

TIME VALUE OF MONEY

With these simple calculator keys, you can easily figure out the terms of any debt, loan, savings account, investment, bond, annuity, etc.



Enter a value, then hit a TVM key. Do this three more times. To solve for the fifth value, hit [CPT] button and then the final TVM key.

+ or - ?

PV, PMT & FV can each be entered as either positive or negative. How do you know which? *It depends on which way the cash is flowing:*

If cash *leaves* you, it's negative.
If cash *comes to* you, it's positive.

N The Number of Periods

- **How many years (or months) will it last?**
 - “matures in X years” / “matures X years from today”
 - “an X-year bond”
 - “bond has a duration of X years”
 - “X years from now”
 - “when you retire in X years”
- **If they say how long the debt/investment/etc. is in years, but the payments will be made *more often than once a year*, you need to modify that N to match the payment periods:**
 - “Annually” N stays the same
 - “Semiannually” $N \times 2$
 - “Quarterly” / “Every Three Months” $N \times 4$
 - “Monthly” $N \times 12$
- **What to do if N lasts forever:**
 - A perpetuity has payments that go on forever. Just use a huge number for N, like 200 or 500 years.

PMT Payment

+ or - ?

- **What is the \$ amount that is being regularly paid?**
 - “you plan to invest \$X per year”
 - “an annuity payment of \$X”
 - bond coupons (see the Bonds sheet for more detail)
- **If the \$ amount is for the year, but payments are being made more often than that, you need to modify that \$ to match the payment periods:**
 - “Annually” PMT stays the same
 - “Semiannually” $PMT / 2$
 - “Quarterly” / “Every Three Months” $PMT / 4$
 - “Monthly” $PMT / 12$
- **Watch out for the timing!**
 - “beginning at the end of this year” or “planning to invest” is fine, don't worry about timing
 - “depositing today” or “annuity due,” definitely need to worry about the timing!
 - You'll need to use **BEGIN MODE**, because the payment is happening before any interest can build up.*
- **Sometimes, PMT is \$0:**
 - If it was just a deposit left alone to grow
 - You invested in something with a one-time outlay
 - *IMPORTANT: A one-time deposit or investment is not a PMT, it's the PV!

Always plug in 4 values to solve for the fifth! *The text sometimes has you plug in 3 to find a fourth. Don't, it's a bad habit.*



BEGIN MODE:



Get out when done!
For END MODE, hit same 4 buttons again.

Always clear out the calculator before each TVM problem:



I/Y Interest Rate Per Period

- **It almost always starts with the annual rate:**
 - “an account earning X% per year”
 - “your opportunity cost is X%”
 - “an X% discount rate” / “discounted at a rate of X% annually” / “a discount rate of X%” / “discounted at X%”
 - “an X% annual percentage yield” (APY, or Effective Yield)
 - “will pay X% per year”
 - “will earn an X% rate of return” / “required rate of return”
 - “expecting to earn X% per year”
 - “assumed portfolio return of X%”
 - “invested at X%”
 - “X% compounded annually” / “an annually compounded rate of X%”
 - “grows annually at X%”
 - “average annual inflation rate of X%”
 - “interest rate of X% APR” (annual percentage rate)
- **Often, you need to modify that rate to match the payment periods:**
 - “Annually” I/Y stays the same
 - “Semiannually” $I/Y / 2$
 - “Quarterly” / “Every Three Months” $I/Y / 4$
 - “Monthly” $I/Y / 12$
- **Watch out for tricky wording!**
 - “an annual rate of X% compounded monthly” is NOT already modified! Divide it by 12 to get your I/Y

FV Future Value

+ or - ?

- **What will the balance be at the end of it all?**
 - “a nest egg goal of \$X”
 - “a lump sum of \$X”
 - “planning to have \$X at retirement”
 - face value of a bond (see the Bonds sheet for more detail)
- **Sometimes, FV is \$0:**
 - When a loan or mortgage is paid off
 - An investment product that is paying for a period of time.

PV Present Value

+ or - ?

- **What is it worth right now?**
 - “today it costs \$X”
 - “you deposit \$X today”
 - “\$X received today”
- **Sometimes, PV is \$0:**
 - When you start off with nothing
 - *IMPORTANT: “a monthly contribution starting today” is not PV, it is a monthly PMT in BEGIN MODE

PV

DISCOUNTING

COMPOUNDING

FV