Financial Calculator Basics & More

To Improve Your Seller Finance Deals and Performing Note Transactions

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Agenda

- Class Prerequisites

- Why do you need the financial calculator?
  - Terms & Definitions
  - The concept of Time Value of Money

- Introduction to the HP 10bii Calculator

- Simple Examples with N, INT, PV, PMT, and FV

- Calculating Discounts!
  - Partial Notes
  - Balloons & Future Partials

- Other useful financial calculator functions

- Additional examples (seller finance scenarios and more)

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Class Prerequisites

What You Need to Get Started

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Class Prerequisites

- This class is for *beginners* who have never used the HP 10bii calculator before. You will need either to have the actual calculator or the app. You can use other calculators or software but the steps *will be different*.
  - The calculator costs up to $60 at Office Depot, Best Buy, and Amazon
  - The app costs $6-14 and is available in the App Store, Google Play Store, and the Microsoft Store, offered by In a Day Development

- To master the concepts in this class, it does not require a math or financial background. But it <u>will</u> require you to have an open mind in the approach to solving the problems.

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Why do you need the financial calculator?

Plus, the concept of the Time Value of Money

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Why do you need the financial calculator?

- As note investors, we are THE BANK. You need to be equipped with many of the same tools financial institutions use.

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Why do you need the financial calculator?

- Financial calculators are indispensable tools when calculating time value of money problems for the purpose of:
  - Calculating your car/house payment amortization schedule
  - Buying/Selling performing whole and partial notes
  - Creating seller finance loans
  - Brokering/Flipping Notes

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Relevant Terms and Definitions

- **Amortization**: The process of paying off debt through regular principal and interest payments over time.

- **Full amortization**: After the end of pay term, a debt is fully paid off.

- **Balloon**: The balance of an income stream after a certain number of payments have already been made

- **Partials**: Short for partial note. It is a series of payments from a note that you own THAT YOU CAN SELL to a 3rd party for income.

Relevant Terms and Definitions

- **Discount**: The delta between how much you pay for a note and the note face value (amount left unpaid on that note)

- **Par**: The face value of the note

- **Yield**: The effective interest rate of a note purchased at a discount from the note face value

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What is the Time Value of Money (TVM)?

- Time value of money is based on the idea that people would rather have money today than in the future, due to the power of compound interest.

- Compounded interest adds accumulated interest back to the principal so that the investor earns interest on the interest.
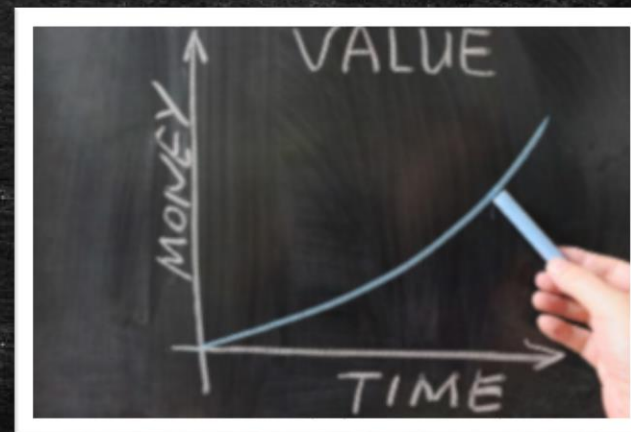
What is the Time Value of Money (TVM)?

- The formula for computing time value of money considers the payment now, the future value, the interest rate, and the time frame.

- It is also why terms like profit and return have little meaning as figures-of-merit in performing notes. Instead, we use interest rate, yield rate, or simply yield.

The TVM Equation

- The TVM equation is described by:

$$FV = PV \times \left(1 + \frac{i}{n}\right)^{n \times t}$$

- Where:
  - FV = Future value of money
  - PV = Present value of money
  - i = interest rate or yield (%)
  - n = number of compounding periods per interval (e.g. – 12/year, 30/mo)
  - t = number of years, months, days

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The TVM Equation

$$FV = PV \times \left(1 + \frac{i}{n}\right)^{n \times t}$$

- Let's say that I want to track an initial deposit of $1000 into an account earning 6% / year. Interest is accrued monthly.

- My future value after 5 years would look something like:

$$FV = \$1000 \times [\ 1 + (6\%/12)\ ]^{(12 \times 5)}$$

$$FV = \$1000 \times [\ 1 + (.005)\ ]^{(60)}$$

$$FV = \$1000 \times [\ 1.005\ ]^{(60)} = \$1348.85$$

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The TVM Equation & The Rule of 72

- Now let's say that I want to track an initial deposit of $1000 into an account earning 12% / year. Interest is accrued monthly.

