ReadySetCrypto Income Through Options Masterclass

Module Two: How Does Options Pricing Work?

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Introduction to Options Pricing

Less is known about Options pricing....how the value of Options change with all of the different factors....than anything else in this business. Entire books have been written solely dedicated to explaining how Options prices change with the underlying price, with time, with changes in volatility, interest rates, etc.

I have several of these books. They are all very thorough and comprehensive; one in particular is about 1000 pages long and covers everything that you'd ever want to know about Options. While I believe that it's a great REFERENCE, books like that actually do a very poor job teaching you about how Options work unless you have a mind like an attorney and you're able to learn complex concepts by simply reading about them.

Myself, I have to learn things by doing them....kinesthetic learning.....and quite frankly, I've learned primarily by making mistakes to understand what NOT to do. So that one particular book has a very useful role; due to its mass, it's functioning as a very necessary door stop. It's always there if I need it.

What I hope to do in this module of the program is to teach you some very challenging concepts by focusing on the meat of the matter, after which I will then encourage you to do further study through those thick books that can someday be a door-stop for you as well, once you earn that right.

If you've done any study at all into Options, you've undoubtedly heard of the Black-Scholes pricing model. Most Options texts and programs include the formula and try to explain it; frankly, unless you're a Math major, it won't be of any help. We will cover the important elements of Options pricing throughout this program in a very straightforward approach without using partial differential equations to confuse you.

Face Value and Premium

Recall from the last module that Options have some very specific components:

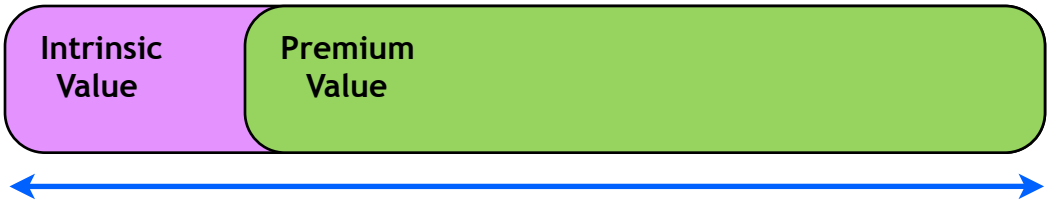
- **Underlying Instrument** - every Option is based on an underlying asset, in our case the underlying instrument will be a Spot Cryptocurrency like Bitcoin or Ethereum.
- **Expiration Date** - every Option that we use will have a defined Expiration Date.
- **Strike Price** - this is the exercise price of that Option.
- **Puts and Calls** - every Option will be defined as a "Put" or a "Call" at that defined strike price, expiring on its specific Expiration Date.

It's time to add another definition to an Option: **Premium or Time Value**.

Think of "Time Value" as the "Premium" added on to the price of an Option. Let's use an analogy...have you ever bought a ticket to a sporting event? We all know that there are two kinds of sporting events....a game....and ***THE GAME***. If we wanted to buy a ticket to a basketball game between Midland High School vs. Eastland High School taking place in a year, we could either buy one today for $5....or wait until the day of the game and buy one for.....$5. There is no PREMIUM to the ticket price.

Now let's take a different example: the final game of March Madness, the NCAA Championship game held every April in the USA. Can you buy a ticket to that game today? Probably. It will be a set price and will not get any cheaper with time. Here's where the "Premium" part comes in....no one knows who will be playing until a couple of days prior to the game. If two relative "unknowns" make the final game, there will be some curiosity that underdogs always attract but these schools will not have the fan base to drive ticket prices higher. On the other hand, if two super-schools like North Carolina and Ohio State make the NCAA final that year, demand for tickets will go through the roof as will the ticket prices. They have huge fan bases and will flock to the game. A ticket with an original face value of $200 will now go for $1000....$2000....or higher. If you sell the ticket for $1000 to someone, think of the original $200 face value as the **Intrinsic Value** of the ticket, and think of the remaining $800 as the **Premium Value** of the ticket.

Figure 1



Total Value of Ticket

You might have seen exactly the opposite thing happen if both semifinal games promised the titanic matchup ahead of time, in which case the ticket prices would inflate ahead of time (PREMIUM!) only to have this premium evaporate if the overall fan base was disappointed with the final matchup. In that case you would barely be able to sell your ticket for face value, or the "Intrinsic Value."

Let's stop and set some definitions down:

Intrinsic Value = the "face value" of an instrument.

