

## Section 5.4 Amortized Loans

↳ loan amount plus interest is paid off in a series of regular equal payments.

A simple interest amortized loan is really an annuity whose FV is the loan amount plus interest. Each payment has an interest portion figured with  $I = Prt$

$$P(1+i)^n = \text{pymt} \cdot \frac{(1+i)^n - 1}{i}$$

$P$  = present value (loan amount)

$i$  = periodic interest rate

$n$  = # of payments

pymt = amount of payment

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$$r = 6\frac{3}{8}\%$$

$$t = 30 \text{ years}$$

$$n = 30 \cdot 12 = 360$$

$$i = \frac{.06375}{12}$$

$$\text{Purchase Price} = 187,600$$

$$20\% \text{ down} \Rightarrow 37,520$$

$$187600 \times .2$$

$$\text{Borrows} \Rightarrow 150,080$$

$$P(1+i)^n = \text{pymt} \cdot \frac{(1+i)^n - 1}{i}$$

$$150080 \left(1 + \frac{.06375}{12}\right)^{360} = \text{pymt} \cdot \frac{\left(1 + \frac{.06375}{12}\right)^{360} - 1}{\left(\frac{.06375}{12}\right)}$$

$$\frac{1010910.135}{1079.681594} = \frac{\text{pymt} \cdot 1079.681594}{1079.681594}$$

$$a) \text{ pymt} = \$936.30$$

b) What is Shirley's interest?

$$\begin{aligned} \text{She pays } & 936.30 \times 360 = 337,068 \\ \text{Total Interest} &= 337,068 - 150,080 \\ &= 186,988 \end{aligned}$$

Max buys a \$210,000 house. He puts 30% down  
finances rest at 4% interest for 20 years  
What's his <sup>monthly</sup> payment?

$$\text{Down} = 0.3 \times 210,000 = 63,000$$

$$\text{Borrow} = 147,000$$

$$P = 147,000$$

$$i = \frac{.04}{12}$$

$$n = 12 \cdot 20 = 240$$

$$147,000 \left(1 + \frac{.04}{12}\right)^{240} = \text{pymt} \cdot \frac{\left(\left(1 + \frac{.04}{12}\right)^{240} - 1\right)}{\left(\frac{.04}{12}\right)}$$

$$\text{pymt} = \$890.79$$