- My future value after 6 years would look something like:

$$FV = \$1000 \times [\, 1 + (12\%/12)\,]^{(12 \times 6)}$$

$$FV = \$1000 \times [\, 1 + (.01)\,]^{(72)}$$

$$FV = \$1000 \times [\, 1.01\,]^{(72)} = \$2047.10$$

Notice how the FV is roughly double the original PV? That is the rule of 72:

# of years to double an investment = 72 / interest rate (%)

It takes 6 years to double an investment earning 12% annually. Or conversely, 12 years earning 6% annually.

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Introduction to the HP 10bii Financial Calculator

(or more accurately, the 10bii app)

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Meet the HP 10bii Financial Calculator

Actual Calculator

Mobile / PC App

Meet the HP 10bii Financial Calculator

- This financial calculator/app works similarly to other brand calculators but there are several differences (outside the scope of this course)

- It can perform basic arithmetic, statistical, and of course financial calculations

- This course will give you a basic introduction to the financial functions ONLY.

NOTE: This presentation was created using the PC version of the app

The HP 10bii Financial Calculator App Essential Keys for Basic Usage

1. Time Value of Money registers

2. +/- key

3. Blue bar

4. Orange bar

5. Clear display button (orange bar + C = clear all)

6. Help button

7. Traditional calculator function keys (DO NOT use unless performing regular arithmetic)

The HP 10bii Financial Calculator App Essential Keys for Basic Usage

8. Cash Flows button

9. Orange bar + TVM buttons = related functions

10. Change App Settings

Calculator Operation – Do this First!

- It is always a good idea before beginning any calculation to perform a Clear All. To do this, hit the orange bar *(which changes the screen to the screenshot)*, then the C button.

- I don't want to scare you but DO NOT approach using this calculator like you would regular calculators. Typically you will NOT need to use the +, -, x, /, = keys unless you are doing arithmetic.

Calculator Operation – TVM registers

Much of the operation revolves around entering values into each of the TVM registers: N, I/YR, PV, PMT, & FV.

- N = number of equal payments over a certain period, normally in months

- I/YR = interest rate or yield of stream of payments

- PV = current balance, balance remaining, loan amount

- PMT = the amount of the P+I payment

- FV = balance remaining, balloon amount, or lump sum

Calculator Operation – TVM registers

- Remember: if you know the information for 4 of the 5 variables, you can solve for the fifth variable.

- For instance, let's say that I am calculating the payment for a loan. I know the # of payments (N), interest rate (I/YR), and starting (PV) & ending principal balance (FV). Therefore, I can calculate the payment amount (PMT).

Calculator Operation – TVM registers
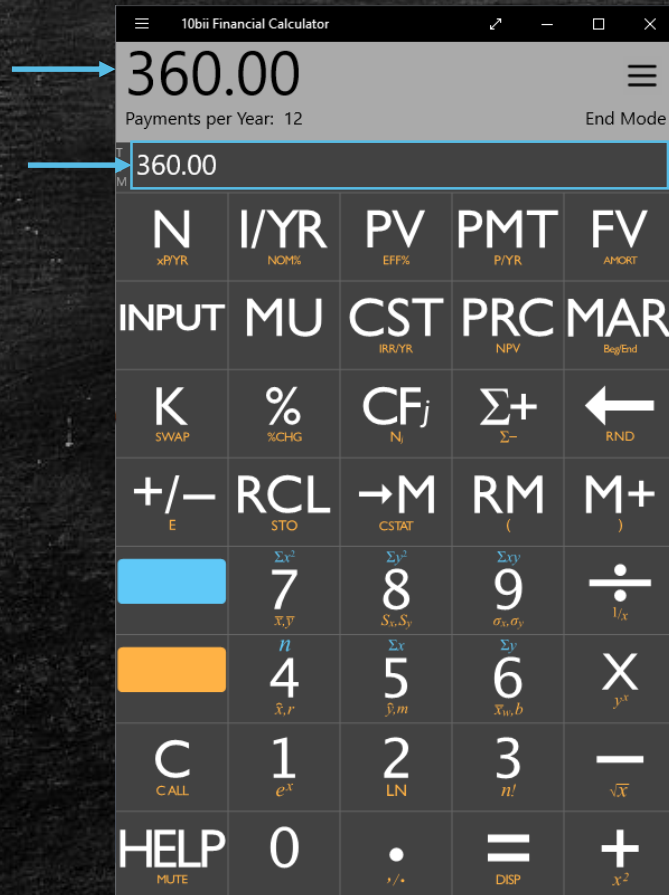
- To input a value into the register, you FIRST enter the digits, THEN you hit the appropriate register key.

- For instance, if you want to enter 360 as the N value, you would enter 360, then tap N.

