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SUMMARY SHEET

Basics of Derivatives - Options

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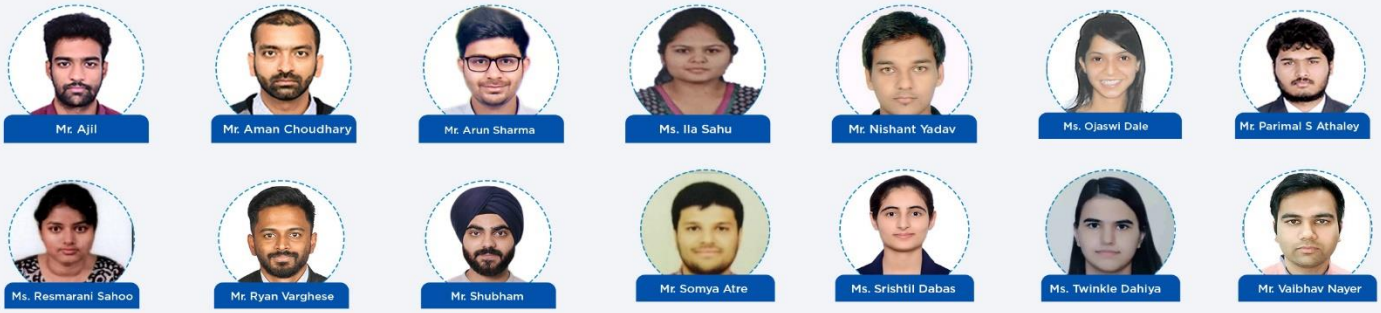
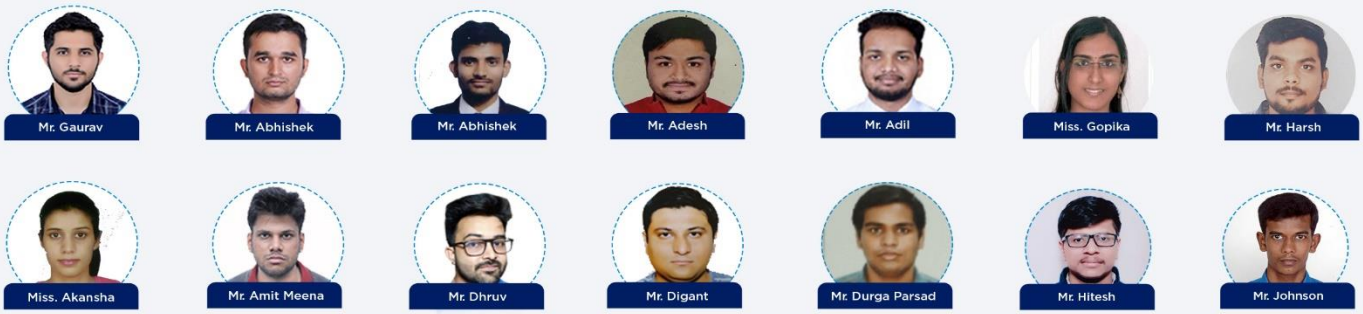
RBI Grade B 2020 - 21

198 Selections Out of 257



SEBI Grade A 2020

63 Selections Out of 80



NABARD Grade A 2020

65 Selections Out of 69

Important Points

1. This Summary Sheet shall only be used for Quick Revision after you have read the Complete Notes

2. For Building Concepts along with examples/concept checks you should rely only on Complete Notes

3. It would be useful to go through this Summary sheet just before the exam or before any Mock Test

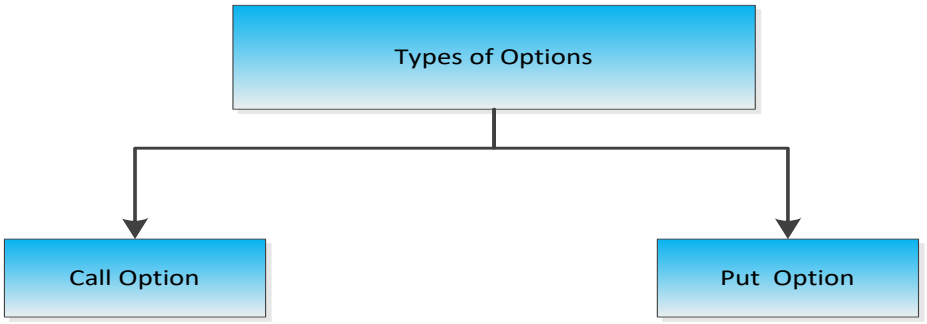
4. Questions in the exam are concept based and reading only summary sheets shall not be sufficient to answer all the questions

1 Summary Points

- **Options:**
  1. An option is a contract that **gives the buyer the right**, but not the obligation, to buy or sell an underlying asset at a specific price on or before a certain date
  2. The **Option holder (long position)** is the **buyer** of the option and the **Option writer (Short Position)** is the **seller** of the option
  3. The option to buy is called **Call Option** and the option to sell is called **Put Option**
  4. The option buyer has the right but no obligation with regards to buying or selling the underlying asset. Therefore, option buyer/ holder will exercise his option only when the situation is favorable to him
  5. While, when option buyer decides to exercise, option writer would be legally bound(obligated) to honor the contract
  6. The fixed price at which the option holder can buy and/or sell the underlying asset is called the **Strike price or Exercise price**
  7. The date when the option expires or matures is referred to as the **Expiration date or maturity date**
  8. After the expiration date, the **option is worthless**
  9. The act of buying or selling the underlying asset as per the option contract is called **exercising the option**
  10. An **Option Premium** is the income received by an investor who sells or "writes" an option contract to another party

