for calculating your credit card bill. This cycle can be adjusted by the company based upon your credit worthiness. For example, a college student with little or no track record of being able to keep up credit card payments may initially be given a 21-day billing cycle. A seasoned credit card holder who has proven to be financially responsible might get a longer billing cycle.

At the end of every cycle, the credit card company takes an accounting of your credits and debits and sends you that information in the form of a **credit card statement**. You should read the statement carefully and verify the charges. All credit card companies have a process through which the credit card holder can dispute errors on the statement.

Jane Sharp has a FlashCard revolving credit card. At the end of a 30-day cycle, Jane receives her FlashCard statement listing all of her purchases and the payments the company has received during that 30-day cycle. Jane's credit card statement is shown on the next page.

Locate each of the terms explained below on Jane's statement.

Jane Sharp					25 Main Street Sunrise, NY	
ACCOUNT INFORMATION						
Account Number 2653 8987 6098			Billing Date 23 Jan		**Payment Due** 2 Feb	
TRANSACTIONS					DEBITS / CREDITS (−)	
2 Jan	Candida's Gift Shop				$75.00	
3 Jan	Skizza's Pizzas				$31.85	
5 Jan	Beekman Department Store				$139.10	
10 Jan	Festival Book Store				$38.50	
21 Jan	Payment				−$75.00	

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	**Minimum Payment**
	$150.50	$75.00	$284.45	$0.00	$3.53	$363.48	$20.00

Total Credit Line	$ 8,000.00	Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
Total Available Credit	$ 7,636.52	$235.10	30	18%	1.5%

- **Account Number** Each credit card account has a unique number.
- **Credit Line** The maximum amount you can owe at any time.
- **Available Credit** The difference between the maximum amount you can owe and the actual amount you owe.
- **Billing Date** The date the bill (statement) was written.
- **Payment Due Date** On this date the monthly payment must be received by the creditor.
- **Transactions** Lists where purchases were made and the date. Some companies use the date posted, which indicates when the creditor received its notification of the charge and processed it. Some companies list the date of transaction, which shows when purchases were made or payments were received. Some companies list both the posted and the transaction dates.
- **Debits/Credits** A debit is the amount charged to your account. A credit is a payment made to reduce your debt. Credits are identified by a negative (−) sign.
- **Previous Balance** Any money owed before current billing period.
- **Payments/Credits** Total amount received by the creditor.
- **New Purchases** The sum of purchases (debits) on the current bill.
- **Late Charge** The penalty for late payments from a previous month.
- **Finance Charge** The cost of using the credit card for the current billing period.
- **New Balance** The amount you currently owe.
- **Minimum Payment** This amount is the lowest payment the credit card company will accept for the current billing period.
- **Average Daily Balance** The average amount owed per day during the billing cycle.
- **Number of Days in Billing Cycle** The amount of time, in days, covered by the current bill.
- **APR** The yearly interest rate.
- **Monthly Periodic Rate** The APR divided by 12.

Here you will learn how to read and verify entries on a credit card statement.

EXAMPLE 1

The summary portion of Jane Sharp's credit card statement shown on the previous page looks as follows:

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$150.50	$75.00	$284.45	$0.00	$3.53	$363.48	$20.00

a. Explain how the new purchases amount was determined.

b. Explain how the new balance amount was determined.

SOLUTION

a. The new purchases amount is the sum of the purchases that appear as debits. This sum must equal the amount $284.45 listed in the New Purchases section of the statement summary.

ACCOUNT INFORMATION				
Account Number		2653 8987 6098	Billing Date 23 Jan	**Payment Due** 2 Feb
TRANSACTIONS				DEBITS / CREDITS (−)
2 Jan	Candida's Gift Shop			$75.00
3 Jan	Skizza's Pizzas			$31.85
5 Jan	Beekman Department Store			$139.10
10 Jan	Festival Book Store			$38.50
21 Jan	Payment			−$75.00

New purchases = 75 + 31.85 + 139.10 + 38.50 = 284.45

b. The new balance amount is determined by using the formula given below.

$$\text{Previous Balance} - \text{Payments} + \text{New Purchases} + \text{Finance Charge} + \text{Late Charge} = \text{New Balance}$$

$$150.50 - 75 + 284.45 + 3.53 + 0 = 363.48$$

■ CHECK YOUR UNDERSTANDING

Suppose you create the following spreadsheet that models the statement summary and input the values in row 2. Write the spreadsheet formula to compute the new balance in cell F2.

