

# MORTGAGES

You are buying a new home that will cost \$300,000. You have saved enough to make a 10% down payment. All closing costs will be paid up front and will not be part of the loan amount.

Loan amount = \$300,000 × 90% = \$270,000 (Since you have paid 10% down, you are borrowing 90% of the home cost.)

Using TVM Solver: P/Y = number of payments per year

C/Y = number of compounding periods per year

Note: A negative value for PV means an outflow of cash.

	A 30-year fixed-rate mortgage with \$4000 closing costs at an APR of 5.75%.	A 15-year fixed-rate mortgage with no closing costs at an APR of 5.5%.	A 5-year ARM with an added .5% for closing costs at an APR of 5.2%. You then have an option to refinance at a different rate on the 30-year loan.	An interest only loan for 5 years at an APR of 5.1% on a 30-year loan.
<p>Monthly Payment</p> $PMT = \frac{P \times \left(\frac{APR}{n}\right)}{1 - \left(1 + \frac{APR}{n}\right)^{-n \times Y}}$	$PMT = \frac{270000 \times \left(\frac{.0575}{12}\right)}{1 - \left(1 + \frac{.0575}{12}\right)^{-12 \times 30}}$ <p>= \$1,575.65</p> <p>With TVM Solver:</p> <p>(1) Press <b>2nd</b> <b>[x<sup>-1</sup>]</b> (FINANCE)</p> <p>(2) Choose 1: TVM Solver</p> <p>(3) Enter   N = 12 × 30                      I% = 5.75                      PV = -270000                      PMT = 0                      FV = 0                      P/Y = 12                      C/Y = 12</p> <p>(4) Arrow up to PMT            (5) Press ALPHA ENTER (SOLVE)</p> <p>▪ PMT = \$1,575.65</p>	$PMT = \frac{270000 \times \left(\frac{.055}{12}\right)}{1 - \left(1 + \frac{.055}{12}\right)^{-12 \times 15}}$ <p>= \$2,206.13</p> <p>With TVM Solver:</p> <p>(1) Press <b>2nd</b> <b>[x<sup>-1</sup>]</b> (FINANCE)</p> <p>(2) Choose 1: TVM Solver</p> <p>(3) Enter   N = 12 × 15                      I% = 5.5                      PV = -270000                      PMT = 0                      FV = 0                      P/Y = 12                      C/Y = 12</p> <p>(4) Arrow up to PMT            (5) Press ALPHA ENTER (SOLVE)</p> <p>▪ PMT = \$2,206.13</p>	<p>For first 5 years:</p> $PMT = \frac{270000 \times \left(\frac{.052}{12}\right)}{1 - \left(1 + \frac{.052}{12}\right)^{-12 \times 30}}$ <p>= \$1,482.60</p> <p>With TVM Solver:</p> <p>(1) Press <b>2nd</b> <b>[x<sup>-1</sup>]</b> (FINANCE)</p> <p>(2) Choose 1: TVM Solver</p> <p>(3) Enter   N = 12 × 30                      I% = 5.2                      PV = -270000                      PMT = 0                      FV = 0                      P/Y = 12                      C/Y = 12</p> <p>(4) Arrow up to PMT            (5) Press ALPHA ENTER (SOLVE)</p> <p>▪ PMT = \$1,482.60</p>	<p>Over 5-year period:            \$270,000 × .051 × 5 = \$68,850</p> $\frac{68850 \text{ interest}}{60 \text{ months}} = \$1,147.50$ <p>With TVM Solver:</p> <p>(1) Press <b>2nd</b> <b>[x<sup>-1</sup>]</b> (FINANCE)</p> <p>(2) Choose 1: TVM Solver</p> <p>(3) Enter   N = 12 × 30                      I% = 5.1                      PV = -270000                      PMT = 0                      FV = 0                      P/Y = 12                      C/Y = 12</p> <p>(4) Arrow up to PMT            (5) Press ALPHA ENTER (SOLVE)</p> <p>▪ PMT = \$1,465.96</p> <p>(6) 2nd MODE (QUIT)</p> <p>(7) Press <b>2nd</b> <b>[x<sup>-1</sup>]</b> (FINANCE)</p> <p>(8) Choose A: ΣInt (1,1) for 1<sup>st</sup> month</p> <p>(9) ENTER » \$1,147.50</p>

## MORTGAGES (continued)

<p>Total paid for house</p>	$\frac{\$1,575.65}{\text{month}} \cdot \frac{12 \text{ months}}{\text{year}} \cdot 30 \text{ years}$ $= \$567,234.00$ $= \text{total paid in 30 years}$ <p>Total paid for house:                      =down payment                      + closing cost                      + total paid on loan</p> $= \$30,000 + \$4000 + \$ 567,234$ $= \$601,234$	$\frac{\$2,206.13}{\text{month}} \cdot \frac{12 \text{ months}}{\text{year}} \cdot 15 \text{ years}$ $= \$397,103.40$ $= \text{total paid in 15 years}$ <p>Total paid for house:                      =down payment                      + closing cost                      + total paid on loan</p> $= \$30,000 + \$0 + \$ 397,103.40$ $= \$427,103.40$		
<p>Interest paid</p>	<p>Total paid – loan amount</p> $= \$567,234.00 - \$270,000$ $= \$297,234.00$ $= \text{Interest paid in 30 years}$	<p>Total paid – loan amount</p> $= \$397,103.40 - \$270,000$ $= \$127,103.40$ $= \text{Interest paid in 15 years}$	<p>Interest paid in first 5 years using TVM Solver:                      (6) 2nd MODE (QUIT)                      (7) Press <span style="border: 1px solid black; padding: 0 2px;">2nd</span> <span style="border: 1px solid black; padding: 0 2px;">x<sup>-1</sup></span>                      (FINANCE)                      (8) Choose A: <math>\Sigma\text{Int}</math> (1,60) for first 60 months                      (9) ENTER » \$67,588.46                      =interest paid in first 5 years</p>	<p>Since the monthly payments are interest only for 5 years,  <math>\\$1,147.50 \times 60</math>  <math>= \\$68,850</math>                      = interest paid in first 5 years</p>