

HP 12c Calculator - Compound Interest Calculations

- Introduction
- Calculating the number of payments or compounding periods
- Example for calculating the number of payments or compounding periods
- Calculating the periodic and annual interest rates
- Example for calculating the periodic and annual interest rates
- Calculating the present value
- Example for calculating the present value
- Calculating the payment amount
- Example for calculating the payment amount
- Calculating the future value
- Example for calculating the future value

Introduction

Interest rates are usually quoted at the annual rate, also called the nominal rate which is the interest rate per year. However, in compound interest problems, the interest rate entered into i must always be expressed in terms of the basic compounding period, which may be years, months, days, or any other time unit.

If the calculator is used to multiply the number of years by the number of compounding periods per year, pressing \boxed{n} then stores the result into n . The same is true for i .

If interest is compounded monthly, use a shortcut provided on the calculator to calculate and store n and i :

- To calculate and store n , key the number of years into the display, then press \boxed{g} $\boxed{12x}$.
- To calculate and store i , key the annual rate into the display, then press \boxed{g} $\boxed{12\div}$.

NOTE:

These keys not only multiply or divide the displayed number by 12; they also automatically store the result in the corresponding register; there is no need to press the \boxed{n} or \boxed{i} key next.

Calculating the number of payments or compounding periods

1. Press **f** CLEAR **FIN** to clear the financial registers.
2. Enter the periodic interest rate, using **i** or **9** **12** **÷**.
3. Enter at least two of the following values:
 - Present value, using **PV**.
 - Payment amount, using **PMT**.
 - Future value, using **FV**.

NOTE:

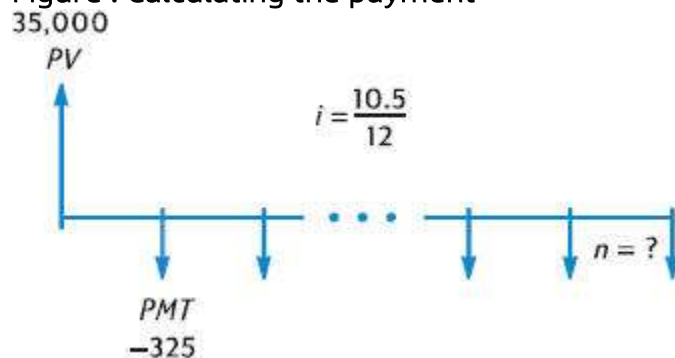
Remember to observe the cash flow sign convention. Cash flow diagrams are useful tools for determining the signs of cash flows over a given period.

4. If a PMT is entered, press **9** **BEG** or **9** **END** to set the payment mode.
5. Press **n** to calculate the number of payments or periods.

Example for calculating the number of payments or compounding periods

A \$35,000 loan is provided at 10.5% interest to an individual to build a log cabin. If a \$325 payment is made at the end of each month, how many payments will be required to pay off the loan, and how many years will this take?

Figure : Calculating the payment



Keystroke	Display	Description
f CLEAR FIN 1 0 . 5 g 12÷	0.88	Clears the financial register and calculates and stores i.
3 5 0 0 0 PV	35,000.00	Stores PV.
3 2 5 CHS PMT	-325.00	Stores PMT (with minus sign for cash paid out).
g END	-325.00	Sets the payment mode to End.
n	328.00	Calculates number of payments required.
1 2 ÷	27.33	Twenty-seven years and four months.

Because the calculator rounds the calculated value of n up to the next higher integer, in the preceding example it is likely that — while 328 payments will be required to pay off the loan — only 327 full payments of \$325 will be required, the next and final payment being less than \$325. The final, fractional, 328th payment can be calculated as follows:

Keystroke	Display	Description
3 2 8 n	328.00	Stores total number of payments.

Keystroke	Display	Description
FV	181.89	Calculates FV — which equals the overpayment if 328 full payments were made.
RCL PMT	- 325.00	Recalls payment amount.
+	- 143.11	Final, fractional payment.

Alternatively, the fractional payment can be made together with the 327th payment. The table below displays how to calculate this final, larger, 327th payment.

Keystroke	Display	Description
3 2 7 n	327.00	Stores number of full payments.
FV	- 141.87	Calculates FV - which is the balance remaining after 327 full payments.
RCL PMT	- 325.00	Recalls payment amount.
+	- 466.87	Final, balloon payment.