Premium or Time Value = the additional subjective value that is pricing in some future event.

Premium/Time Value is also known as "Extrinsic Value" which is a complement to "Intrinsic Value," but we won't use that term as most can barely pronounce it.

Let's cement these definitions by giving a couple more examples:

Above-Sticker Car Pricing - during the 2008 gasoline price bubble, SUV's sat on lots while anyone in need of a car immediately went after the most fuel-efficient car around. And one of those cars was the tiny SmartCar that you've probably seen. They were just starting to be sold in the States when the price of gas began to soar. Dealers quickly went out of stock and were forced to adopt premium pricing measures to handle the demand. The Sticker Price of the car is considered the "Retail Price" of the car (or the Intrinsic Value) and normally you can buy a vehicle for less than that in a buyer's market; in this case a Premium was attached to the price of the car above and beyond the Sticker price.

Popular Christmas Toys - every year we seem to be deluged with the “it” toy that kids MUST have for Christmas. The problem is, there’s such a demand that the toys are simply unavailable through normal retail outlets. That’s where the secondary market kicks in, with a market like eBay. Buyers that were lucky enough to buy one before the “rush” can now turn around and sell their toy for the Face Value (Intrinsic) plus a Premium. And guess what - there is an Expiration Date attached to this selling option as well! It’s December 24th. After that date, all of the Premium pricing evaporates and you’ll be lucky to sell the toy for the original face value.

OK, hopefully you now understand the concepts of Intrinsic (Face) value, as well as Premium/Time Value.

Now let’s see how we use these concepts with Options.

Intrinsic and Time Value of Options

Now we get into the real meat of the matter. If you haven't traded Options before, you'll need to go through this material patiently until you understand it, otherwise the rest of the program will seem like gibberish.

With any Option, we will have two components to the price:

- **Intrinsic Value** - "real" value as measured by the underlying crypto price.
- **Time Value** - "premium" value which is not covered by the price of the asset/coin.

You can think of Intrinsic value as the "face value" of an Option (remember our ticket example above) and the Time value as the "premium" that was charged above and beyond the face value price.

Example of Intrinsic vs. Time Value

As I write this, the Bitcoin spot price is $9497; this gives us the perfect opportunity to show the difference between Intrinsic Value and Time Value/Premium.

For this example we will focus on Call Options and their associated Intrinsic and Time Value at two different strike prices on a specific Options chain.

First off, let's look at the 02AUG BTC Options Chain for the Call Options, shown in Figure 2. Focus on the prices of the $9000 and $9500 Calls, encircled in the red box.

Figure 2

Calls **BTC Price = $9497** Underlying: SYN.BTC-2AUG19($9504.32) **2 Aug 2019**

Size	Bid	Ask	Size	Strike
10.0	0.0100 $95.09	- -	-	6500
10.0	0.0100 $95.09	- -	-	7000
10.0	0.0100 $95.09	- -	-	7500
0.1	0.1050 $998.40	- -	-	8000
0.1	0.0475 $451.36	0.2120 $2014.51	0.4	8500
0.1	0.0695 $660.49	0.0740 $703.26	0.4	9000
0.3	0.0380 $361.16	0.0415 $394.43	3.9	9500

Note that the $9000 BTC calls are $660 bid x $703 ask, and the $9500 calls are $361 bid x $394 ask. Let's just say for convenience that those options are available at the midpoint between bid and ask, or $682 and $378, respectively.

First, the $9500 strike price. Since the price of BTC is actually below this strike price, the option is considered "out of the money" thus it has ZERO Intrinsic Value! The entirety of the Option's value is "Time Value" or "Premium" between now and the expiration date in a few days.

We can then conclude that for Call Options, any option with a strike price ABOVE the current price of the underlying coin has ZERO INTRINSIC VALUE and 100% TIME VALUE.

Now we look at the $9000 call option; determining the pricing components of this option is a little more complex.

- **Intrinsic Value:** The Intrinsic Value of the option is the difference between the asset price ($9497) and the strike price ($9000) or $497.
- **Time Value:** The Time Value of the option is the difference between the current value of the option ($682) and the Intrinsic Value ($497) or $185.

