

Section 9.6: The Cost of Home Ownership

Objectives

1. Understand mortgage options.
2. Compute the monthly payment and interest costs for a mortgage.
3. Compute payments and interest for other kinds of installment loans.

Mortgages

- A **mortgage** is a long-term loan for the purpose of buying a home.
- The down payment is the portion of the sale price of the home that the buyer initially pays to the seller.
- The **amount of the mortgage** is the difference between the sale price and the down payment.
- Fixed rate mortgages have the same monthly payment during the entire time of the loan.

Computations Involved with Buying a Home

- Many lending institutions require the buyer to pay one or more points at the time of closing—that is, the time at which the mortgage begins.
- A point is a onetime charge that equals 1% of the loan amount.

For example, two points means that the buyer must pay 2% of the loan amount at closing.

- A document, called the **Truth-in-Lending Disclosure Statement**, shows the buyer the APR for the mortgage.
- In addition, lending institutions can require that part of the monthly payment be deposited into an escrow account, an account used by the lender to pay real estate taxes and insurance.



Loan Payment Formula for Installment Loans

The regular payment amount, PMT , required to repay a loan of P dollars paid n times per years over t years at an annual rate r is given by

$$PMT = \frac{P \left(\frac{r}{n} \right)}{\left(1 - \left(1 + \frac{r}{n} \right)^{-nt} \right)}$$

$n=12$
monthly payments

Example 1: The price of a home is \$195,000. The bank requires a 10% down payment and two points at the time of closing. The cost of the home is financed with a 30-year fixed rate mortgage at 7.5%. $n=12$
 $r=.075$
 $t=30$

- a. Find the required down payment. 10% of \$195,000
 $= .10 \times 195,000$
 $= \$19,500$



- b. Find the amount of the mortgage. \Rightarrow LOAN, amount borrowed (subtract off portion paid already in down payment)
$$\begin{array}{r} 195,000 \\ - 19,500 \\ \hline P = \$175,500 \end{array}$$
 borrowed through mortgage

- c. How much must be paid for the two points at closing?
2% of loan amount
 $= .02 \times 175,500$
 $= \$3,510$ one-time fee

- d. Find the monthly payment (excluding escrowed taxes and insurance).

$$PMT = \frac{175,500 \left(\frac{.075}{12} \right)}{\left(1 - \left(1 + \frac{.075}{12} \right)^{-12 \times 30} \right)} = \$1227.12 \text{ monthly payment}$$

$\Rightarrow \$1227/\text{mo.}$
Round to nearest whole dollar

- e. Find the total interest paid over 30 years.

$$\begin{aligned} & \text{all payments} - \text{amount borrowed} \\ & = (\$1227.00)(12)(30) - \$175,500 \\ & = \$441,720 - \$175,500 \end{aligned}$$

$$= \$266,220 \rightarrow \text{Interest is more than original value of house}$$

But you would have spent \$ on rent anyway, \neq
now you own a valuable asset

Example 2: The price of a home is \$465,000. The bank requires a 20% down payment at the time of closing. The cost of the home is financed with a 30-year fixed rate mortgage at 5.5%.

- a. Find the required down payment.

$$20\% \text{ of } 465,000$$

$$.20 \times 465,000 = \$93,000$$

$$r = .055$$

$$t = 30$$

$$n = 12$$



- b. Find the amount of the mortgage.

$$\begin{array}{r} 465,000 \text{ sale price} \\ - 93,000 \text{ down payment} \\ \hline P = 372,000 \text{ borrowed} \end{array}$$

- c. Find the monthly payment (excluding escrowed taxes and insurance).

$$PMT = \frac{372,000 \left(\frac{.055}{12} \right)}{\left(1 - \left(1 + \frac{.055}{12} \right)^{-12 \times 30} \right)} = \$2112/\text{mo.}$$

- d. Find the total interest paid over 30 years.

$$\text{total payments} - \text{loan amount}$$

$$(2112)(12)(30) - 372,000$$

$$760,320 - 372,000 = \$388,320 \text{ interest}$$

- e. As another option, the family decides to consider a 20-year mortgage, still at 5.5% and with a 20% down- payment. Find the monthly payment and the total interest paid over 20 years. $t = 20$ only change

$$PMT = \frac{372,000 \left(\frac{.055}{12} \right)}{\left(1 - \left(1 + \frac{.055}{12} \right)^{-12 \times 20} \right)} = \$2559/\text{mo.}$$

$$2559(12)(20) - 372,000$$

$$614,160 - 372,000$$

$$= \$242,160 \text{ much less interest than in the 30-year loan}$$

Monthly Payments and Interest Costs for Other Kinds of Installment Loans

Example 3: You decide to take a \$20,000 loan for a new car. You can select one of the following loans, each requiring regular monthly payments: $n=12$

Installment Loan A: 3-year loan at 7%.

Installment Loan B: 5-year loan at 6%.

- a. Find the monthly payments and the total interest for Loan A.

$$PMT = \frac{20,000 \left(\frac{.07}{12} \right)}{\left(1 - \left(1 + \frac{.07}{12} \right)^{-12 \times 3} \right)} \approx \boxed{\$618/\text{mo}}$$

$$\text{Interest: } (618)(12)(3) - 20,000 = \boxed{\$2,248} \text{ Interest}$$

- b. Find the monthly payments and the total interest for Loan B.

$$PMT = \frac{20,000 \left(\frac{.06}{12} \right)}{\left(1 - \left(1 + \frac{.06}{12} \right)^{-12 \times 5} \right)} \approx \boxed{\$387/\text{mo}}$$

$$\text{Interest: } (387)(12)(5) - 20,000 = \boxed{\$3,220} \text{ Interest}$$

- c. Compare the monthly payments and total interest for the two loans.

Loan B has lower monthly payment,
but it has higher total interest paid
since it's over a longer time. (Even though
the interest rate is lower)