Calculating the periodic and annual interest rates

1. Press **f** CLEAR **FIN** to clear the financial registers.
2. Enter the number of payments or periods, using **n** or **g** **12x**.
3. Enter at least two of the following values:
 - Present value, using **PV**.
 - Payment amount, using **PMT**.
 - Future value, using **FV**.

NOTE:

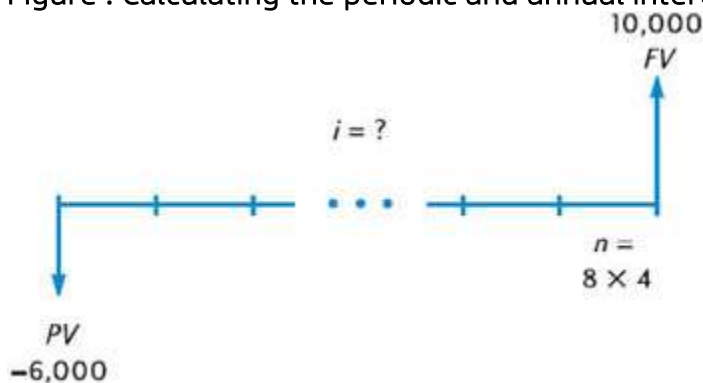
Remember to observe the cash flow sign convention.

4. If a PMT is entered, press **g** **BEG** or **g** **END** to set the payment mode.
5. Press **i** to calculate the periodic interest rate.
6. To calculate the annual interest rate, key in the number of periods per year, then press **x**.

Example for calculating the periodic and annual interest rates

What annual interest rate must be obtained to accumulate \$10,000 in 8 years on an investment of \$6,000 with quarterly compounding?

Figure : Calculating the periodic and annual interest rates



Keystroke	Display	Description
f CLEAR FIN 8 ENTER 4 X n	32.00	Clears the financial register and calculates and stores n.
6 0 0 0 CHS PV	-6,000.00	Stores PV (with minus sign for cash paid out).
1 0 0 0 0 FV	10,000.00	Stores FV.
i	1.61	Periodic (quarterly) interest rate.
4 X	6.44	Annual interest rate.

Calculating the present value

1. Press **f** CLEAR **FIN** to clear the financial registers.
2. Enter the number of payments or periods, using **n** or **g** **12X**.
3. Enter the periodic interest rate, using **i** or **g** **12÷**.
4. To calculate the present value, enter either or both of the following:
 - Payment amount, using **PMT**.
 - Future value, using **FV**.

NOTE:

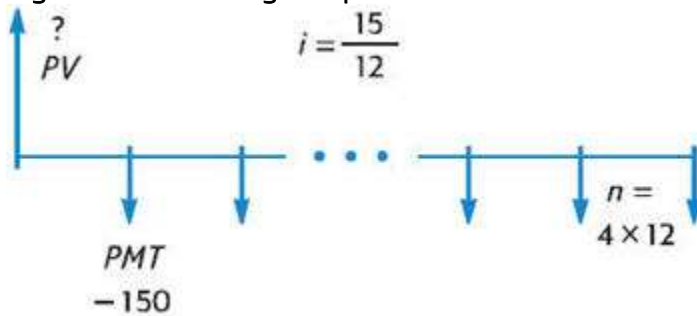
Remember to observe the cash flow sign convention.

5. If a PMT is entered, press **g** **BEG** or **g** **END** to set the payment mode.
6. Press **PV** to calculate the present value.

Example for calculating the present value

A new car is purchased with a loan including 15% interest compounded monthly over the 4-year term of the loan. If the payments of \$150 are done at the end of each month and the down payment would be \$1,500, calculate the maximum price to be paid for the car? (Assume the purchase date is one month prior to the date of the first payment.)

Figure : Calculating the present value



Keystroke	Display	Description
<code>f</code> CLEAR <code>FIN</code> <code>4</code> <code>g</code> <code>12X</code>	48.00	Clears the financial register and calculates and stores n.
<code>1</code> <code>5</code> <code>g</code> <code>12÷</code>	1.25	Calculates and stores i.
<code>1</code> <code>5</code> <code>0</code> <code>CHS</code> <code>PMT</code>	-150.00	Stores PMT (with minus sign for cash paid out).
<code>g</code> <code>END</code>	-150.00	Sets payment mode to End.
<code>PV</code>	5,389.72	Maximum amount of loan.

Keystroke	Display	Description
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">5</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">0</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">+</div>	6,889.72	Maximum purchase price.