	A	B	C	D	E	F
1	**Previous Balance**	**Payments**	**New Purchases**	**Late Charge**	**Finance Charge**	**New Balance**
2						

Pascual has a credit line of $15,000 on his credit card. His summary looks as follows. How much available credit does Pascual have?

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge
	$4,598.12	$4,000.00	$1,368.55	$20.00	$5.78

SOLUTION   Pascual needs to determine his new balance and then subtract that from his credit line in order to find his available credit.

$$4,598.12 - 4,000.00 + 1,368.55 + 20.00 + 5.78 = \$1,992.45$$

He has a new balance of $1,992.45. Subtracting this from his credit line of $15,000 leaves him with an available credit of $13,007.55.

■ CHECK YOUR UNDERSTANDING

Rhonda had a previous balance of $567.91 and made an on-time credit card payment of $567.91. She has a credit line of x dollars and made purchases totaling y dollars. Write an algebraic expression that represents her current available credit.

Myrna is examining the summary section of her credit card statement. Myrna has checked all the entries on her bill and agrees with everything except the new balance. Determine where the error was made.

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance
	$1,748.00	$100.00	$800.00	$9.15	$19.00	$2,576.15

SOLUTION   Add the amounts that show money Myrna must pay to the credit card company.

$1,748.00	previous balance
800.00	purchases
9.15	finance charge
+ 19.00	late charge
$2,576.15	total to be paid

Subtract the $100 payment, and Myrna's new balance will be $2,476.16. It appears that Myrna was not credited for her payment. Under the Fair Credit Billing Act, Myrna must notify her creditor in writing within 60 days from the statement date on her bill.

■ CHECK YOUR UNDERSTANDING

Determine the error that was made using the following summary statement.

SUMMARY	Previous Balance	Payments / Credits	New Purchases
	$850.00	$560.00	$300.00
	Late Charge	**Finance Charge**	**New Balance**
	$3.00	$4.78	$504.78

Credit card companies pay college students generously to stand outside dining halls, dorms, and academic buildings and encourage their fellow students to apply for credits cards.

Louise Slaughter, American Congresswoman

1. How might the quote apply to what you have learned?

Use the FlashCard statement to answer Exercises 2–7.

ACCOUNT INFORMATION							
Account Number		4-10700000		Billing Date	30 May	**Payment Due**	8 Jun
TRANSACTIONS						DEBITS / CREDITS (−)	
9 MAY	3291684271	Fanelli Furs				$975.00	
12 MAY	594683219	Brooklyn Pets				$32.50	
15 MAY	7677095385	Maple Garage				$178.21	
18 MAY	8765713281	PAYMENT				−$150.00	
21 MAY	321447162	Caruso's Restaurant				$41.53	

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	**Minimum Payment**
	$420.50	$150.00	$1,227.24	$0.00	$19.80	$1,517.54	$30.00

		Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
Total Credit Line	$ 3,000.00				
Total Available Credit	$ 1,661.51	$1,199.97	30	19.8%	1.65%

2. How many purchases were made during the billing cycle?

3. What is the sum of all purchases made during the billing cycle?

4. When is the payment for this statement due?

5. What is the minimum amount that can be paid?

6. How many days are in the billing cycle?

7. What is the previous balance?

8. Rollie has a credit card with a line of credit at $4,000. He made the following purchases: $425.36, $358.33, $377.11, and $90.20. What is Rollie's available credit?

9. Rebecca has a credit line of $6,500 on her credit card. She had a previous balance of $398.54 and made a $250 payment. The total of her purchases is $1,257.89. What is Rebecca's available credit?

