

There's no place like home.

Judy Garland, American Actress, as Dorothy in *The Wizard of Oz*

Mortgage Application Process

8-3

Key Terms

- market value
- property tax
- real estate tax
- assessed value
- down payment
- mortgage
- fixed rate mortgage
- adjustable rate mortgage
- foreclose
- homeowner's insurance
- escrow
- front-end ratio
- back-end ratio
- debt-to-income ratio
- balloon mortgage
- interest-only mortgage

Objectives

- Compute the monthly cost of paying for a house.
- Understand the research that is necessary before you purchase a home.

WHAT DO YOU NEED TO KNOW ABOUT MORTGAGES?

Buying a house is probably the most expensive investment you will ever make. **Market value** is the amount for which a house could be sold. Homeowners pay **property taxes**, also called **real estate taxes**. The **assessed value** of a home is an amount used to determine the property taxes. The assessed value may not be the same as the market value. Property taxes help pay for government services, such as schools, libraries, and police.

After making the required **down payment**, most people take out a loan to pay the balance owed on their new home. These loans are **mortgages**. Because interest rates differ, shopping for a mortgage can be important. You should become familiar with the following mortgage vocabulary.

- **Fixed rate mortgage** A fixed rate mortgage is a mortgage in which the monthly payment and annual percentage rate (APR) remain the same throughout the entire loan period.
- **Adjustable rate mortgage** An adjustable rate mortgage is a mortgage in which the monthly payment and the APR may change, as specified in the signed agreement.
- **Foreclosure** The bank forecloses on (takes possession of) the home and sells it if the homeowner cannot pay the mortgage.
- **Homeowner's insurance** Insurance that covers damage to the home due to fire, and other natural disasters. It also covers the contents of the home in case of theft or vandalism.

Most mortgage loans are repaid over 15 to 30 years, which means a home buyer is taking on a long-term financial responsibility.

EXAMINE THE QUESTION

Students need to see the financial implications buying a home will have on their lives. In this lesson, students will get an idea what it costs to purchase a home.

Combined with their knowledge of income taxes, students will get a better picture of what salary it will take to purchase the kind of home they want.

Additionally, combining this lesson's skills with the credit chapter will show students how much interest they pay over the life of a mortgage.

CLASS DISCUSSION

Discuss situations when the students' families have made insurance claims and the circumstances that caused the damage. Did having insurance save the family a lot of money?

TEACH

This lesson examines the costs of a mortgage, property taxes, homeowner's insurance, and other periodic payments related to housing.

EXAMPLE 1

Students will see that the interest on a home purchase can be hundreds of thousands of dollars. Point out that the interest on the loan in Example 1 is actually more than the principal.



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Have students consider the order of operations and the formula use in the solution to determine if additional parentheses need to be included when entering the equation into a calculator. Some students will benefit by rewriting the formula, placing parentheses around the numerator and denominator when they make the substitutions.

CHECK YOUR UNDERSTANDING

Answer $I = (360M - p)$

Skills and Strategies

Here you will examine what costs must be researched by a prospective home buyer before committing to the responsibility of a monthly mortgage payment for many years.

EXAMPLE 1

Heather is planning to buy a home. She has some money for a down payment already. She sees a home she would like and computes that she would need to borrow \$190,000 from a bank over a 30-year period. The APR is 6.4%. What will be her total interest for the 30 years?

SOLUTION Recall the monthly payment formula from Chapter 4.

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

where M = monthly payment
 p = principal
 r = interest rate expressed as a decimal
 t = number of years

Substitute and simplify. Round to the nearest cent.

$$M = \frac{190,000 \left(\frac{0.064}{12} \right) \left(1 + \frac{0.064}{12} \right)^{12(30)}}{\left(1 + \frac{0.064}{12} \right)^{12(30)} - 1} \approx 1,188.46$$

The monthly payment is \$1,188.46.

There are 12 payments per year, so there are 360 payments over the 30 years. Multiply to find the sum of all 360 payments.

$$360(1,188.46) = 427,845.60$$

The sum of the monthly payments is \$427,845.60. To find the interest, subtract the principal from this amount.

$$427,845.60 - 190,000 = 237,845.60$$

Heather will pay \$237,845.60 in interest. This is almost a quarter of a million dollars, and it is just interest! Buying a home is an expensive proposition.

■ CHECK YOUR UNDERSTANDING

Don and Barbara Weinstein are looking for a home for which they would have to borrow p dollars. If they take out a 30-year loan with a monthly payment equal to M , express their interest I algebraically.

