

# PRECALC A

Last 3 days:

TODAY - Notes on Amortized Loans

TOMORROW - work on final project

WEDNESDAY - finish final project

What if school gets cancelled Wednesday? (not likely)

Project is either

1) excused

2) counted if you email me your project by 2:30 pm Wednesday

## Amortized Loans

↳ loan paid off in a series of regular equal payments.

Student loans

Auto Loans

Home Loans

A simple interest amortized loan is really an annuity whose FV (future value) is the loan plus interest. Each payment portion figured with  $I = Prt$ .

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

$P$  = present value (or loan amount)

$i$  = periodic interest rate

$n$  = # of payments

$\text{pymt}$  = payment

Purchase Price = \$187,600

20% Down = 37,520 ←  $187600 \cdot 0.2$

Borrows \$150,080 =  $P$

$r = 6\frac{3}{8}\% = 6.375\%$

$t = 30$  years

$n = 360$  payments

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

$\text{pymt} = ?$

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

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

on calculator  $1010910.135$

$$150080 \left(1 + \frac{.06375}{12}\right)^{360} = 1010910.135$$

$1079.681594$

$$\frac{\left(1 + \frac{.06375}{12}\right)^{360} - 1}{\left(\frac{.06375}{12}\right)} = 1079.681594$$

$$\begin{aligned} \text{pymt} &= 1010910.135 \div 1079.681594 \\ &= \$936.30 \end{aligned}$$

What does homeowner pay total in interest?

$$936.30 \times 360 - 150080$$

$$= \$186,988$$

What if it was a 15 year loan?

$$r = 6\% \quad n = 180$$

$$P = 150080$$

$$i = \frac{.06}{12}$$

$$150080 \left(1 + \frac{.06}{12}\right)^{180} = \text{pymt} \cdot \frac{\left(\left(1 + \frac{.06}{12}\right)^{180} - 1\right)}{\left(\frac{.06}{12}\right)}$$

$$368310.3618 = \text{pymt} \cdot 290.8187124$$

$$\text{pymt} = \$1266.46$$

Amortization Schedule - how much of each payment goes to interest and how much goes to principal?

Payment #	Payment	Interest Portion	Principal Portion	Balance
0	—	—	—	150,080
1	936.30	① 797.30	② 139.00	③ 149,941.00
2	936.30	④ 796.56	⑤ 139.74	⑥ 149,801.26

$$\textcircled{1} I = Prt = 150080 \cdot .06375 \cdot \frac{1}{12} = 797.30$$

$$\textcircled{2} \text{Payment} - \text{Int. Portion} = 936.30 - 797.30 = 139.00$$

$$\textcircled{3} \text{ Balance} - \text{Princ. Portion} = 150080 - 139 = 149,941.00$$

$$\textcircled{4} I = 149941 \cdot .06375 \cdot \frac{1}{12} = 796.56$$

$$\textcircled{5} 936.30 - 796.56 = 139.74$$

$$\textcircled{6} 149941 - 139.74 = 149,801.26$$