10. The APR on Leslie's credit card is currently 21.6%. What is the monthly periodic rate?

11. Sheldon's monthly periodic rate is 1.95%. What is the APR?

12. Zea has a credit limit of $2,000 on her credit card. Each month, she charges about $200 and makes a payment of $125.
   a. Estimate the number of months that Zea can continue this pattern until she reaches her credit limit.
   b. Consider that part of the $125 Zea pays each month will be for finance charges. How will the number of months from part a be affected by these charges?

13. Examine this portion of the credit card summary.

Average Daily Balance	# Days in Billing Cycle	APR
W	X	Y %

  a. Express the sum of the cycle's daily balances algebraically.

  b. Express the monthly periodic rate as an equivalent decimal without the % symbol.

14. Fill in the missing amounts for a–d.

ACCOUNT INFORMATION

Type	Revolving	Account Number 234 98765 90	Billing Date 16 Aug	**Payment Due Date** 1 Sep

TRANSACTIONS		DEBITS / CREDITS (−)
6 AUG	Meghan's Shop	$85.63
7 AUG	Payment	−$63.00
8 AUG	Joe's Italian Restaurant	$47.60
10 AUG	University of New York	$855.00
15 AUG	SkyHigh Airlines	$370.50
16 AUG	Payment	−$137.00

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$215.88	**b.**	**c.**	$0.00	$6.70	**d.**	$25.00

Total Credit Line $ 5,000.00
Total Available Credit **a.**

Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
$446.41	30	18%	1.5%

15. Examine the summary section of a monthly credit card statement. Use the first five entries to determine whether the new balance is correct. If it is incorrect, write the correct amount.

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$359.02	$80.00	$103.65	$0.00	$5.34	$548.01	$18.00

16. Check the new balance entry on the monthly statement below by using the first five entries. If the new balance is incorrect, write the correct amount.

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$424.41	$104.41	$103.38	$23.00	$7.77	$454.15	$54.00

17. A credit card statement is modeled using the following spreadsheet. Entries are made in columns A–F. Write the formula to calculate the available credit in cell G2.

	A	B	C	D	E	F	G
1	**Previous Balance**	**Payments**	**New Purchases**	**Late Charge**	**Finance Charge**	**Credit Line**	**Available Credit**
2							

18. Determine the amount of the payment made on this credit card.

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$939.81		$125.25	$3.00	$15.38	$833.44	$25.00

19. The previous balance after the last billing cycle is represented by A, recent purchases by B, payments by C, finance charge by D, late charge by E. Express the relationship among the variables that must be true in order for the new balance to be zero.

4-6 Average Daily Balance

Objectives

- Calculate the average daily balance using the credit calendar.

- Calculate the finance charge using the credit calendar.

Key Terms

- average daily balance
- credit calendar
- billing date

HOW ARE THE ENTRIES ON THE MONTHLY STATEMENT CALCULATED?

Credit card users who do not pay their bills in full are charged a finance charge for the convenience of extra payment time. The finance charge is computed on any statement in which the consumer has a previous unpaid balance.

The charge is based on the average amount the consumer owed each day of the billing cycle. This average is the **average daily balance**. It is used with the monthly periodic rate to determine the finance charge. Billing cycles and interest rates differ from card to card and from user to user with the same credit card.

Skills and Strategies

Here you will learn how to calculate the average daily balance using a credit card billing calendar, often called a **credit calendar**.

Elena Kaye						44 Central Avenue Onesburg, TX

ACCOUNT INFORMATION						
Account Number		07-3458-1299	Billing Date	13 Nov	**Payment Due**	5 Dec

TRANSACTIONS					DEBITS / CREDITS (−)	
25 Oct	House Depot					$67.00
29 Oct	Bubble Wrap Shipping Co.					$55.00
5 Nov	Payment					−$160.00

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$829.30	$160.00	$122.00	$0.00	$12.09	$803.39	$59.00

Total Credit Line	$ 3,000.00	Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
Total Available Credit	$ 2,196.61				
		854.46	31	16.98%	1.415%

EXAMPLE 1

Use the information given in Elena Kaye's credit card statement to verify the accuracy of her average daily balance.