- You will then notice "360.00" appear above the N key. Each value you see in the row above the TVM keys are the values stored in the respective TVM registers.
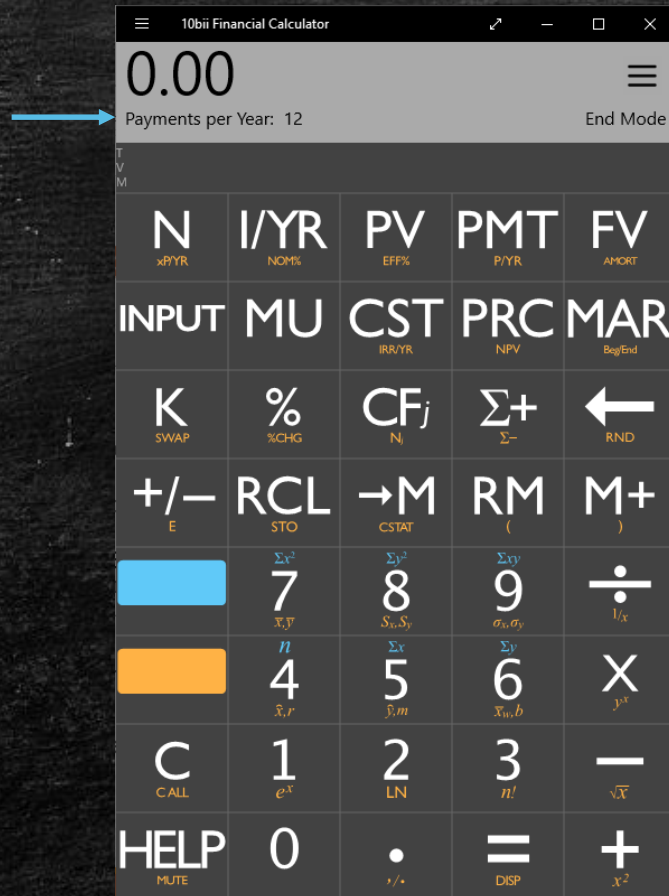
Calculator Operation – Remember This!

Things to remember:

- PV, FV, -or- PMT must be negative. If FV=0, then PV -or- PMT should be negative. (Negative = outflow, Positive = inflow)

- To enter a negative number, input the digits FIRST, then hit the +/- key. It will not work if you hit the +/- first.

Calculator Operation – Remember This!

More things to remember:

- Payment, Time Period, and Interest Rates need to be consistent.

- By default, the calculator assumes 12 *monthly* payments per year.

- It also, by default, takes whatever your interest input is and divides by 12. Note: You do not have to manually adjust this yourself.

- This all can be changed to suit the scenario. You can change the # of payments to whatever - quarterly, annual, etc.

Calculator Operation – Remember This!
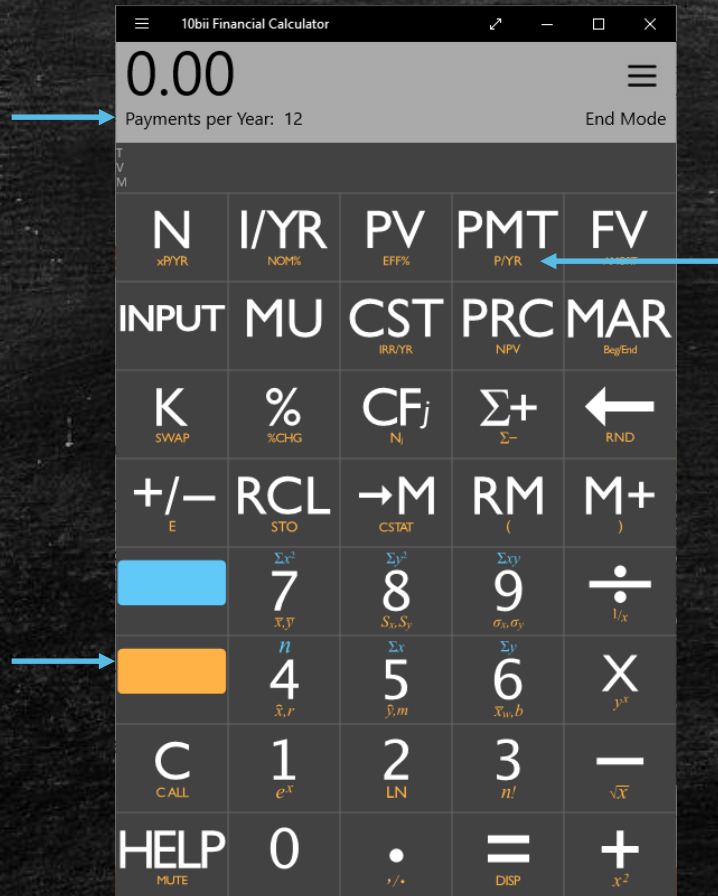
To change the number of payments per year:

- Enter the number of payments (1, 2, 4, 12, etc.)

- Press the orange bar key.

- Press the PMT key.

- Check the change to "Payments per Year" in the calculator display

Simple Examples with N,Int,PV,PMT,FV

Using the Financial Calculator for the first time

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
?	?	?	?	?

Imagine the following scenario:.

You obtain a fully amortized loan from the bank for a house in the amount of $400,000. The term is 360 months (30 years) and the interest rate is 5%. If you want to figure out what the payments will be over that time, how do you use the calculator to figure that out?