Calculating the payment amount

1. Press f CLEAR FIN to clear the financial registers.
2. Enter the number of payments or periods, using n or g 12x.
3. Enter the periodic interest rate, using i or g 12÷.
4. Enter either or both of the following:
 - Present value, using PV.
 - Future value, using FV.

NOTE:

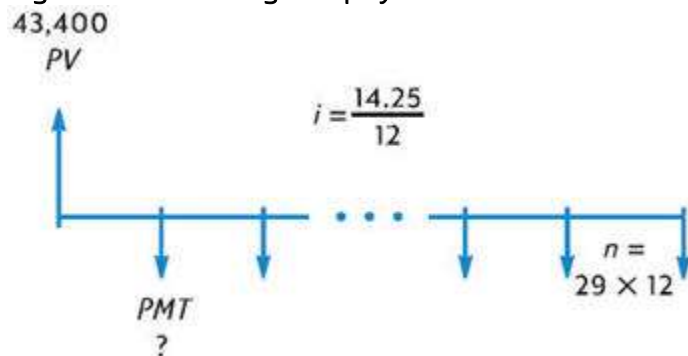
Remember to observe the cash flow sign convention.

5. Press g BEG or g END to set the payment mode.
6. Press PMT to calculate the payment amount.

Example for calculating the payment amount

Calculate the payment amount on a 29-year, \$43,400 mortgage at 14^{1/4}% annual interest.

Figure : Calculating the payment amount



Keystroke	Display	Description
f CLEAR FIN 2 9 g 12X	348.00	Clears the financial register and calculates and stores n.
1 4 . 2 5 g 12÷	1.19	Calculates and stores i.
4 3 4 0 0 PV	43,400.00	Stores PV.
g END	43,400.00	Sets payment mode to End.
PMT	-523.99	Monthly payment (with minus sign for cash paid out).

Calculating the future value

1. Press **f** CLEAR **FIN** to clear the financial registers.
2. Enter the number of payments or periods, using **n** or **g** **12X**.
3. Enter the periodic interest rate, using **i** or **g** **12÷**.
4. To calculate the future value, enter either or both of the following:
 - Present value, using **PV**.
 - Payment amount, using **PMT**.

NOTE:

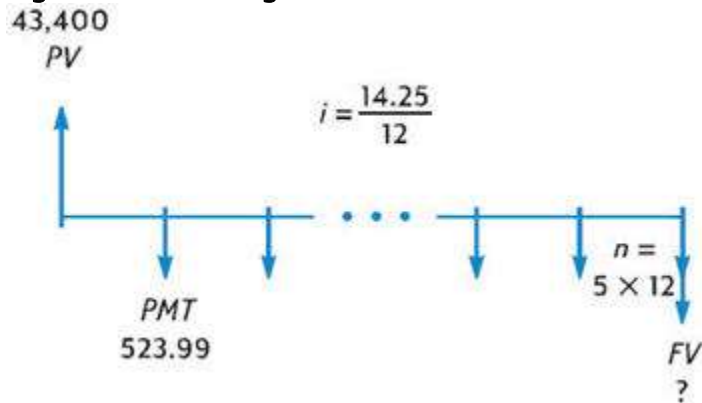
Remember to observe the cash flow sign convention.

5. If a PMT is entered, press **g** **BEG** or **g** **END** to set the payment mode.
6. Press **FV** to calculate the future value.

Example for calculating the future value

The payment amount on a 29-year, \$43,400 mortgage at $14\frac{1}{4}\%$ annual interest is \$523.99. If the seller requests a balloon payment at the end of 5 years, what would be the amount of the balloon?

Figure : Calculating the future value



Keystroke	Display	Description
<code>f</code> CLEAR <code>FIN</code> <code>5</code> <code>g</code> <code>12X</code>	60.00	Clears the financial register and calculates and stores n.
<code>1</code> <code>4</code> <code>.</code> <code>2</code> <code>5</code> <code>g</code> <code>12÷</code>	1.19	Calculates and stores i.
<code>4</code> <code>3</code> <code>4</code> <code>0</code> <code>0</code> <code>PV</code>	43,400.00	Stores PV.
<code>5</code> <code>2</code> <code>3</code> <code>.</code> <code>9</code> <code>9</code> <code>CHS</code> <code>PMT</code>	-523.99	Stores PMT (with minus sign for cash paid out).
<code>g</code> <code>END</code>	-523.99	Sets payment mode to End.

Keystroke	Display	Description
FV	- 42,652.37	Amount of balloon payment.