EXAMPLE 2

Don 4 do

Jessica and Darryl Delaware are looking at a house, and they contacted the tax assessor to find out what the property taxes would be. In their town, the tax is based on the square footage and other features of the house. The classified ad describing their house is shown below. What is the annual property tax on their house if the town has a tax rate of 0.89%?

2-story Colonial with 2.5 bath, frpl, full basement, CAC, 30 × 30 ft deck, 3/4 acre, 600 sq ft first flr, 1500 sq ft second flr, 20 × 20 ft dormer, 12 × 21 ft garage, 16 × 32 ft vinyl pool, gas ht, excellent cond. \$289K

SOLUTION Property tax is based on the assessed value of the house. The Delaware's received a copy of how the assessed values are computed, shown at the right. Some of the assessed values are based on square footage, and some are flat rates. Compute the assessed value for each part.

Add all the assessed values to find the total assessed value of the home.

Structural Rates per Square Foot	Flat Rates
1st floor over basement \$3.00	land \$1,000 per acre
1st floor over slab \$2.25	1st bathroom \$0
2nd floor \$2.25	extra full bathroom \$100
garage \$1.00	half bathroom \$50
dormer \$1.00	fireplace \$125
barn \$0.75	tennis court \$375
deck \$0.50	spa \$125
shed \$0.70	central air conditioning \$200
vinyl-lined pool \$0.75	gas heat \$700

	Square footage	Assessed Value
first floor	600	$600 \times 3 = 1,800$
second floor	1,500	$1,500 \times 2.25 = 3,375$
dormer	$20 \times 20 = 400$	$400 \times 1 = 400$
garage	$12 \times 21 = 252$	$252 \times 1 = 252$
deck	$30 \times 30 = 900$	$900 \times 0.5 = 450$
pool	$16 \times 32 = 512$	$512 \times 0.75 = 384$
land		$\frac{3}{4} \times 1,000 = 750$
extra bathrooms		$1\frac{1}{2} = 100 + 50 = 150$
fireplace		125
central air conditioning		200
gas heat		700

$$1,800 + 3,375 + 400 + 252 + 450 + 384 + 750 + 150 + 125 + 200 + 700 = 8,586$$

The assessed value is \$8,586.

Multiply the assessed value by the tax rate to compute the annual property tax. The town has a tax rate of 89%. Find 89% of \$8,586 to find the annual property tax.

$$0.89(8,586) = 7,641.54$$

The property tax on the house is \$7,641.54 per year.

EXAMPLE 2

Students may have heard adults complaining about property taxes being high in certain locations. Remind them what services are paid for by property taxes.

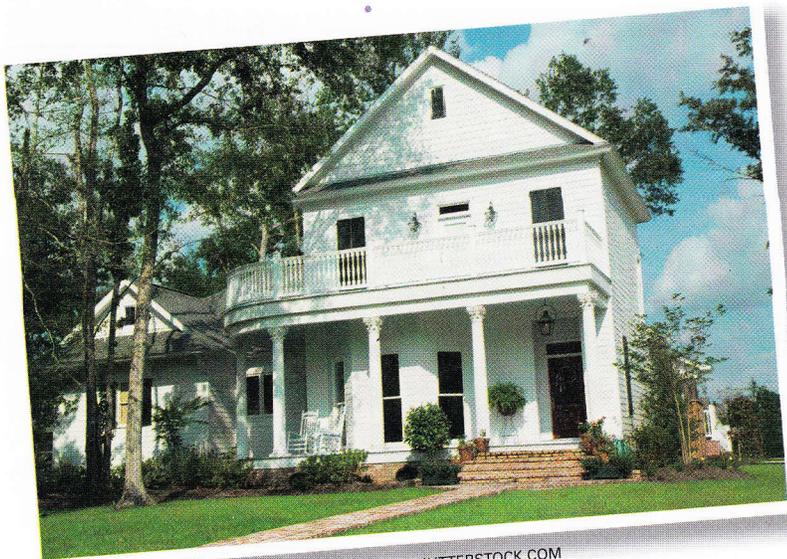
Explain to students that property taxes are not usually collected annually—they are collected monthly or semiannually.

CHECK YOUR UNDERSTANDING

Answer $P = ar$

EXAMPLE 3

Explain to students that a common practice is to have the bank collect property tax and homeowner's insurance payments with the mortgage.