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
360	5	400000	?	0

N — Number of periods

I/YR — Interest Rate

PV — Enter positive # for cash inflow (TO you)

Enter negative # for cash outflow (FROM you)

FV — Fully amortized FV = 0
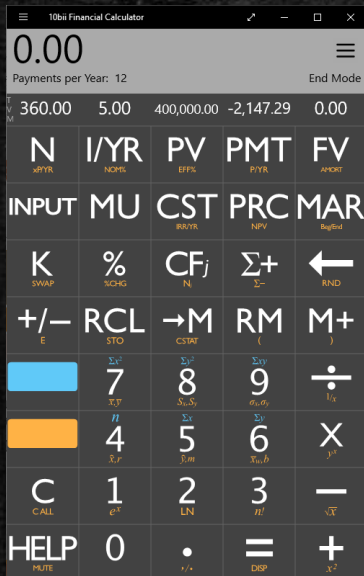
Let's begin by entering into the calculator the information we know.

- Enter 360 then N. This is the term in MONTHS. Do not enter 30.

- Enter 5 then I/YR. This is the interest rate in %.

- Enter 400000 then PV. We enter a positive number here because it is inflow. This amount is being provided TO YOU to give in turn to the seller.

- Enter 0 then FV. We enter 0 here because the loan is fully amortized. There will be a $0 balance at the end of 360 months.

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
360	5	400000	?	0

Number of periods → N

Interest Rate → I/YR

Enter positive # for cash inflow (TO you) → PV

Enter negative # for cash outflow (FROM you) → PMT

Fully amortized FV = 0 → FV

Now, let's solve for PMT by simply pressing PMT.

What do you get?

You should get -2147.29. Your calculator's registers should look like the screenshot on the left.

If you did not, check the steps from the previous slide.

Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
360	5	400000	-2147.29	0

So, we figured out that you will pay $2147.29 each month for 30 yrs.

But why is it negative? That is because this amount is OUTFLOW. It is leaving your bank account to go elsewhere.

Now, what if we wanted to know the UPB (unpaid balance) after the first 5 years of payments? How do we solve for that?

Simple Examples with N,Int,PV,PMT,FV

3 Variables Stay The Same

N	I/YR	PV	PMT	FV
~~360~~ 60	5	400000	-2147.29	?

↑
Replace

One of the reasons the financial calculator is so useful because we can play what-if scenarios once we "lock in" key terms.

In this case, we need to find out what FV will be after 5 years.

We already know the *interest rate*, the *original PV value*, and the *payment amount.* That will not change over the loan term.
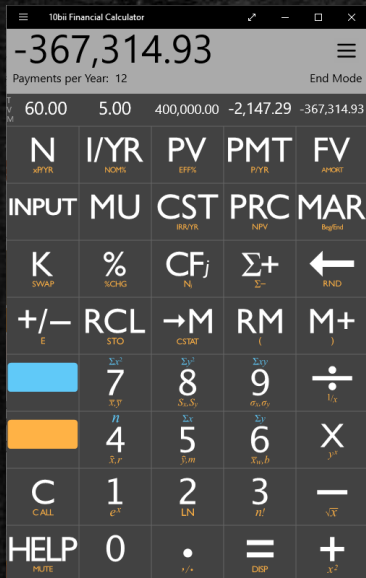
In order to figure out the answer, we first need to change the N from 360 to 60. 60 is the number of months in 5 yrs. Press 60 then N.

Now we solve for FV by pressing FV. Now, what do you get?

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
60	5	400000	-2147.29	-367314.93

The calculator informed us that the balance after 5 years will be $367,314.93.

This number is negative because it is still an outflow or debt - that is the amount YOU will still owe on the loan.

But before we move on, do you understand what we are doing here?

Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
60	5	400000	-2147.29	-367314.93

Here, by adjusting N can use the calculator kind of like a time machine.

I can move back and forth to predict what my loan's future balance will be!

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
60	5	?	-2147.29	-367314.93

On the flip side, let's say I am looking at an amortization schedule (AM schedule). I know my *current balance*, *payment*, *interest rate*, and the *number of payments* made thus far.

I can calculate the *original principal balance* at the start of the loan.

See! It really is a time machine!

Great Scott!

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Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
360	5	400000	-2147.29	0
360	3.5	400000	?	0
360	6	400000	?	0

To further illustrate how we can use this calculator tool, let's solve for PMT given different values of I/YR.

We will use the same N and PV values as before.

Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
360	5	400000	-2147.29	0
360	3.5	400000	-1796.18	0
360	6	400000	-2398.20	0

You can see the payment answers above in red...

Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
?	4	400000	-2000.00	0
?	4	500000	-2000.00	0
?	4	1000000	-2000.00	0

Let's now work on solving for N by adjusting PV and keeping everything else constant

Simple Examples with N,Int,PV,PMT,FV

N	I/YR	PV	PMT	FV
330.13	4	400000	-2000.00	0
538.42	4	500000	-2000.00	0
No Solution	4	1000000	-2000.00	0

Above are the results in purple...