SOLUTION   Carefully follow Steps 1–8.

Step 1 On a blank sheet of paper, draw a grid that has 7 boxes across and 5 boxes down. Draw an arc in each corner.
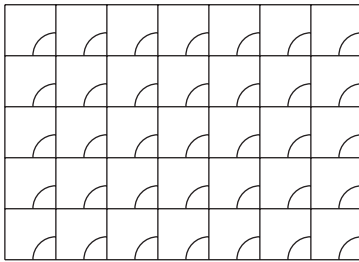
Step 2 On Elena's statement you can find that the number of days in the billing cycle is 31 days. Shade in the last 4 days that will not be used.

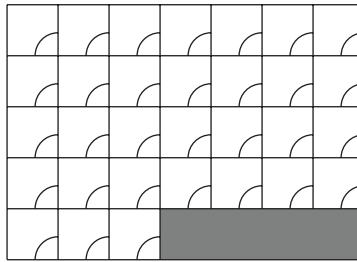**Step 3** Enter the **billing date**, 11/13, in the corner section of the last day on the calendar. Number the days back from that date until the calendar is completely filled in. Notice that although the billing date is in November, the billing cycle includes some days from October. Enter the month of the first date in your calendar and the month of the first day of the next month.

OCT.						
14	15	16	17	18	19	20
21	22	23	24	25 NOV.	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13				

Step 4 Look at the posted dates of each of the charges (debits). Put a plus sign (+) and the charged amount on the calendar dates that have debits posted. Next look at the posted date of the payment made. Put a minus sign (−) and the payment made on that calendar date.

OCT.						
14	15	16	17	18 +67.00	19	20
21	22 +55.00	23	24	25 NOV.	26	27
28	29 −160.00	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13				

Step 5 The first day of the billing cycle is October 14. The previous balance of $829.30 is the amount Elena owed on October 14. Enter that balance on October 14. Notice that Elena made no purchases or payments until October 25, so on each day from October 14 to October 24, the daily balance is $829.30. Enter this number on each of these dates.

OCT. $829.30	$829.30	$829.30	$829.30	$829.30	$829.30	$829.30
14	15	16	17	18	19	20
$829.30	$829.30	$829.30	$829.30 +67.00			
21	22	23	24	25 NOV.	26	27
+55.00						
28	29	30	31	1	2	3
−160.00						
4	5	6	7	8	9	10
11	12	13				

Step 6 A $67.00 purchase was made on October 25. The amount Elena owes on October 25 is increased by $67.00. The amount owed from October 25 to October 28 is $896.30.

OCT.						
$829.30 **14**	$829.30 **15**	$829.30 **16**	$829.30 **17**	$829.30 **18**	$829.30 **19**	$829.30 **20**
$829.30 **21**	$829.30 **22**	$829.30 **23**	$829.30 **24**	+67.00 $896.30 **25**	$896.30 **26**	$896.30 **27**
+55.00 $896.30 **28**	**29**	**30**	**31**	NOV. **1**	**2**	**3**
−160.00 **4**	**5**	**6**	**7**	**8**	**9**	**10**
11	**12**	**13**				

Step 7 A $55.00 purchase was made on October 29, and a payment of $160.00 was made on November 5. The purchase must be added to the daily balance of October 28, and the payment must be subtracted from the daily balance of November 4. There are no other transactions, so continue the daily balance amount through to the end of the billing cycle.

OCT.						
$829.30 **14**	$829.30 **15**	$829.30 **16**	$829.30 **17**	$829.30 **18**	$829.30 **19**	$829.30 **20**
$829.30 **21**	$829.30 **22**	$829.30 **23**	$829.30 **24**	+67.00 $896.30 **25**	$896.30 **26**	$896.30 **27**
+55.00 $896.30 **28**	$951.30 **29**	$951.30 **30**	$951.30 **31**	NOV. $951.30 **1**	$951.30 **2**	$951.30 **3**
$951.30 **4**	−160.00 $791.30 **5**	$791.30 **6**	$791.30 **7**	$791.30 **8**	$791.30 **9**	$791.30 **10**
$791.30 **11**	$791.30 **12**	$791.30 **13**				

Step 8 To find the average daily balance, add all the daily balances and divide by the number of days in the billing cycle, 31. The sum of the daily balances is $26,488.30. Divide that sum by 31.

$$26,488.30 \div 31 = 854.46$$

The average daily balance is $854.46.

