Consider a 100,000 mortgage at 10% which has a required payment of 850 per month. Interest rate is 6% (i.e. 0.5% per month)

<table>
<thead>
<tr>
<th>Month</th>
<th>BEGIN BALANCE</th>
<th>PMT</th>
<th>Interest DUE</th>
<th>Paid to Principle</th>
<th>END BALANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100,000</td>
<td></td>
<td>500</td>
<td>350</td>
<td>99,650</td>
</tr>
<tr>
<td>1</td>
<td>99,650</td>
<td>850</td>
<td>498.25</td>
<td>351.75</td>
<td>99,298.25</td>
</tr>
<tr>
<td></td>
<td>99,298.25</td>
<td>1000</td>
<td>496.49</td>
<td>503.51</td>
<td>98,794.74</td>
</tr>
</tbody>
</table>

BEGIN BALANCE is the DUE one month's ending balance
Payment is the amount of the loan payment
Interest Due = BEGIN BALANCE x Month by Interest Rate
Paid to Principle = Payment - Interest Due
END BALANCE = BEGIN BALANCE - Paid to Principle
CALCULATOR HINTS

1. Clear your calculator between problems.

2. Make sure the word BEGIN does not show on your display (unless you are closing a beginning or ending payment type problem).

3. When clearing the calculator, check for the correct PV, PMT, FV, and that the P/YR is correct.

For Amortization, first be sure there are #5 for PV, FMT, INR, and that the P/YR is correct.

Enter the starting period for amortization, then press INPUT.

Then enter the final period for amortization and press Amort.

Then press to scroll through.
To calculate the monthly payment on a constant payment fully amortizing loan, we solve for PMT on the calculator.

Example: For a $35,000 loan with a 17% interest rate and 30 year term, what is the monthly payment? 
PMT( PV 35,000, I 17, N 360) = $924.66

See Mortgage Basics Practice Quiz.
Unless stated otherwise, assume mortgage payments are made monthly.

1. Complete the following table, assuming monthly payments

<table>
<thead>
<tr>
<th>Interest Rate</th>
<th>Loan Amount</th>
<th>Term (years)</th>
<th>Monthly Payment</th>
<th>Year 1 Int Amount</th>
<th>Year 1 Principle</th>
<th>Balance after 1 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>17%</td>
<td>135000</td>
<td>30</td>
<td>1424.66</td>
<td>22,938.27</td>
<td>157.85</td>
<td>134,842.15</td>
</tr>
<tr>
<td>10%</td>
<td>135000</td>
<td>30</td>
<td>1184.72</td>
<td>13,466.21</td>
<td>750.43</td>
<td>134,299.57</td>
</tr>
<tr>
<td>3%</td>
<td>135000</td>
<td>30</td>
<td>569.17</td>
<td>4011.46</td>
<td>2,281.58</td>
<td>132,181.42</td>
</tr>
<tr>
<td>17%</td>
<td>135000</td>
<td>15</td>
<td>2,077.66</td>
<td>22,788.04</td>
<td>2,143.88</td>
<td>132,856.12</td>
</tr>
<tr>
<td>10%</td>
<td>135000</td>
<td>15</td>
<td>1,450.72</td>
<td>13,357.80</td>
<td>4,092.84</td>
<td>130,907.16</td>
</tr>
<tr>
<td>3%</td>
<td>135000</td>
<td>15</td>
<td>932.29</td>
<td>3,951.03</td>
<td>7,236.45</td>
<td>127,763.55</td>
</tr>
</tbody>
</table>

2. How much interest will you pay in the 9th year of a $95,000, 9.5%, 25 year mortgage? 
\[ P(T) = 12 \]
\[ P(T) = \text{pv} = -95,000, \text{inr} = 9.5, \text{n} = 300 \]
\[ \text{INT} = 7,877.42 \]

3. How much will you pay into principle on a 7.78%, $115,000, 10 year mortgage in the final 2 years of the mortgage. 
\[ P(T) = \text{pv} = -115,000, \text{inr} = 7.78, \text{n} = 120 \]
\[ \text{INT} = 30,721.14 \]