As expected, as you increase the original PV value, it should take longer to pay off. However, when the PV was increased to $1M, the calculator could not converge on an answer, given the payment and interest.

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Calculating Discounts

Including Balloons and Partial Notes

Calculating Discounts

- **Discounting** is the act of paying less than the face value of a note.

- Note Investors almost always will demand a Discount.

- Note Investors do so in order to boost their yields while giving themselves extra protection against default

Calculating Discounts

- For example, if I pay $12k for a note whose face value is $15k, then I am getting a $3k discount on that note.

- But let's take that a step further…

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Calculating Discounts

- Imagine a note that has a face value of $15k, an interest rate of 6%, a remaining term of 43 months, and a payment of $388.55.

- What is my yield if I pay $12k for the note instead of $15k?

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Calculating Discounts

N	I/YR	PV	PMT	FV
43	6	-15000	388.55	0
43	?	-12000	388.55	0

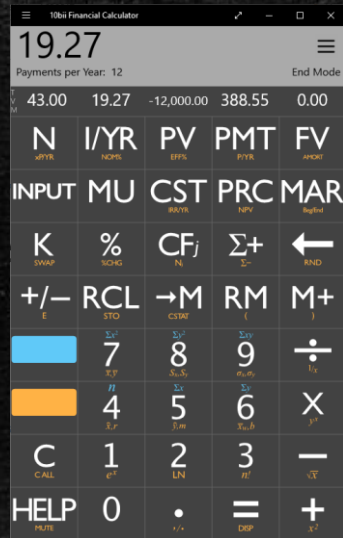We already know that if I buy this note at par, **6%** will be my interest rate or yield.

However, if I buy the note at **$12k**, then my yield jumps to…

Calculating Discounts

N	I/YR	PV	PMT	FV
43	6	-15000	388.55	0
43	19.27	-12000	388.55	0

19.27%!!

Calculating Discounts

- Let's now look at discounts in a slightly different way.

- One of the benefits of note investing is being able to choose your yield when making a purchase of a performing note.

- Instead of calculating yield based on purchase price, let's calculate the purchase price *based on the yield* that we seek.

Calculating Discounts

N	I/YR	PV	PMT	FV
120	8	-10000	?	0

We have a $10k, 8% interest note over 10 years. How much would one pay for this note to yield 10%? 15%?

As was the case in the previous problems, we follow a certain process. Our first goal is to <u>amortize the loan</u> in the calculator:

1. Collect all the information about the note that we know
2. Convert the loan term to the pertinent units (e.g. - 10 -> 120, N)
3. Solve for the missing variable (e.g. - PMT)

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Calculating Discounts

N	I/YR	PV	PMT	FV
120	8	-10000	121.33	0
120	10	?	121.33	0
120	15	?	121.33	0

The P+I payment is around $121. Now that we have the registers locked into the amortized note, then our next goal is to solve the discount problem itself:

4. Keep 3 of the 5 registers the same (e.g. - N, PMT, FV)
5. Adjust 1 of the registers by entering a new value (e.g. - 8 -> 10, I/YR)
6. Solve for the 5th register (e.g. - PV)

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Calculating Discounts

N	I/YR	PV	PMT	FV
120	8	-10000	121.33	0
120	10	-9181.00	121.33	0
120	15	-7520.23	121.33	0

The answers are above in purple.

This example dramatizes the effect that selecting your yield can have on the amount you pay for a performing note!

About Partials

- Partials are short for Partial Notes

- When you own a performing note, you can sell a piece of the note or a stream of payments to a 3rd party for income.

- Once the terms of the partial have concluded with the partial buyer, the payment stream reverts back to the original owner.

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Why Partials?

Buyers

- Less expensive than whole notes
- Less risk (not as long as whole notes)
- Better yields

Sellers

- Seller can use the funds to recapitalize and buy more notes.
- Typically, the seller will be able to resume collecting payments after the partial is done.
- Partials help avoid the big discounts sellers face with whole notes.

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Discounting Partials

- The process to discount partials is not that much different from the process to discount whole loans
  1. Amortize the loan in the calculator
  2. *Replace the whole loan term with that of the partial term* NEW STEP
  3. Discount the partial based on the yield or purchase price

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Discounting Partials

N	I/YR	PV	PMT	FV
240	7	-145000	?	0

Let's say that we had recently originated a 20 year fully amortized $145,000 loan with a 7% interest rate on a house in Dallas. At closing, we turn around and sell the first 10 years of payments at a 9% yield. How much did we sell the partial for?

Discounting Partials

	N	I/YR	PV	PMT	FV
Whole →	240	7	-145000	1124.18	0
Partial →	120	9	?	1124.18	0

- After amortizing the loan in the calculator, we find out that the monthly payment is $1124.18.

- Since we are selling the first 120 months of payments at 9% yield, N changes to 120 and I/YR changes to 9%.