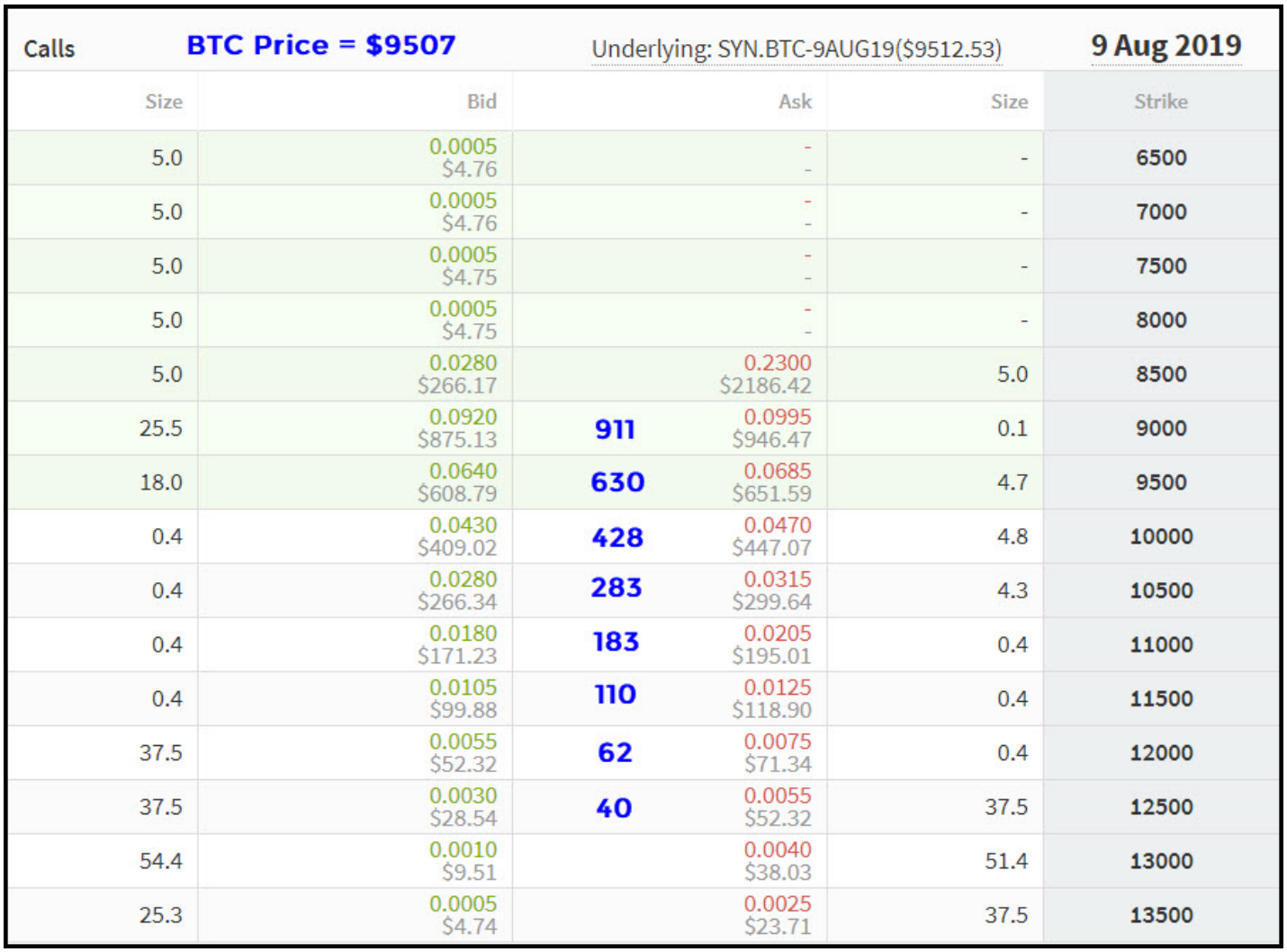
Note how the Time Value is the extra "Premium" attached to the Option. There is no BASIS for this value, other than EXPECTATIONS and TIME. These are very important concepts as we'll see later, as it's this Time Value that we'll sell to others. We're going to sell something that literally doesn't exist, and others will buy it.

Intrinsic vs. Time Value on the Options Chain

If you're new to Options, you might still be confused about where we're going and the points that we're trying to make. That's OK, we'll use some repetition here to drive our point home.

