



hp calculators

## HP 12C Amortization

[Your Checklist For Amortizing a Mortgage](#)

[More Practice with Amortization](#)



See also the other available mortgage topics, such as [Mortgage/Loan Basics](#), [Mortgages with Balloon Payments](#), and [Mortgages with Loan Fees \("Points"\)](#).



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### Your Checklist For Amortizing a Mortgage:

(Before you read here, be sure you understand the material in [Time Value of Money \(TVM\) Basics](#) and [Mortgage/ Loan Basics](#).)

The term “amortize” is derived from the Latin term *mort*, which means “to kill.” After all, an installment loan, or *mortgage* is an arrangement of payments that gradually “kills off” a debt. A payment (PMT) that fully amortizes a mortgage, therefore, is the monthly installment amount sufficient to completely pay off the loan over its full term. Simple concept, fancy language.

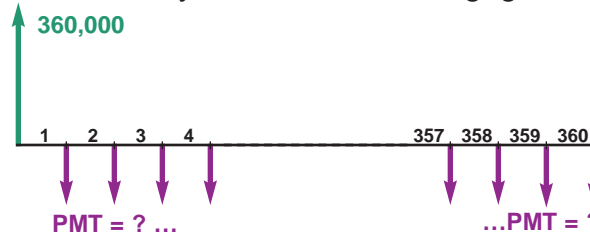
But often you need to know not only the end result of amortization but also some intermediate numbers: amounts paid as interest or principal, and remaining balances. You may need to know these annually, for tax purposes, or sometimes more often than that. These intermediate calculations are done by the **f AMORT** key. Working forward chronologically from the beginning of the loan, you can calculate the total principal and interest paid over any contiguous set of periods—and the remaining balance as of the end of that time.



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For example, suppose you have this 30-year, \$360,000 mortgage at 8.5%.




And suppose you want to know the principal and interest paid in each of the first three years—and the remaining balances at the end of each of those years. Here's your checklist:


- 1. Calculate the normal fully-amortizing payment amount.**  
In this example, press  $9$   $\text{END}$ ,  $30$   $9$   $12$   $\times$ ,  $8.5$   $9$   $12$   $\div$ ,  $360000$   $\text{PV}$   $0$   $\text{FV}$ ,  $\text{PMT}$  (result: **-2,768.09**).  
For more about mortgage basics and how to calculate a fully-amortizing payment, see [Mortgage Loan Basics](#).
- 2. Clear the n register.** In this example, press  $0$   $\text{n}$ . The n register acts as your counter for the total number of periods amortized so far in the loan—so you want to start at zero.
- 3. Key in the number of payments to be included in the first partial amortization, then press  $\text{f AMORT}$  to see the interest paid for those periods.**  
In the example, press  $12$   $\text{f AMORT}$ ... **-30,495.60**.
- 4. Press  $\text{x} \leftrightarrow \text{y}$  to see the principal paid over those periods.**  
In the example, press  $\text{x} \leftrightarrow \text{y}$ ... **-2,721.48**.
- 5. Press  $\text{RCL PV}$  to see the remaining balance as of the end of those periods.**  
In the example, press  $\text{RCL PV}$ ... **357,278.52**.
- 6. Repeat steps 3-5 as necessary to amortize the mortgage as far as you wish.**  
In this example, press  $12$   $\text{f AMORT}$  (interest in Year 2: **-30,255.03**);  
then  $\text{x} \leftrightarrow \text{y}$  (principal in Year 2: **-2,962.05**);  
then  $\text{RCL PV}$  (remaining balance at end of Year 2: **354,316.47**);  
then  $12$   $\text{f AMORT}$  (interest in Year 3: **-29,993.22**);  
then  $\text{x} \leftrightarrow \text{y}$  (principal in Year 3: **-3,223.86**);  
then  $\text{RCL PV}$  (remaining balance at end of Year 3: **351,092.61**).



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A couple of comments about amortization and the  key.

First, don't forget to work forward from the beginning of the loan! That's the only way the HP 12C can compute with  correctly—because the **PV** register contains the remaining balance after each set of payments (each partial amortization). You can't just jump in and ask it to find the P & I totals for, say, year 7 without working forward through years 1-6.

