**LOAN PAYMENTS**

\[ P = \text{amount borrow (loan principal)} \]
\[ n = \text{number of payments per year} \]
\[ PMT = \text{regular payment amount} \]
\[ APR = \text{annual percentage rate} \]
\[ Y = \text{loan term in years} \]

Formula

\[ PMT = \frac{P \times \left( \frac{APR}{n} \right)^{-nY}}{1 - \left(1 + \frac{APR}{n}\right)^{-nY}} \]

Example

You have student loans totaling $8,500 when you graduate from Northern Arizona University. The APR is 8.5% and the loan term is 10 years.

\[ PMT = \frac{8500 \times \left( \frac{0.085}{12} \right)^{-12 \times 10}}{1 - \left(1 + \frac{0.085}{12}\right)^{-12 \times 10}} = $105.39 \]

Total payment over the lifetime of the loan =

\[ $105.39 \times \frac{12 \text{ months}}{\text{month}} \times 10 \frac{\text{years}}{\text{year}} = $12,646.80 \]

Using TVM Solver (TI-83:FINANCE; TI-83+, TI-84:APPS)

1. Press \( \text{2nd} \) \( x^{-1} \) (FINANCE) or \( \text{APPS} \)
2. Choose 1: TVM Solver
3. Enter \( N = 12 \times 10 = 120 \)
   \( I\% = 8.5 \)
   \( PV = -8500 \) (calculator considers this an outflow of cash)
   \( PMT = 0 \)
   \( FV = 0 \)
   \( P/Y = 12 \) (number of payments per year)
   \( C/Y = 12 \) (number of compounding periods per year)
   \( PMT = \text{highlight END for end of month deposits} \)
4. Arrow up to PMT since we are looking for the monthly payment
5. Press \( \text{ALPHA} \) \( \text{ENTER} \) (SOLVE).
   • \( \text{PMT} = $105.39 \)

Total interest using the TVM Solver.

6. Press \( \text{2nd} \) \( \text{Mode} \) (Quit)
7. Press \( \text{2nd} \) \( x^{-1} \) (FINANCE) or \( \text{APPS} \)
8. Choose A: \( \Sigma \text{Int} \)
9. Enter: 1,120 then press ENTER

Total interest = $4,146.54

(The small difference with the value in column 2 is due to the rounding in those calculations)
<table>
<thead>
<tr>
<th>End of</th>
<th>Interest (decrease)</th>
<th>Payment toward principal (increase)</th>
<th>New principal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month 1</td>
<td>$\frac{.085}{12} \times $8,500 = $60.21$</td>
<td>$$105.39 – $60.21 = $45.18$</td>
<td>$$8,500 – $45.18 = $8,454.82$</td>
</tr>
<tr>
<td>Month 2</td>
<td>$\frac{.085}{12} \times $8,454.82 = $59.89$</td>
<td>$$105.39 – $59.89 = $45.50$</td>
<td>$$8,454.82 – $45.50 = $8,409.32$</td>
</tr>
<tr>
<td>Month 3</td>
<td>$\frac{.085}{12} \times $8,409.32 = $59.57$</td>
<td>$$105.39 – $59.57 = $45.82$</td>
<td>$$8,409.32 – $45.82 = $8,363.50$</td>
</tr>
</tbody>
</table>

Principal and interest payment portions change as the loan is paid down.