■ **CHECK YOUR UNDERSTANDING**

Is there a better time during the billing cycle when Elena could have made her payment so that the average daily balance would have been less?

EXAMPLE 2

Determine the finance charge for Elena's billing cycle.

SOLUTION   Once the average daily balance is computed using the calendar, find the finance charge using the average daily balance and the monthly periodic rate.

Balance × monthly period rate	854.46 × 1.415%
Express rate as a decimal.	854.46 × 0.01415
Simplify and round.	12.09

Her finance charge is $12.09.

■ **CHECK YOUR UNDERSTANDING**

When might Elena have made her purchases during the billing cycle in order to decrease her finance charge?

> *The best way to deal with credit card debt is to educate yourself.*
>
> **Mark Rosen,** Author

1. How might the quote apply to what you have learned?

2. Ralph just received his June FlashCard bill. He did not pay his May bill in full, so his June bill shows a previous balance and a finance charge. The average daily balance is $470, and the monthly periodic rate is 1.5%. What should Ralph's finance charge be?

3. Lauren did not pay her January FlashCard bill in full, so her February bill has a finance charge added on. The average daily balance is $510.44, and the monthly periodic rate is 2.5%. What should Lauren's finance charge be on her February statement?

4. Jennifer did not pay her FlashCard bill in full in September. Her October bill showed a finance charge, and she wants to see whether or not it is correct. The average daily balance is $970.50, and the APR is 28.2%. Find the finance charge for her October statement.

5. Daniyar paid his April FlashCard with an amount equal to the new purchases shown on his bill. His May bill shows an average daily balance of $270.31 and a monthly periodic rate of 1.95%. What is the finance charge on Daniyar's May statement?

6. Use Mark Gilley's FlashCard statement. There is an error in his bill. The average daily balance, finance charge, available credit, and new balance amounts are not filled in. You can find a copy of the blank calendar at www.cengage.com/school/math/financialalgebra.
   a. What is Mark's average daily balance?
   b. What is Mark's finance charge?
   c. What is Mark's new balance?
   d. What is Mark's available credit?
   e. If the $200 payment had been posted on 6/13, would Mark's finance charge for this billing cycle have been higher or lower?

7. After Wade paid his May credit card bill, he still had a balance of z dollars. He made no additional payments or purchases before he received his next bill. The monthly periodic rate on this account is 2.015%. What expression represents the finance charge on his June statement?

Mark Gilley						700 West Street Maintown, FL

ACCOUNT INFORMATION						
Account Number		7-6231-491	Billing Date	26 Jun	**Payment Due**	10 Jul

TRANSACTIONS					DEBITS / CREDITS (−)	
31 May	63214987261	Linda's Art Shop				$251.00
12 Jun	62115497621	Artisign's Inc.				$72.50
18 Jun	73216532116	Payment Thank you				−$200.00
20 Jun	73162225142	Sylvart Corp.				$18.50

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	**Minimum Payment**
	$800.00	$200.00	$342.00	$0.00			$25.00

Total Credit Line Total Available Credit	$ 6,000.00	Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
			31	18%	1.5%

8. Ed Lubbock's FlashCard bill is below. There are entries missing.

Ed Lubbock						1234 Algebra Street Euclid, WA

ACCOUNT INFORMATION

Account Number		7-6234712	Billing Date	10 Dec	**Payment Due**	21 Dec

TRANSACTIONS					DEBITS / CREDITS (−)	
24 NOV	632174293	Rusty's Rib Palace				$48.00
1 DEC	321446253	Payment				−$100.00
6 DEC	333261114	Petrela Sailboats				$30.00

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$421.50	$100.00	$78.00				$30.00

Total Credit Line Total Available Credit	$ 1,000.00	Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
			30	19.8%	1.65%

    a. What is Ed's average daily balance?
    b. What is Ed's finance charge?
    c. What is Ed's new balance?
    d. What is Ed's available credit?
    e. If the $30 charge to Petrela Sailboats had been posted on 12/9, would the finance charge be higher or lower for this billing cycle? Explain.