You don't have to go one year at a time, though. If you're really only interested in year 7, then the first number of payments to calculate should be 72—that's all of the first 6 years lumped together. Just calculate this, ignore those results, and ask for the next 12 payments: the twelve payments in year 7.

Also, this note: The HP 12C computes every value—including financial registers—to ten digit accuracy, but of course, nobody makes mortgage payments to any more precision than 2 decimal places (dollars and cents). The difference between your computed PMT and the actual payment can be up to nearly half a penny per month—not much, you might think, but it can build up to some dollars' worth of difference over the life of a mortgage (and the small but increasing discrepancies between your calculated results and the numbers appearing on your mortgage statements can cause some consternation).

To smooth all this out, the  calculations on the HP 12C use rounded values. How does it round? *To the precision you have requested for the display* (when you pressed  2 or  4, etc.). That is, no matter whether the value sitting in the PMT register is ten digits long, the calculations for  will use a rounded PMT value (and a rounded value for the result of applying the interest rate,  $i$ , to PV, as well). Of course, this doesn't necessarily clear up every discrepancy between your HP 12C and your mortgage lender; some lenders have differing methods for rounding. But it will get very, very close in most instances.



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### More Practice with Amortization

**Problem:** You have a 30-year, \$125,000 mortgage at 6.75%. For year 2 of this mortgage, find the amounts paid to principal and interest, and calculate the remaining balance.

**Solution:** (9) END, if necessary)

30 (9) 12x

6.75 (9) 12÷

125000 (PV)

0 (FV)

(PMT)...

0 (n) 12 (f) AMORT

12 (f) AMORT

(X>Y)

(RCL) (PV)...

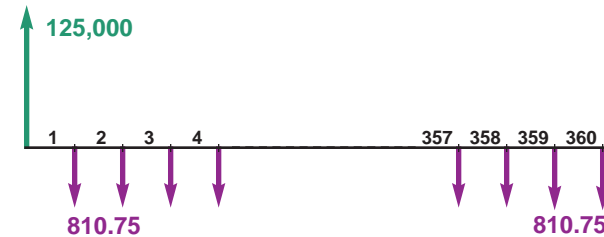
(Result: **-810.75**)

(This is Year 1—ignore these results.)

This is Year 2 interest: **-8,304.02**

This is Year 2 principal: **-1,424.98**

Remaining balance after Year 2: **122,242.82**



**Problem:** You have a 20-year, \$250,000 mortgage at 7.125%. Find the amounts paid to principal and interest in the first year and also over the whole life of the loan.

**Solution:** (9) END, if necessary)

20 (9) 12x

7.125 (9) 12÷

250000 (PV)

0 (FV)

(PMT)...

0 (n) 12 (f) AMORT

(X>Y)

0 (n) 250000 (PV)

240 (f) AMORT...

(X>Y)

(RCL) (PV)...

(Result: **-1,957.05**)

This is Year 1 interest: **-17,623.57**

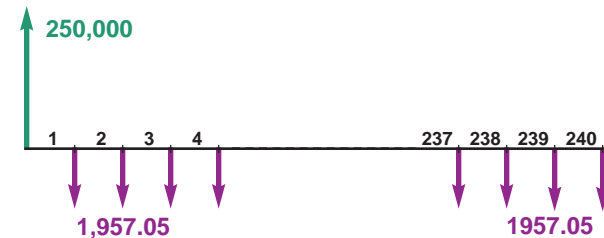
This is Year 1 principal: **-5,861.03**

(Reset to do the whole loan at once.)

(takes awhile)... The interest for all 240 payments: **-219,691.82**

This is the principal for all 240 payments: **-250,000.18**

(The remaining balance—a slight *overpayment*, due to rounding.)





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Note in this last example, that you could more quickly calculate the interest for the entire loan via simple arithmetic: 1957.05 **CHS** **ENTER** 240 **×** 250000 **+**. Result: -219,692.00

This differs from the **AMORT** result by just 18 cents (the same 18 cents overpaid to principal above, according to rounding to 2 decimal places each month).

Of course, there are many other calculations possible with mortgages. See, for example, [Mortgages with Balloon Payments](#) and [Mortgages with Loan Fees \("Points"\)](#).