Let's bring this to life a little bit with a more concrete example; let's show another live Options chain and figure out our Intrinsic and Time Values in Figure 3:

Figure 3



Calls | BTC Price = $9507 | Underlying: SYN.BTC-9AUG19($9512.53) | 9 Aug 2019

Size	Bid		Ask	Size	Strike
5.0	0.0005 $4.76		- -	-	6500
5.0	0.0005 $4.76		- -	-	7000
5.0	0.0005 $4.75		- -	-	7500
5.0	0.0005 $4.75		- -	-	8000
5.0	0.0280 $266.17		0.2300 $2186.42	5.0	8500
25.5	0.0920 $875.13	911	0.0995 $946.47	0.1	9000
18.0	0.0640 $608.79	630	0.0685 $651.59	4.7	9500
0.4	0.0430 $409.02	428	0.0470 $447.07	4.8	10000
0.4	0.0280 $266.34	283	0.0315 $299.64	4.3	10500
0.4	0.0180 $171.23	183	0.0205 $195.01	0.4	11000
0.4	0.0105 $99.88	110	0.0125 $118.90	0.4	11500
37.5	0.0055 $52.32	62	0.0075 $71.34	0.4	12000
37.5	0.0030 $28.54	40	0.0055 $52.32	37.5	12500
54.4	0.0010 $9.51		0.0040 $38.03	51.4	13000
25.3	0.0005 $4.74		0.0025 $23.71	37.5	13500

This is a live options chain of BTC on Deribit using a slightly more distant series than the one in Figure 2. (one week further out in time) The blue numbers in the middle represent the “midpoint” between bid and ask prices, and we’ll use those numbers to determine our Intrinsic and Time Value figures. The current price of BTC was $9507 for this snapshot of the options chain. Let’s go through these one by one, starting at the top with the $9000 calls:

- **$9000 Calls:** Since the strike price is < the current price of BTC ($9507) this option is considered “in the money” therefore it will have a combination of Intrinsic and Time Value. The Intrinsic Value is the difference between the strike price ($9000) and the current price ($9507) or $507. The Time Value component is the difference between the total price of the option ($911) and the Intrinsic value ($507) for a Time Value component of $404.

- **$9500 Calls:** Since the strike price is < the current price of BTC ($9507) this option is considered “in the money” therefore it will have a combination of Intrinsic and Time Value. The Intrinsic Value is the difference between the strike price (9500) and the current price ($9507) or $7. The Time Value component is the difference between the total price of the option ($630) and the Intrinsic value ($7) for a Time Value component of $623.
- **$10000 Calls:** Since the strike price is > the current price of BTC ($9507) this option is considered “out of the money” therefore it will have ZERO Intrinsic value and ALL Time Value. The Time Value is then the value of the option, which is $428.
- **$10500 Calls:** Since the strike price is > the current price of BTC ($9507) this option is considered “out of the money” therefore it will have ZERO Intrinsic value and ALL Time Value. The Time Value is then the value of the option, which is $283.
- **$11000 Calls:** Since the strike price is > the current price of BTC ($9507) this option is considered “out of the money” therefore it will have ZERO Intrinsic value and ALL Time Value. The Time Value is then the value of the option, which is $183.

We could go through the remaining strikes on the chain but they’ll repeat the same pattern; the rest > $11000 are “out of the money” thus the option value is all extrinsic/time value.

You can also see this in the chain above; any Options that are highlighted in light green are “in the money” thus have Intrinsic Value. Any non-highlighted Options are “out of the money” thus have no Intrinsic Value. Put Options are the exact opposite of that; we won’t confuse you for right now so we’ll stick with Call Options.

This will take some practice to understand the difference between “Intrinsic Value” and “Time Value” in the various options that you’ll see; sometimes it’s just a matter of spending a few minutes a day to practice. Once you start trading, it’s not something that you’ll spend much time looking at, but for now, it’s important that you know how Options are priced.

An Option that is “In The Money” will have a combination of Intrinsic Value and Time Value.

An Option that is “Out of the Money” will have only Time Value.

If you were watching carefully, you’ll also note that the “Time Value” component actually was the largest right “at the money.” We’ll use that characteristic to our advantage in upcoming modules.

Does Time Value of an Option Change With Duration?

When we deal with a trading instrument like spot Bitcoin, how much does the value of the option change over time? We know from the last section….that no matter how far out in time that the Option has an expiration date, that the INTRINSIC VALUE of that Option will not change with time! The difference between the current price and the strike price of the Option will be the same regardless if that Option has an expiration date a few days away….or several months away!