9. Examine the following 21-day credit calendar. The opening balance is Y dollars. On March 23, a purchase of X dollars was made. On March 28, a payment of Z dollars was made. On April 4, a purchase of W dollars was made.

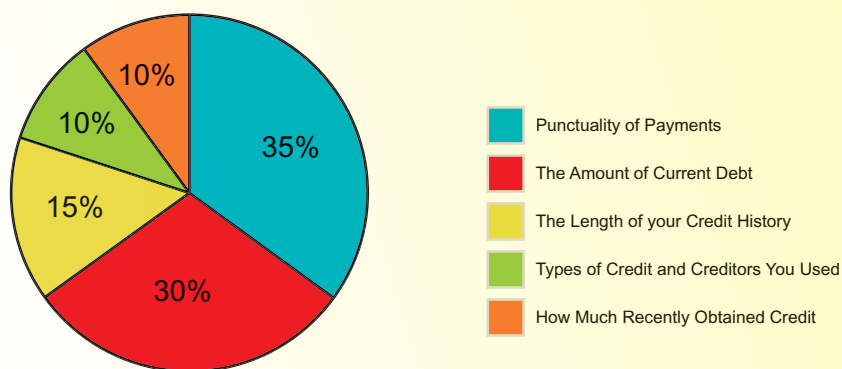| MARCH						
Y /16	Y /17	Y /18	Y /19	Y /20	Y /21	Y /22
$Y + X$ /23	/24	/25	/26	/27	$- Z$ /28	/29
/30	/31	APRIL /1	/2	/3	$+ W$ /4	/5
/6	/7	/8	/9	/10	/11	/12
/13	/14	/15	/16	/17	/18	/19

    a. What is the algebraic expression for the daily balance on March 23? Write it in on that date and on March 24–27.
    b. What is the algebraic expression for the daily balance on March 28 after the payment is made? Write it in on that date and on March 29 to April 3.
    c. What is the algebraic expression that represents the daily balance on April 4 after the purchase is made? Write it in on that date and on April 5.
    d. Write the algebraic expression for the sum of the daily balances.
    e. What is the algebraic expression for the average daily balance?

You Write the Story!!

FICO scores are measures of your credit risk to a potential creditor. The graph gives the weighted contribution of several factors that affect your credit rating. The Fair Isaac Corporation, the creators of the FICO score, keeps their formulas for computing the scores a secret. Write a short newspaper-type article centered on the circle graph. You can find a copy of this graph at www.cengage.com/school/math/financialalgebra. Copy and paste it into your article.

Pie chart percentages: 35%, 30%, 15%, 10%, 10%

- Punctuality of Payments
- The Amount of Current Debt
- The Length of your Credit History
- Types of Credit and Creditors You Used
- How Much Recently Obtained Credit

Reality Check

1. There are six laws that regulate consumer credit in the United States. Find when each act was signed into law. What problem was the act trying to help solve? What are the major provisions of each act? Prepare a poster displaying your findings. The laws are listed below.

- Equal Credit Opportunity Act
- Electronic Funds Transfer Act
- Fair Credit Reporting Act
- Fair Credit Billing Act
- Fair Debt Collection Practices Act
- Truth-in-Lending Act

2. Visit two lending institutions in your area. Find the APR, monthly payment, and finance charge for a $15,000, three-year loan at the two lenders. Prepare a poster that includes a business card from each lender and the following mathematical information for the loan.

- APR
- monthly payment
- total of all monthly payments
- finance charge

3. Go online and find information on the FICO score. What is the range of possible scores? How can each score be interpreted? What contributes to the FICO score? Summarize the information you find from the websites. Prepare your information in a report.