- We solve for the discounted partial note by solving for PV.

Discounting Partials

	N	I/YR	PV	PMT	FV
Whole →	240	7	-145000	1124.18	0
Partial →	120	9	-88744.94	1124.18	0

We sold the partial for $88,744.94 for the right of this 3rd party to collect ~$1125/mo for ten years.

Fun fact: When we get the note back after 10 yrs, a total of $96,821.82 will still be due to US!

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About Balloon Payments

- A balloon payment is a lump sum payment normally due at maturity of certain loans.

- The large lump sum payment translates into lower monthly payments for the borrowers.

- Common practice is for the borrower to refinance out of the loan before the balloon is due.

- They are common in seller finance loans, but are somewhat frowned upon by the Consumer Finance Protection Bureau (CFPB) due to the risk to the borrower.

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Discounting a Balloon Payment

- The process to discount a balloon payment is a little different than what we have done up until this point but remains simple.

  1. Enter the information you know into the calculator. That usually consists of the time before the balloon is to be paid (N), the desired yield (I/YR), and the balloon itself (FV). *Remember that there is no applicable PMT here*.

  2. Solve for PV.

  3. The PV value found here is the discounted balloon value. This means that for a balloon to be paid in the future, it is worth THIS amount RIGHT NOW.

Discounting a Balloon Payment

N	I/YR	PV	PMT	FV
120	5	?	0	50000
120	20	?	0	50000

Here is an example:

Let's purchase a lump sum payment of $50,000 due in 10 years. Calculate our desired yields at 5% and at 20%.

Discounting a Balloon Payment

N	I/YR	PV	PMT	FV
120	5	-30358.05	0	50000
120	20	-6879.23	0	50000

As you can see (and should expect), the larger the desired yield, the larger the discount will end up being.

Either way, we will now be owed this entire balloon payment in 10 years.

Discounting a Future Partial Note

Now, what if we have a series of payments in the future that we want to liquidate TODAY?

- The process to discount future partials is a combination of everything we have learned so far in discounting partials and balloons.
    1. Enter the series of payments and desired yield in the calculator, solve for PV.
    2. The PV value is the discount of the series of payments.
    3. Convert to a <u>balloon payment</u> by *negating* the PV value and entering into FV.
    4. Zero out PMT as there will be no payments between the present and when the payments start.
    5. Change N to the number of intervals before the payments start.
    6. Solve for PV again. <u>This</u> PV is the discounted future partial note value.

Discounting a Future Partial Note

N	I/YR	PV	PMT	FV	
120	8	?	1000	0	Discount the Stream

Here is an example:

Let's say that there is a series of 120 payments of $1000 that will not start for 15 years. What would be the value of the discounted partial at a yield of 8%?

Step One: Solve for PV.

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Discounting a Future Partial Note

N	I/YR	PV	PMT	FV	
120	8	-82421.48	1000	0	Discount the Stream
180	8	?	0	+82421.48	Convert to Balloon Discount the Balloon

1. -$82,421.48 is the value for the discounted stream of payments.

2. We convert that number to a balloon payment.

3. We replace the old N value with the *# of months before the payments begin*

4. IMPORTANT! Zero out the PMT register.

5. We solve for PV again, with the result this time being the *discounted future partial note*.

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Discounting a Future Partial Note

N	I/YR	PV	PMT	FV	
120	8	-82421.48	1000	0	Discount the Stream
180	8	-24923.93	0	+82421.48	Convert to Balloon / Discount the Balloon

1. -$82,421.48 is the value for the discounted stream of payments.

2. We convert that number to a balloon payment.

3. We replace the old N value with the *# of months before the payments begin*

4. IMPORTANT! Zero out the PMT register.

5. We solve for PV again, with the result this time being the *discounted future partial note*.

   One would pay $24,923.93 for the future partial note at that yield RIGHT NOW!

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Other Useful Financial Calculator Functions

AMORT & CFj

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AMORT function (Am Schedules)
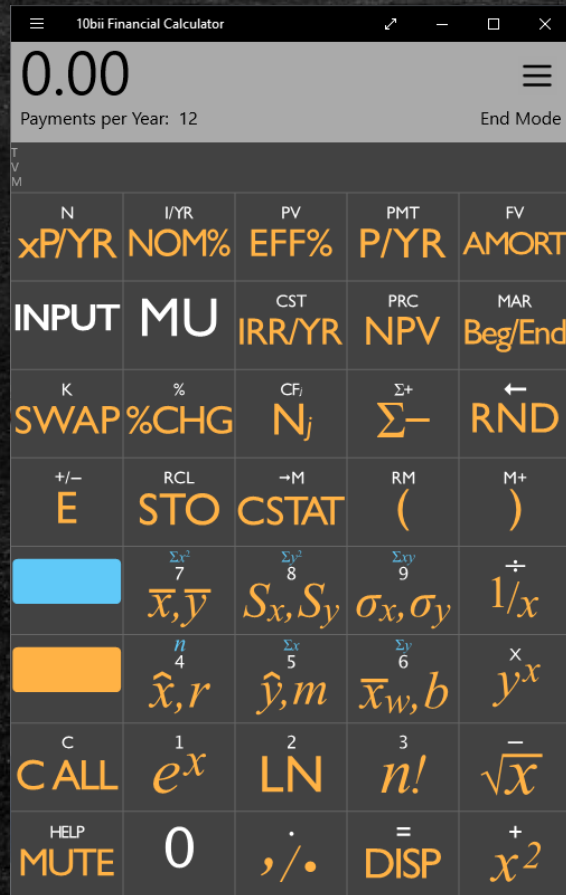
- The AMORT function produces an amortization schedule based on the parameters you have already entered into the financial calculator.

