

### Extra Mortgage Problems and Answers

1. What is the monthly mortgage payment for a \$150,000 FRM at 9.25% for 15 years, 20 years, 25 years, 30 years, and 50 years?

Mortgage Payments for 9.25% for \$150,000 for:

|          |            |
|----------|------------|
| 15 years | \$1,543.79 |
| 20 years | \$1,373.80 |
| 25 years | \$1,284.57 |
| 30 years | \$1,234.01 |
| 50 years | \$1,167.90 |

Notice that the interest alone would be \$1,156.25 so a 50 year loan is barely above the interest alone payment.

2. What is the monthly and annualized loan constant for a loan of \$100,000 at 10.0% for 15 years, and 30 years? Hint: do not use annual payments for the annualized constant.

Answer: Enter \$1.00 for the PV in the calculator, 10%/12 for the monthly I, and 15 x 12 or 30 x 12 for N then solve for the payment and you will get:

for 15 years the monthly loan constant is .010746051 annualized to .128952614  
for 30 years the monthly loan constant is .008775716 annualized to .105308588

Note that if payments were annual for 30 years at 10%  
the annual loan constant would be .106079248

Mortgage payments can be determined for any size loan at 105 for 15 or 30 years using the above loan constants by multiplying the loan constant by the loan dollar amount.

3. What is the mortgage balance for a loan that starts at \$250,000 at 12% for 30 years (monthly payments) after 5 years, 10 years, 15 years?

Answer: After 5 years = \$244,158.05  
After 10 years = \$233,544.99  
After 15 years = \$214,264.28

Note that the solution is found by changing the N to the remaining number of months and solving for PV.

4. What would the total interest paid be for the loan in problem number 3 after 30 years?

Answer: The total of the payments would be \$2,571.53 times 360 or \$925,750.80 so that this sum less \$250,000 gives a net of \$675,750.80 in interest payments if the loan were paid off fully over 30 years.

5. What is the APR on a loan at 7.0% with 5 points for 30 years (monthly)? Note that the dollar amount does not matter, but use \$100,000 if you wish.

Answer: Using \$100,000 as the base, the payments are first solved as \$665.30 per month. Now change the PV to \$95,000 from the original loan less 5,000 for 5 points and solve for I, as .626343036 monthly but 7.516116433 annualized which is the APR. The lender would probably round this off to 7.52%

6. What would the effective yield be for the loan in problem 5 if paid off in 5 years?

Answer: First solve for the Future Value which is the loan balance in 5 years, which is \$94,131.59. Enter this as a negative number in the FV, change the N to 60 months and change the PV to \$95,000 and solve for I, which is the effective yield as .687960207 monthly or 8.255522479 annually rounded off to say 8.25%.

7. How many points must a lender charge to bring the contract rate of 5.0% up to 5.5% for a 30 -year loan (monthly payments) of \$300,000? Assume no prepayment and solve to the nearest dollar.

Answer: The dollar value of the points equals the loan amount less the present value of a stream of payments at the desired yield. In this case the payments are first calculated as \$1,610.464869 per month which we will round off to \$1,610.46, then the PV of this rounded payment at 5.5% is \$283,637.05, so the lender will need the difference or \$16,363 rounding again to the nearest dollar to get the desired APR. This is 5.4543151 in points which the lender will likely round to 5.45 or 5.5 points. Note that we do not wish to imply much rounding during the calculation process. But payments will need to be rounded to the nearest penny after a careful calculation with all the floating decimals possible in your calculator or spreadsheet. Lenders will not carry out points to so many decimals after calculation and will typically round to the nearest 1/8<sup>th</sup> of one percent or in some cases to the 100<sup>th</sup> decimal level.