4. There are three major credit reporting agencies in the United States. They are named Equifax, Experian, and TransUnion. They keep records of your credit activity and provide your potential creditors with information on your financial habits. This helps a creditor decide how much of a credit risk each customer is. Go online or to a library and look up information about these three credit reporting agencies. Summarize the information you obtain in a report.

5. Find contact information for three credit unions in your area. Write to each credit union and explain that you are doing a report for school. Find the requirements to join each credit union. Find the APR, monthly payment, and finance charges for a $31,000 new-car loan over a five-year period. Prepare your information on a poster.

6. Talk to your teacher about having a local bank representative come to your class. Have the class prepare questions about loans and credit cards in advance. Plan a script of the questions that will be addressed. When the bank representative comes to speak, act as moderator for the discussion. Keep a log of the questions and which student asked them. Write a thank you letter to the bank representative after the session.

7. Interview your parents or relatives about their use of loans and credit cards. Find what they consider wise spending habits, and what they have learned about credit. If they agree to let you see their last credit card statement, show them how to check entries in the statement, including the average daily balance and the finance charge.

8. Find out if any local store has an installment plan. Go to the store and interview a customer service representative. Ask questions about how their installment plan works. Get the monthly payment and finance charge for a specific item in the store, purchased under the installment plan. Prepare a report for the class.

9. Find a website that lists the terms and conditions of major credit cards. Research two different cards by going to the provider's links. Compare and contrast the advantages and disadvantages of each.

10. Some credit card providers offer student credit cards. Research this type of card and discuss how it differs from a regular credit card.

Dollars and Sense   Your Financial News Update

Go to www.cengage.com/school/math/financialalgebra where you will find a link to a website containing current issues about credit cards. Try one of the activities.

How much is 1 billion credit cards? How far would they stretch end-to-end? The typical credit card measures 54 mm by 85 mm.

1. A credit card's length is 85 mm. Convert this to inches by using an online metric conversion table. Round to the nearest hundredth.

2. There are 5,280 feet in a mile and 12 inches in each foot. How many inches are equivalent to a mile?

3. How many credit cards, placed end to end, would it take to span a mile? Round to the nearest integer.

4. The circumference of the earth is approximately 24,901 miles at the equator. How many credit cards (end to end) would it take to circle the earth?

5. Write your answer to Exercise 4 in words.

6. In Really? Really! you read facts involving 1 billion credit cards. How many times would 1 billion credit cards circle the earth at the equator?

Applications

Round monetary amounts to the nearest cent.

1. Faith is taking an $8,100, $2\frac{1}{2}$-year loan with an APR of 8.22%. What is the monthly payment for this loan?

2. Shania bought a $1,455 drum set on the installment plan. The installment agreement included a 15% down payment and 18 monthly payments of $80.78 each.
   a. How much is the down payment?
   b. What is the total amount of the monthly payments?
   c. How much will Shania pay for the drum set on the installment plan?
   d. What is the finance charge?

3. Pauline's credit card was lost on a business trip. She immediately reported it missing to her creditor. The person who found it hours later used it, and charged w dollars worth of merchandise on the card, where $w < 50. How much of the w dollars is Pauline responsible for paying?

4. Carly took a $7,000, three-year loan with an APR of 8.15%.
   a. What is the monthly payment?
   b. What is the total amount of the monthly payments?
   c. What is the finance charge?

5. Sarah is taking out a $24,400, four-year new-car loan with an APR of 6.88%. What is the finance charge for this loan? Round to the nearest hundred dollars.

6. The policy of the Black Oyster Pawnshop is to lend up to 30% of the value of a borrower's collateral. Pete wants to use a $2,000 guitar and a $900 camera as collateral for a loan. What is the maximum amount that he could borrow from Black Oyster?

7. Juan purchased a tool set for t on the installment plan. He made a 15% down payment and agreed to pay m per month for the next y years. Express the finance charge algebraically.

8. Jake had these daily balances on his credit card for his last billing period. He did not pay the card in full the previous month, so he will have to pay a finance charge. The APR is 18.6%.

two days @ $331.98
eleven days @ $1,203.04
four days @ $996.71
thirteen days @ $1,002.76

a. What is the average daily balance?
b. What is the finance charge?