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CHECK YOUR UNDERSTANDING

Answer $m + \frac{h}{3} + \frac{p}{12}$

■ CHECK YOUR UNDERSTANDING

The assessed value of a home is a dollars and the tax rate, expressed as a decimal, is r . Express the property tax P algebraically.

EXAMPLE 3

Kevin and Cathy Mackin have a mortgage with National Trust Bank. The bank requires that the Mackins pay their homeowner's insurance, property taxes, and mortgage in one monthly payment to the bank.

Their monthly mortgage payment is \$1,233.56, their semi-annual property tax bill is \$5,206, and their annual homeowner's insurance bill is \$1,080. How much is the monthly payment they make to National Trust?

SOLUTION The bank wants the insurance and taxes paid monthly so the Mackins do not have large bills to pay at the end of the year. The bank holds the insurance and property tax money and pays those bills for the Mackins when they are due. This is holding money in **escrow**.

Divide the annual insurance by 12 to get a monthly amount.

$$1,080 \div 12 = 90$$

The Mackins must pay \$90 per month into escrow for their homeowner's insurance.

Divide the semi-annual property tax by 6, and round to the nearest cent to get a monthly amount for the property tax.

$$5,206 \div 6 = 867.67$$

The Mackins must pay \$867.67 per month into escrow for their property taxes.

The monthly payment to National Trust is the sum of the monthly mortgage, insurance, and taxes.

$$1,233.56 + 90 + 867.67 = 2,191.23$$

The Mackins pay the bank \$2,191.23 each month.

■ CHECK YOUR UNDERSTANDING

Michelle and Dan Zlotnick pay their mortgage, insurance, and property taxes in one monthly payment to the bank. If their monthly mortgage payment is m dollars, their annual property tax payment is p dollars, and their quarterly homeowner's insurance payment is h dollars, express the amount they pay the bank monthly algebraically.

EXAMPLE 4

Tom and Lori Courtney are considering buying a house and are researching the potential costs. Their adjusted gross income is \$135,511. The monthly mortgage payment for the house they want would be \$1,233. The annual property taxes would be \$9,400, and the homeowner's insurance premium would cost them \$876 per year. Will the bank lend them \$190,000 to purchase the house?

SOLUTION Banks use several factors, including credit rating, to decide if they will lend money. The bank wants to be paid back. They want assurance that the borrowers can afford the monthly payments.

One indicator is the **front-end ratio**, which is a ratio of monthly housing expenses to monthly gross income.

$$\text{Front-end ratio} = \frac{\text{Monthly housing expenses}}{\text{Monthly gross income}}$$

Banks often want the front-end ratio to be 28% or less before they lend the money.

Find the monthly amount for property tax.

$$\text{Annual property tax} \div 12 = \frac{9,400}{12} \approx 783.33$$

Rounded to the nearest cent, the monthly property tax is \$783.33.

Find the monthly amount for homeowner's insurance.

$$\text{Annual insurance} \div 12 = \frac{876}{12} = 73$$

Find the monthly gross income.

$$\text{Annual gross income} \div 12 = \frac{135,511}{12} \approx 11,292.58$$

The monthly gross income is \$11,292.58, rounded to the nearest cent.

Substitute these values into the front-end ratio. Convert the decimal equivalent to a percent.

$$\text{Front-end ratio} = \frac{1,233 + 783.33 + 73}{11,292.58} = \frac{2,089.33}{11,292.58} \approx 0.185 = 18.5\%$$

The front-end ratio is 18.5%.

The Courtneys' front-end ratio is less than 28%, so the bank would say they can afford the mortgage on this house based on the front-end ratio.

EXAMPLE 4

Explain to students that the bank does not want to have to repossess the house—they want to make sure the borrowers can afford the mortgage, so they set up the front-end ratio to create a benchmark for mortgage approvals.

CHECK YOUR UNDERSTANDING

$$\text{Answer} = \frac{m + \frac{p}{12} + \frac{h}{12}}{\frac{x}{12}}$$

■ CHECK YOUR UNDERSTANDING

Ken and Julie Frederick have an adjusted gross income of x dollars. They are looking at a new house. Their monthly mortgage payment would be m dollars. Their annual property taxes would be p dollars, and their annual homeowner's premium would be h dollars. Express their front-end ratio algebraically.

EXAMPLE 5

The back-end ratio takes into account the aggregate of a borrower's monthly debts. Together with the front-end ratio, it paints

EXAMPLE 5

Bill and Terry Noke are considering buying a house and need to figure out what they can afford and what a bank will lend them. Their adjusted gross income is \$166,988. Their monthly mortgage

payment for the house they want would be \$1,544. Their annual property taxes would be \$9,888, and the homeowner's insurance premium would cost them \$1,007 per year. They have a \$510 per month car loan, and their average monthly credit card bill is \$5,100. Would the bank lend them \$210,000 to purchase their house?