So the difference in Option prices between short-duration options that expire this week….vs. options that expire in a few months….is the “Premium” or “Time Value” priced into the Option.

The following Option prices are for Bitcoin, with the current price at $9505, so the $10000 strike price is “out of the money” thus ALL time value for the option price.

The first value in Figure 4 below is for an option with just a few days left before expiration, for a mid-point value of about $205. The second value is for an option with several MONTHS before expiration, for a mid-point value of $2232. A pretty dramatic change in value, yes? And all of that difference is TIME VALUE.

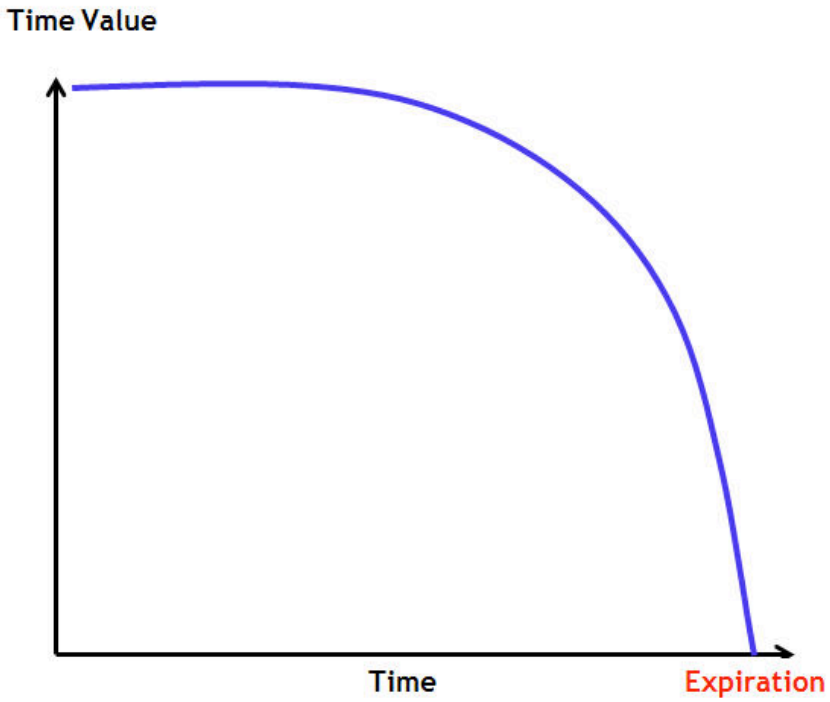
Figure 4

0.0210 $199.55	0.0220 $209.06	24.0	**10000**
0.2275 $2207.88	0.2325 $2256.41	5.4	**10000**

This illustrates a general rule that the longer an Option has until Expiration, the higher the Time Value component of the Option price will be.

In Figure 5 below, you can see how there is an exponential decay to Time Value; the closer that the Option gets to the Expiration Date, the faster that the Time Value component of the Option will decay.

Figure 5



In fact, one of the best analogies that I've heard concerning this erosion of Time Value...is to imagine holding an ice cube in your hand. At the other end of the room from you is a roaring fire. As long as you are not that close to the fire, the ice cube will melt at a very slow rate. The closer that you get to the fire, the faster that it will accelerate the melting of that ice cube. Options are the "ice cube" in this example; the closer to that Option's Expiration date, the faster that the Time Value component will erode.

Note that the "Intrinsic Value" is always there and will not erode prior to Options Expiration. If your Option has Intrinsic Value, you must exercise or close that position prior to the Expiration date so that you do not lose the Intrinsic Value of that Option.

Another factor that influences how much Time Value an Option has depends on whether it's "in the money," "at the money," or "out of the money." If we were to draw the effect of Time Value on Option pricing as a function of the spot price, we would find that "at the money" Options contain the highest percentage of Time Value vs. in-the-money or out-of-the-money Options.

Other Influences on Options Pricing

We've learned that the Option price is comprised of Intrinsic Value, as well as Time Value/Premium. Time Value erodes with the passage of time, and it erodes faster as it gets closer to that Option's Expiration date.

What other influences are there to determine the value of an Option?

Price Movement

Through all the work that we did above to determine the Intrinsic Value and Time Value of our Options, we assumed a fixed price. In reality, price is always moving around all the time as traders exercise their right of Price Discovery. And what you'll find as an extension of that, is that Options will gain and lose value in relation to that rise or fall in price.

