



hp calculators

## HP 12C Mortgage with Loan Fees (“Points”)



[Your Checklist For Calculating an Effective Rate on a Mortgage with Loan Fees](#)

[More Practice Solving for Effective Rates on Mortgages with Points](#)

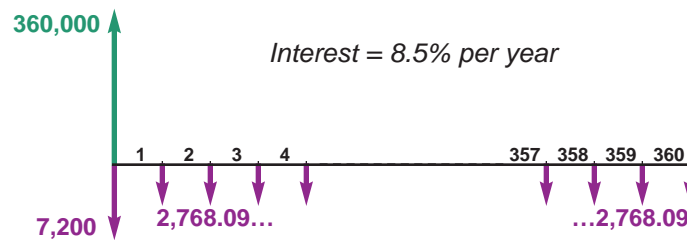
See also the other available mortgage topics, such as [Mortgage/Loan Basics](#), [Amortization](#), and [Mortgages with Balloon Payments](#).



## HP 12C Mortgage with Loan Fees (“Points”)

### Your Checklist For Calculating an Effective Rate on a Mortgage with Loan Fees:

(Before you read on here, be sure to read the material presented in [Time Value of Money Basics](#) and [Mortgage/Loan Basics](#).) As you know, it’s always best to draw a cash flow diagram—a picture of any investment situation. Here’s a typical example of a real estate mortgage with loan fees.



Since they happen at the same time as the loan is disbursed, the loan fees (also known as “points”—since they’re often calculated as one or more percentage points of the amount of the loan) act as a sort of an instant repayment of a small part of the loan—but *they don’t reduce the other payments*; they’re extra finance charges *not reflected* in the mortgage rate used to calculate the normal PMT. Therefore, to compute the effective rate of interest—including these prepaid finance charges—you need to calculate the interest rate of the above scenario. Notice how, in effect, you’re making the normally computed PMT on a slightly reduced loan amount. Here’s your checklist:

- 1. Calculate the normal fully-amortizing payment amount.** In this example, press **9** **END**, 30 **9** **12x**, 8.5 **9** **12÷** 360000 **PV** 0 **FV**, **PMT** (result: **-2,768.09**). For a reminder about mortgage loan basics and how to calculate a fully-amortizing payment like this—i.e. the payment amount that would normally pay off the loan entirely over its full term—see [Mortgage/Loan Basics](#).
- 2. Reduce the loan amount by the loan fees.** In this example, press **RCL** **PV** 2 **%** **-** **PV**.
- 3. Press **i** to calculate the effective monthly rate.** In this example, press **i** to get **0.73**.
- 4. Multiply the monthly result by 12 to get the annualized version of the effective loan rate.** For the example, press 12 **×** (or **RCL** **9** **12÷**) to get **8.72**. That’s higher than the quoted rate, 8.5, which makes sense: You made the same PMT’s on a slightly smaller loan, in effect.



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A couple of comments about loan fees:

First, a terminology reminder about interest rates: The quoted mortgage rate is a nominal annualized rate used to calculate the normal PMT amount. (It’s nominal because the *actual* rate used in that calculation is the monthly rate, which is  $1/12^{\text{th}}$  of the annualized rate—be sure to read through [Time Value of Money Basics](#) for more on this.)

The effective loan rate or effective A.P.R. (“Annual Percentage Rate”), which includes the loan fees, is also an annualized rate. But it, too, is a nominal rate—again,  $1/12^{\text{th}}$  of the actual monthly rate—computed so that you can compare it to the quoted annualized rate. (It would be simpler to compare actual monthly rates, but everyone “thinks” on an annualized basis.)

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). To more accurately reflect real life, therefore, you might wish to re-enter the PMT amount by hand—thus rounding that value to dollars and cents—after calculating the 10-digit version. But in the case of calculating the effective loan rate with fees, such round-off differences seldom change the resulting rate significantly—i.e. not, at least in its first few 5 or 6 places. (Since the effect is larger, however, the same concern is actually built into the **AMORT** function—see [Amortization](#) for more on that.)



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### More Practice Solving for Effective Loan Rates on Mortgages with Loan Fees

**Problem:** A 30-year, \$125,000 mortgage at 6.75% has a 1-point fee. Find the effective A.P.R.

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

30 (9 **12x**)

6.75 (9 **12÷**)

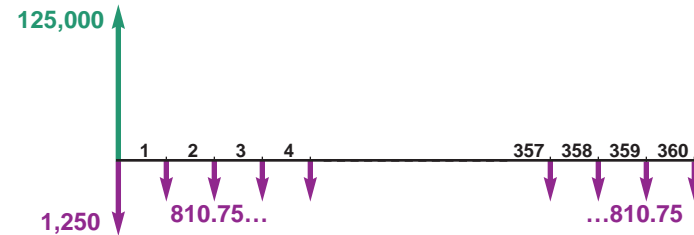
125000 (PV)

0 (FV)

(PMT)... (result: **-810.75**)

(RCL) (PV) 1 (%) (-) (PV)

(i)... (takes time to compute... result: **0.57**) 12 (X) to annualize... result: **6.85**



**Problem:** A 20-year, \$250,000 mortgage at 7.125% has a 2.5-point fee. Find the effective A.P.R.

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

20 (9 **12x**)

7.125 (9 **12÷**)

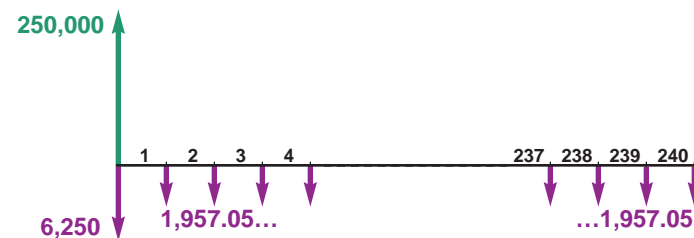
250000 (PV)

0 (FV)

(PMT)... (result: **-1,957.05**)

(RCL) (PV) 2.5 (%) (-) (PV)

(i)... (takes time to compute... result: **0.62**) (RCL) (9 **12÷**) to annualize... result: **7.46**



(Keep in mind that you can always press (f) 3 or (f) 4, etc., to see more decimal places in the resulting interest rates. At three places, for example, the above result is **7.456**—a more direct comparison with the three-place quoted rate of 7.125.)

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