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 \times 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.

<table>
<thead>
<tr>
<th>Monthly Payment</th>
<th>A 30-year fixed-rate mortgage with $4000 closing costs at an APR of 5.75%.</th>
<th>A 15-year fixed-rate mortgage with no closing costs at an APR of 5.5%.</th>
<th>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.</th>
<th>An interest only loan for 5 years at an APR of 5.1% on a 30-year loan.</th>
</tr>
</thead>
</table>
| \( PMT = \) \( P \times \left( \frac{APR}{n} \right) \) \[ \frac{1}{1 - \left( 1 + \frac{APR}{n} \right)^{-n \times Y}} \] \( = \) $1,575.65 | \( PMT = \frac{270000 \times \left( \frac{.0575}{12} \right)}{1 - \left( 1 + \frac{.0575}{12} \right)^{-12 \times 30}} \) \( = \) $1,575.65 | \( PMT = \frac{270000 \times \left( \frac{.055}{12} \right)}{1 - \left( 1 + \frac{.055}{12} \right)^{-12 \times 15}} \) \( = \) $2,206.13 | \( PMT = \frac{270000 \times \left( \frac{.052}{12} \right)}{1 - \left( 1 + \frac{.052}{12} \right)^{-12 \times 30}} \) \( = \) $1,482.60 | Over 5-year period: \( $270,000 \times 0.051 \times 5 = $68,850 \)
| \( With TVM Solver: \) (1) Press 2nd \( x^{-1} \) (FINANCE) (2) Choose 1: TVM Solver (3) Enter \( N = 12 \times 30 \) \( I\% = 5.75 \) \( PV = -270000 \) \( PMT = 0 \) \( FV = 0 \) \( P/Y = 12 \) \( C/Y = 12 \) (4) Arrow up to PMT (5) Press ALPHA ENTER (SOLVE) \( \bullet \) \( PMT = $1,575.65 \) | \( With TVM Solver: \) (1) Press 2nd \( x^{-1} \) (FINANCE) (2) Choose 1: TVM Solver (3) Enter \( N = 12 \times 15 \) \( I\% = 5.5 \) \( PV = -270000 \) \( PMT = 0 \) \( FV = 0 \) \( P/Y = 12 \) \( C/Y = 12 \) (4) Arrow up to PMT (5) Press ALPHA ENTER (SOLVE) \( \bullet \) \( PMT = $2,206.13 \) | \( With TVM Solver: \) (1) Press 2nd \( x^{-1} \) (FINANCE) (2) Choose 1: TVM Solver (3) Enter \( N = 12 \times 30 \) \( I\% = 5.2 \) \( PV = -270000 \) \( PMT = 0 \) \( FV = 0 \) \( P/Y = 12 \) \( C/Y = 12 \) (4) Arrow up to PMT (5) Press ALPHA ENTER (SOLVE) \( \bullet \) \( PMT = $1,482.60 \) | \( With TVM Solver: \) (1) Press 2nd \( x^{-1} \) (FINANCE) (2) Choose A: \( \Sigma \) Int (1,1) for 1st month (3) ENTER » $1,147.50 |

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### MORTGAGES (continued)

<table>
<thead>
<tr>
<th>Total paid for house</th>
<th>Total paid – loan amount</th>
<th>Total paid – loan amount</th>
<th>Interest paid in first 5 years using TVM Solver:</th>
<th>Since the monthly payments are interest only for 5 years, $1,147.50 \times 60 = $68,850</th>
</tr>
</thead>
</table>
| $1,575.65 \times 12 \text{ months year} \times 30 \text{ years}$  $= \$567,234.00$  $= \text{total paid in 30 years}$ | $\$567,234.00 - \$270,000$  $= \$297,234.00$  $= \text{Interest paid in 30 years}$ | $\$397,103.40 - \$270,000$  $= \$127,103.40$  $= \text{Interest paid in 15 years}$ | (6) 2nd MODE (QUIT)  
(7) Press $\text{2nd} \text{x}^{-1}$ (FINANCE)  
(8) Choose A: $\Sigma \text{Int} (1,60)$ for first 60 months  
(9) ENTER $\$67,588.46$ $= \text{interest paid in first 5 years}$ | |
| $\$2,206.13 \times 12 \text{ months year} \times 15 \text{ years}$  $= \$397,103.40$  $= \text{total paid in 15 years}$ | | | | |

Total paid for house:  
- down payment  
- closing cost  
- total paid on loan  

- $\$30,000 + \$4000 + \$567,234$  
- $\$601,234$  

- $\$30,000 + \$0 + \$397,103.40$  
- $\$427,103.40$  

Interest paid:  
- Total paid – loan amount  

- $\$567,234.00 - \$270,000$  
- $\$297,234.00$  
- $\$68,850$  

Interest paid in first 5 years:

(6) 2nd MODE (QUIT)  
(7) Press $\text{2nd} \text{x}^{-1}$ (FINANCE)  
(8) Choose A: $\Sigma \text{Int} (1,60)$ for first 60 months  
(9) ENTER $\$67,588.46$  

= interest paid in first 5 years