This is related to the "Delta" of an Option, which you might see as a field of the Options chain, which is the gain/loss of the value of that option with a one-point move in the underlying asset price. In practice we will see that:

- **Call Options that you buy** will generally increase in value to the buyer if the price goes higher.
- **Call Options that you sell** will generally decrease in value to the seller if the price goes higher.
- **Put Options that you buy** will generally increase in value to the buyer if the price goes lower.
- **Put Options that you sell** will generally decrease in value to the seller if the price goes lower.

These are simple generalizations to start with so you can get the feel of what these instruments do and how they perform with changes in the underlying instrument's price.

We will also see that the values of Puts and Calls do not track the rise and fall of the underlying price of the stock in a linear fashion. There are a lot of "moving parts" that we need to learn and understand and put in our favor prior to placing a position. This lack of linearity is what makes applying Options so difficult to the newcomer, yet gives you an advantage if you have the knowledge on how to apply these moving pieces, one of them being Implied Volatility.

Implied Volatility

Here's a new term - what does it mean? "Implied" means something that is "suggested without being explicitly stated" and "Volatility" means "tending to fluctuate sharply and regularly." The term "Implied Volatility," therefore, means to "*assume price changes in the future.*"

Recall our earlier example as basketball fans held their breath, waiting to see who would get into the NCAA Final game to play for the National Championship. The closer that the tournament got to deciding the final two teams, the higher the excitement....and the higher the secondary market for ticket prices got. (eBay, Craigslist, StubHub, scalpers, etc)

Once the final two teams were known, all that hype and excitement was released like air being let out of a balloon. This is exactly what happens to the price of Options prior to a big news release, like an Earnings release for a company, a general FOMC policy release that might include a change in interest rates, or an announcement by a drug company letting investors know whether or not a product was approved for sale. The balloon gets blown up before the announcement as a large future move in price is "baked in," or discounted. And most of the time, the balloon is deflated after the announcement as expectations did not meet realities. "*oh, is **that** all.....we already **knew** that.*"

Quite a difference from the value of the spot currency, which are not affected by any implied moves…..the price of the spot crypto is…THE PRICE. Options, on the other hand, can vary DRAMATICALLY based on the "implied" future move.

For now, we're just going to introduce you to the concept of Implied Volatility so that you're aware of it. We'll go much deeper into this topic as we get into further modules of the program, so we can show how to create yet another edge to your trades by using this dynamic of Options pricing.

Tasks - Options Pricing

Here is your “homework” for this module:

- Think of a recent event where the buzz and expectation for an upcoming event got higher and higher until it actually happened....what happened immediately after the event? Did you sense that the “air was let out of the balloon?”

- Log into your broker’s online interface and find one specific Call Option on Bitcoin...like the “at the money” BTC Calls for the upcoming week. Track the values of that Option every day, and track the price of Bitcoin. Notice how the value of the Option moves with price, but also that the value of that Option drops as expiration day approaches.

- For that same Option that you are tracking, identify the amount of INTRINSIC value, as well as the amount of TIME value associated with that Option.

- Find the corresponding Put Option at the same strike price and month as the Call Option that you are tracking. Identify the amount of INTRINSIC and TIME value present in that Put Option.

- Download the Options Pricing Cheat Sheet and familiarize yourself with how the value of an option rises and falls depending on whether it’s a put or call, and whether you sold it or bought it

- Watch the associated video for this module, and take the module quiz.

Options Pricing - Summary

From here on through the rest of this program, we're going to start using our newly-defined terms to discuss Options. When we buy an Option, we're "long" that Option. When we sell an Option, we're "short" that Option.

Options have two components to their price - **Intrinsic Value** and **Time Value**.

Time Value is the "Premium" component of an Option's value. It is based on many factors, including time to Expiration, the Implied Volatility, and whether the Option is in the money, at the money, or out of the money.

Time Value erodes as a function of its proximity to the Expiration date. It erodes very slowly until Expiration is a few weeks away, and then the erosion takes on an exponential shape and starts to increase rapidly. We will see in the subsequent levels of this program how we can use this to our benefit!

A rise in price will generally benefit a long Call Option, and a drop in price will generally benefit a long Put Option. Conversely, a rise in price will cause a short Call Option to drop in value, and a drop in price will cause a short Put Option to drop in value.

You must bake this price/Option relationship into your mind, because we're about to start applying it with the Call Option first, in the next module.