4. Compute the balance, at 6 3/4 years, on a $125,000, 6.25%, 30 year mortgage. 
\[ P(T) = \text{pv} = -125,000, \text{inr} = 6.25, \text{n} = 360 \]
\[ 3/4 \times 12 = 9 \text{ mo} \]
\[ \text{INT} = 769.66 \]

5. You need a loan of $135,000, but want to pay it off as soon as possible. For a 7.75% rate, and 25 year term, what will your required monthly payment be? If you choose to pay $1500 per month on this loan, how fast will you be able to pay it off?
\[ P(T) = \text{pv} = -135,000, \text{inr} = 7.75, \text{n} = 300 \]
\[ 1,500 \times 12 = 18,000 \text{ in 1 yr} \]
\[ \text{INT} = 136 \text{ payments} \]

6. With a graduated payment mortgage, your initial payments are too low to amortize your loan at the standard rate. If a 105,000 mortgage with a 9% interest rate is chosen, and the first year payment is $600/mo., what will the balance be after the first year? How much will you have paid into interest in the first year?
\[ P(T) = \text{pv} = -105,000, \text{inr} = 9, \text{pmnt} = 600 \]
\[ \text{INT} = 12 \times 600 = 7,200 \]

7. You have acquired a $125,000 mortgage at 10.125%, for 30 years. If you make a double payment on the first anniversary of the mortgage, and then make the required payments from then on, how many fewer mortgage payments will you make than if you just paid your required amount for the life of the loan.

8. A reset mortgage allows for one interest rate reset during the life of the loan. If you have a 7/23, the mortgage rate will be reset after 7 years, to fully amortize at the end of the original 30 year period (i.e. after 23 more years). For a 6 3/8, $100,000, mortgage, compute the reset payment if the new rate resets to 8 7/8%. 

Name:  

9/2/03  9/4/03
End BAL 12 24,323 1 WPT 2 Amort

Balance after extra payment in Month 12
\[ \text{BAL} = \frac{23,245.52}{1.0853} = 21,452.52 \]
\[ \text{BAL} = \frac{23,245.52}{1.0853} = 21,452.52 \]

It will take 331 more payments to repay the loan.

If I did not make the extra payment, it would take 348 payments...

So I will make 348 \( \times \) 3 = 7 payments.

WPT

\[ \text{PMT} (P V = 100,000, I Y R = 6.375\%, N = 360) = 623.87 \]

BAL 84 90,226.47

\[ \text{WPT} \times 24 \text{ more} \]

\[ \text{PMT} (P V = 70,226.42 I Y R = 8.875\% N = 276) = 76.776 \]
\[\begin{align*}
\text{17} & \quad I \, yr = 9 \% \quad F \, yr = 1 \\
\quad 7 \, yr & \quad FV = 2,000 \\
P/YR & = 1 \\
2) \quad FV(PV = -2,000; I \, yr \, 9; \, N = 7) \\
& = 2,193.647
\end{align*}\]

b) \text{7} \% \text{ compounded quarterly} \\
\begin{align*}
P/YR & = 4 \\
I \, yr & = 7 \% \\
N & = 7 \times 4 = 28 \text{ quarters} \\
P/YR & = 4 \\
FV(PV = -12,000; I \, yr \, 7; \, N = 28) \\
& = 222,274.44
\end{align*}

c) \text{What are the \textit{EN}s} \\
\begin{align*}
\text{ENy} & = \left(1 + \frac{\text{APR}}{m}\right)^m - 1 \\
\text{ENy}_a & = \left(1 + \frac{0.09}{1}\right) \approx 7 \% \\
\text{ENy}_b & = \left(1 + \frac{0.09}{4}\right)^4 \approx 9.3 \%
\end{align*}

\text{Use calculator set TVM 4} \\
I \, yr = 7 \\
\text{EFF} \% = 7.3 \%
F77 #2. What is better, 7% compounded monthly or 8% compounded annually.

**Solution:** Choose highest EAY

For 8% compounded annually,

EAY = 8%

For 7% compounded

- 1 yr 7%
- 5 yr 7%
- 10 yr 7.23%

Choose 8% Annual as it has higher EAY