- You must amortize the loan in the calculator *before* hitting the AMORT button.

- The function will produce an error if no values have been entered into N.
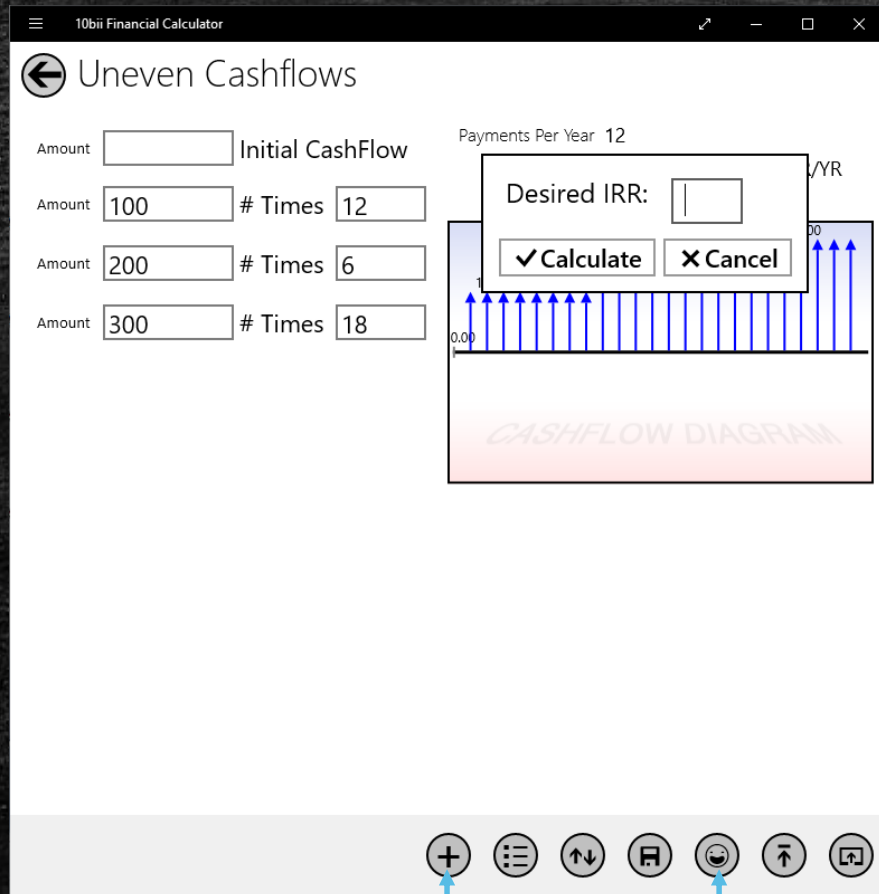
AMORT function (Am Schedules)

CFj function (Cash Flows)

- The purpose of the CFj button is to calculate the uneven cash flows for an investment.

- Note: This function is different from the "Cashflow Diagram" function accessible via the Change App Settings key at the top right corner.

- You can use this function to pictorially view and mathematically calculate the discounted uneven flows.

- In the app, you press the key to activate the function. You do not need to have entered values into the calculator beforehand.

CFj Function (Cash Flows)

- When this screen appears, the you can enter all investment cashflows.

- If there is not an initial cashflow, leave it blank.

- If there are more than 1 cashflow to be entered, use the + button at the bottom to add another row.

- When done entering the cashflows, you can view them pictorially on the right. You can then use the happy face icon (as shown below on the PC) or the NPV button (on the app) to enter the desired yield.