9. Kim's credit card was not paid in full last month so she will pay a finance charge this month. She had an average daily balance of d during this billing period, which had 31 days. The APR was p%.
a. Express algebraically the APR as an equivalent decimal.
b. Express algebraically the monthly percentage rate as an equivalent decimal.
c. Express the finance charge algebraically.

10. Michelle's credit card billing cycle is 30 days. She had a daily balance of b dollars for d days. Then she charged one item for $56, and that was all of the purchases she made for the rest of the month. There was no other activity on the credit card. Express her average daily balance algebraically.

11. The finance charge on Lauren's credit card bill last month was $13.50. Her APR is 18%. What was her average daily balance?

12. Riel had an average daily balance of $415.22 on his May credit card statement. The bill showed that his APR was 21.6% and that his finance charge was $89.69. When he verified the finance charge, did he find that it was correct or incorrect? Explain.

13. What is the monthly period rate on a loan with an APR of 19.5%?

14. Harold borrowed $8,000 for five years at an APR of 6.75%.
a. What is Harold's monthly payment?
b. What is the total amount that Harold paid in monthly payments for the loan?
c. What is the amount Harold will pay in finance charges?

15. Examine the summary section of a monthly credit card statement. Use the first five entries to determine the new balance.

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$421.36	$1,703.50	$1,273.11	$0.00	$9.03		$18.00

16. The table lists the balances at the end of each year for a 15-year, $50,000 loan with an 8% interest rate.

Year	Balance
0	$ 50,000.00
1	$ 48,201.08
2	$ 46,252.85
3	$ 44,142.91
4	$ 41,857.85
5	$ 39,383.13
6	$ 36,703.01
7	$ 33,800.44
8	$ 30,656.96
9	$ 27,252.57
10	$ 23,565.62
11	$ 19,572.66
12	$ 15,248.28
13	$ 10,564.98
14	$ 5,492.97
15	$ 0.00

 a. Construct a scatterplot using the data points (year, loan balance).
 b. Write a linear regression equation that approximates the year/loan balance relationship. Round to the nearest integer.
 c. Write a quadratic regression equation that approximates the year/loan balance relationship. Round to the nearest integer.
 d. Write a cubic regression equation that approximates the year/loan balance relationship. Round to the nearest integer.

17. Bill can afford a monthly payment of $475. He wants to take out a $20,000 loan at 7% interest rate. What should the length of the loan be? Round your answer to the nearest year.

18. Ciana wants to take out a $7,500 loan with a 5.3% APR. She can afford to pay $128 per month for loan payments.
 a. What should be the length of her loan? Round to the nearest tenth of a year.
 b. What would an increase of $20 to the monthly payment have do to the length of her loan?

19. Use the credit card statement and a blank credit card calendar.

ACCOUNT INFORMATION							
Account Number			3-22767195	Billing Date	5 May	Payment Due	18 May
TRANSACTIONS					DEBITS / CREDITS (−)		
7 APR	124576893	Macy's					$676.00
15 APR	762938471	Bedford Auto Body Shop					$721.80
19 APR	309175832	Barnes and Noble Books					$93.15
27 APR	100445638	Payment					−$1,340.00
30 APR	876655411	FedEx					$115.75
3 MAY	998430828	TicketMaster					$450.95

SUMMARY	Previous Balance	Payments / Credits	New Purchases	Late Charge	Finance Charge	New Balance	Minimum Payment
	$978.00	$1,340.00	$2,057.55	$0.00			$115.00

Total Credit Line Total Available Credit	$ 3,000.00	Average Daily Balance	# Days in Billing Cycle	APR	Monthly Periodic Rate
			30	19.8%	1.65%

 a. What is the total of all of the purchases made this billing cycle?
 b. What is the amount of total payments?
 c. What is sum of the daily balances?
 d. What is the average daily balance?
 e. What is the monthly periodic rate?
 f. What is the finance charge?
 g. What is the new balance?
 h. What is the available credit?

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