Home Loan Example

We will look at financing for a $250,000$ house with a 18% down payment. The mortgage is a 30 year fixed rate of $6\frac{7}{8}\%$ with a monthly payment.

Based on this information, we know that $r = 0.06875$, $n = 12$, and $t = 30$.

1. What is the down payment?

$$.18(250000) = \$45,000$$

2. What is the amount of the home loan?

$$A = 250000 - .18(250000) = .82(250000) = \$205,000$$

3. What is the monthly payment?

$$Pymt = \frac{205000\left(1 + \frac{.06875}{12}\right)^{(12*30)}}{\left[\frac{\left(1 + \frac{.06875}{12}\right)^{(12*30)} - 1}{\left(\frac{.06875}{12}\right)}\right]} = \$1346.70$$

4. What is the balance due on the loan at the end of the 10th year?

$$Bal = 205000\left(1 + \frac{.06875}{12}\right)^{(12*10)} - 1346.70\left[\frac{\left(1 + \frac{.06875}{12}\right)^{(12*10)} - 1}{\left(\frac{.06875}{12}\right)}\right] = \$175,395.36$$

5. What is your equity in the house at the end of the 10th year?

$$equity = price - Bal = 250000 - 175395.36 = \$74,604.64$$

6. At the end of the 10th year, how much has your equity increased since you bought the house?

$$equity - down = 74604.64 - 45000 = \$29,604.64$$

7. How much have you paid out for the house by the end of the 10th year?

$$down + total\ of\ payments = 45000 + 1346.70 * 12 * 10 = \$206,604$$

8. Construct an amortization schedule for the 6 months from the end of $5\frac{1}{2}$ year (i.e payments 66-72).

First, we need to find the balance owed on the loan after payment number $12*5.5 = 65$.

$$205000 \left(1 + \frac{.06875}{12}\right)^{65} - 1346.70 \left[\frac{\left(1 + \frac{.06875}{12}\right)^{65} - 1}{\left(\frac{.06875}{12}\right)}\right] = \$191,482.87$$

payment number	principal portion	interest portion	total payment	balance due on loan
65	–	–	–	$191,482.87

Next, we need to find the interest on the balance for one month. We use the formula $I = Prt$.

$$191482.87 * .06875 * \frac{1}{12} = \$1097.04$$

payment number	principal portion	interest portion	total payment	balance due on loan
65	–	–	–	$191,482.87
66		$1097.04		

Now, we find the principal portion of the payment by subtracting the interest portion from the total payment of $1346.70.

payment number	principal portion	interest portion	total payment	balance due on loan
65	–	–	–	$191,482.87
66	$249.66	$1097.04	$1346.70	

To complete this line of the table, we need to get the new balance due on the loan. To find this, we subtract the principal portion of the current payment from the balance due after the previous payment.

$$\$191482.87 - 249.66 = 191233.21$$

payment number	principal portion	interest portion	total payment	balance due on loan
65	–	–	–	$191,482.87
66	$249.66	$1097.04	$1346.70	$191233.21

To complete each new line of the table, we just cycle through the steps:

(a) find the interest portion of the payment

(b) find the principal portion of the payment

(c) find the new balance due

The complete amortization schedule for the 6 months is

payment number	principal portion	interest portion	total payment	balance due on loan
65	–	–	–	$191,482.87
66	$249.66	$1097.04	$1346.70	$191233.21
67	$251.09	$1095.61	$1346.70	$190982.12
68	$252.53	$1094.17	$1346.70	$190729.59
69	$253.98	$1092.72	$1346.70	$190475.61
70	$255.43	$1091.27	$1346.70	$190220.18
71	$256.90	$1089.80	$1346.70	$189963.28
72	$258.37	$1088.33	$1346.70	$189704.91

9. How much will you have paid out for the loan in the end?

$$1346.7 * 12 * 30 = \$484,812$$

10. How much will you have paid for the house in the end?

$$45000 + 484812 = \$529,812$$

11. How much will you have paid in total interest in the end?

$$529812 - 250000 = \$279,812 \qquad \text{or} \qquad 484812 - 205000 = \$279,812$$

12. What percentage of the price of the house did you end up paying?

$$529812/250000 * 100 = 211.9\%$$