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a picture of how credit-worthy the borrower is for the mortgage in question.

CHECK YOUR UNDERSTANDING

Answer 51%

SOLUTION In Example 4 you learned about the front-end ratio that banks use to assess potential borrowers. Banks also use the **back-end ratio**, or **debt-to-income ratio**, which takes into account a borrower's regular monthly debts, such as car loans, alimony, child support, and credit card bills.

$$\text{Back-end ratio} = \frac{\text{Total monthly expenses}}{\text{Monthly gross income}}$$

Banks generally want a back-end ratio less than 36% to approve a mortgage application.

Find the monthly amounts for the homeowner's insurance and the property taxes to the nearest dollar.

$$\text{Monthly homeowner's insurance} \quad 1,007 \div 12 \approx 84$$

$$\text{Monthly property tax} \quad 9,888 \div 12 = 824$$

The total monthly expenses are the sum of the mortgage payment, property tax, homeowners insurance, car payment, and credit card payments.

$$\text{Add.} \quad 1,544 + 824 + 84 + 510 + 5,100 = 8,062$$

Find the Noke's monthly gross income by dividing by 12 and rounding to the nearest dollar.

$$166,988 \div 12 \approx 13,916$$

Substitute these values into the back-end ratio.

$$\text{Back-end ratio} = \frac{8,062}{13,916} \approx 0.579$$

The back-end ratio for the Nokes is 58%.

The back-end ratio for the Nokes is greater than 36%. The bank will not give them a loan for \$210,000.

■ CHECK YOUR UNDERSTANDING

Find the back-end ratio to the nearest percent for the Nokes in Example 5, if they pay off their car, and Terry gets a \$12,000 raise.

EXAMPLE 6

Chris and Scott Halloran are opening a new restaurant. They take out a 6.1%, 15-year, \$300,000 mortgage on the building, but they do not have a lot of money because they are spending what they have to get the business started. Years in the future they intend to have much more money from the success of the restaurant. Can they get a loan that will fit well with their current and future incomes? How much will they pay in interest for the loan? What are the monthly payments?

SOLUTION The Hallorans can take out a balloon mortgage. A **balloon mortgage** features a very high last payment, with all other payments being relatively low.

One type of balloon loan is an **interest-only** balloon mortgage where only the interest is paid until the final month.

Use the monthly payment formula. Substitute, simplify, and round to the nearest cent.

$$M = \frac{300,000 \left(\frac{0.061}{12} \right) \left(1 + \frac{0.061}{12} \right)^{12(15)}}{\left(1 + \frac{0.061}{12} \right)^{12(15)} - 1} \approx 2,547.81$$

To find the interest due on the Halloran's loan, first find the total amount due for the loan. Then subtract the \$300,000 principal from the total paid.

The loan is for 15 years, so there will be $12 \times 15 = 180$ payments.

$$\text{Payment amount} \times 180 \qquad 2,547.81 \times 180 = 458,605.80$$

$$\text{Total paid} - \text{principal} \qquad 458,605.80 - 300,000 = 158,605.80$$

The interest on the Halloran's loan, rounded to the nearest dollar, is \$158,606.

If the last payment is the \$300,000 balloon, the first 179 payments equal the interest only.

$$\text{Divide.} \qquad 158,606 \div 179 \approx 886.07$$

The first 179 monthly payments are \$886.07, and the 180th (last) payment, at the end of the 15 years, is the balloon payment of \$300,000.

Notice that the initial monthly payments were low, allowing the Hallorans to put money into their business.

Keep in mind that they had to start saving for the balloon payment years in advance since it is so high.

There are other ways to set up balloon payments, but all of them feature the large final payment.

EXAMPLE 6

Discuss the advantages and disadvantages of the large balloon payment at the end of the loan. It makes the monthly payments lower when the business starts, which is helpful to a new business. However, the final payment must be saved for in advance since it is so large.

CHECK YOUR UNDERSTANDING

$$\text{Answer } \frac{x}{239}$$

■ CHECK YOUR UNDERSTANDING

The total interest on a 20-year balloon mortgage with principal p dollars is x dollars. If just the interest is paid before the final balloon payment, express the monthly payment before the balloon payment amount algebraically.