Add rows   Use to discount cashflows

CFj Function (Cash Flows)
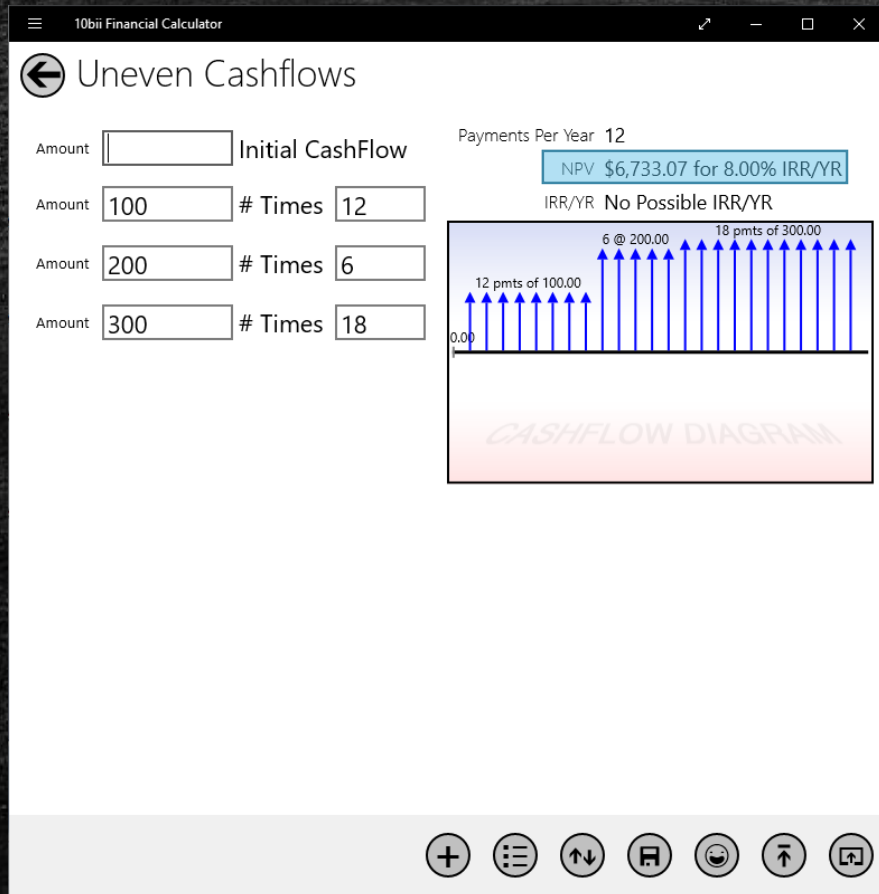
- After entering the IRR/YR, the present value is shown at the top right (highlighted in light blue).

- Pro Tip: You can also use CFj to discount partial and future partial notes!

Additional Examples

Seller Finance Scenarios & More

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Additional Examples

- What are the interest rates for $300,000 20 year notes with payments as depicted to the right?

N	I/YR	PV	PMT	FV
240	?	300000	-2699.18	0
240	?	300000	-1663.79	0
240	?	300000	-3950.37	0
240	?	300000	-5811.01	0
240	?	300000	-1447.64	0

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Additional Examples

- Larry graduated from MIT and got an engineering job right after grad school. He is 22 years old.

- Larry is also an adept investor. Not only did he open up a Roth IRA upon starting his new job, he was able to immediately begin making contributions of $500 / mo to a fund that grows money at 9%.

- How much money will Larry have at age 67 when he finally hangs up his slide rule?

N	I/YR	PV	PMT	FV
?	9	0	-500	?

Additional Examples

- In the calculator, let's amortize a seller finance note that was created 5 yrs ago. The note holder wants to resell it to an investor.

- The note has $75,550 UPB on it @ 7.25% & 20 years left.

- The seller has been poorly self-servicing the loan and the documentation is not all there.

- Because of these problems, you demand a discount. What could you pay for the note given the possible desired yields (in red)?

N	I/YR	PV	PMT	FV
240	7.25	75550	?	0
240	9	?	Same	0
240	10.5	?	Same	0
240	12	?	Same	0
240	15	?	Same	0

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Additional Examples

- I am selling a home in Ellenwood, GA for $125,000. I am offering to carryback 90% of the loan to the buyer at 5% for 30 years. What will the payment be to me?

- On this same loan, a note investor offers to purchase the first 6-year stream of payments for $22.5k. What is the investor's yield?

- If I offer to sell him the second 6-year term as well and he wants to make 10% yield, how much should he pay?

N	I/YR	PV	PMT	FV
360	5	???	?	0

N	I/YR	PV	PMT	FV
72	?	-22500	Same As above	0

N	I/YR	PV	PMT	FV
72	10	?	Same As above	0
72	10	?	0	?

Additional Examples

Rule of Thumb:

Here is a tip when calculating partials -- no calculator required!

If a seller sells off $\frac{1}{x}$ of the payment stream term at $\frac{1}{x}$ of the UPB, the buyer's yield increases to roughly the x multiple of the original yield or interest rate.

In the current example, the seller sold the partial at 1/5 of the term (72) at 1/5 of the UPB (22500). Therefore the buyer yield was roughly 5x the interest rate (~24.84%).

N	I/YR	PV	PMT	FV
360	5	-112500	603.92	0

Whole

$x\frac{1}{5}$　　　X 5　　　$x\frac{1}{5}$

N	I/YR	PV	PMT	FV
72	24.84	-22500	603.92	0

Partial

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