11. Options traded on the exchange are called **Exchange- traded options** and options not traded on an exchange are called **Over-the-counter options**

- **Types of Options**



- **Call Option:** A call gives the holder the **right, but not an obligation to buy an asset** at a certain price within a specific period of time. Buyers of calls hope that the price of the underlying asset will **increase** substantially before the option expires
- In the call option, **the Buyer** of the option is said to be **long** into the option and **the Seller** of the option is said to be **short** into the option
- **Example:** The price of stock in the market today is 500. Ram thinks the price will move to 600. So, he decides to buy a call option of Rs. 500 from Sham with the expiry date of 1 month from now by paying Rs 20.
    1. Here, Ram is buying the Option hence he is the Option holder whereas Sham is the Option writer
    2. Buying a call option will give Ram the right, not an obligation to buy the shares at 500 one month from now
    3. Rs. 20 paid to buy the call option is the option premium
    4. Strike price of the options contract is 500 and the expiration date is 1 month from the date of the contract

Case 1: When the price of the share is 600 on the date of the expiry

1. Ram is in Profit and Sham is in loss
2. Ram will exercise the option and will buy the shares at 500 and then sell them at 600. So the profit from this to Ram would be 100.
3. The loss to Sham would be also 100
4. But since Ram has paid 20 to sham as the option premium so the net profit for Ram would be 100-20 = 80. The net loss to sham would also be 80

Case 2: When the price of the share is 400 on the date of the expiry

1. Ram is in loss and Sham is in Profit
2. Ram will not exercise the option and option would expire as it is.
3. The loss to Ram would be also 20 i.e. the price paid for option premium.

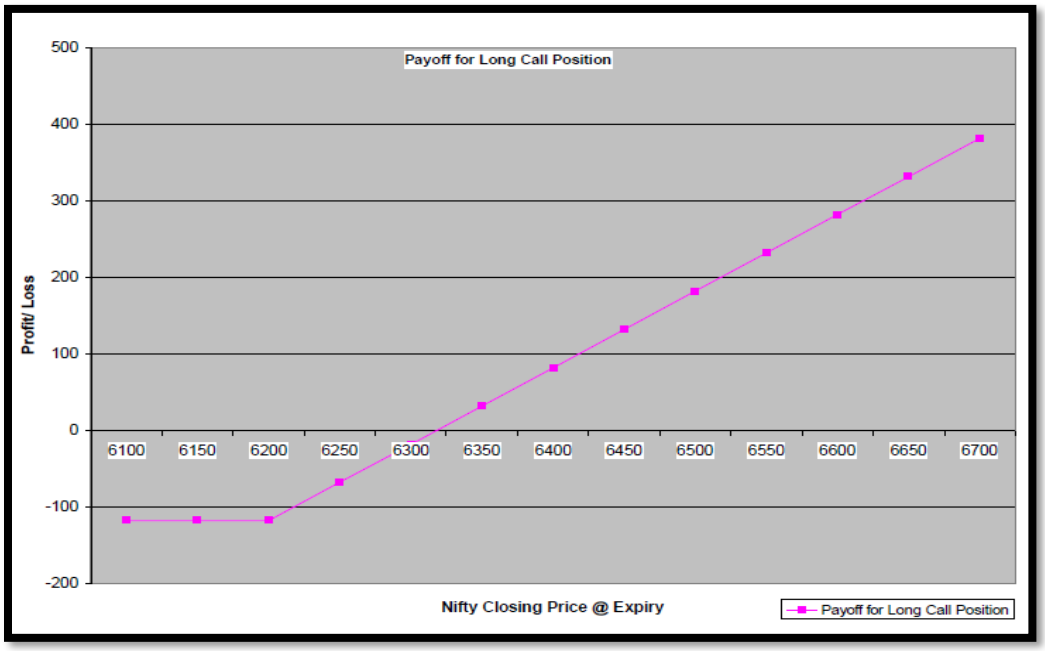
4. The profit for sham would also be 20 i.e. the price he got for option premium

- **In Call Option, buyer has huge profit potential but limited loss potential and seller has huge loss potential but limited profit potential**

- **Graph of Profit/Loss of Buyer of Call Option**

Example: On October 1, 2010, Nifty is at **6143.40**. You buy a call option with strike price of 6200 at a premium of **Rs. 118.35** with expiry date October 28, 2010

For profits/losses for other values, a table is given below. This table is used to draw the pay off chart given in the next page. Strike Price (X)	6200			
Premium		118.35		
Nifty at Expiry	Premium Paid	Buy Nifty at	Sell Nifty at	Payoff for Long Call Position
	A	B	C	D = A + B + C
6100	-118.35	0	0	-118.35
6150	-118.35	0	0	-118.35
6200	-118.35	-6200	6200	-118.35
6250	-118.35	-6200	6250	-68.35
6300	-118.35	-6200	6300	-18.35
6350	-118.35	-6200	6350	31.65
6400	-118.35	-6200	6400	81.65
6450	-118.35	-6200	6450	131.65
6500	-118.35	-6200	6500	181.65

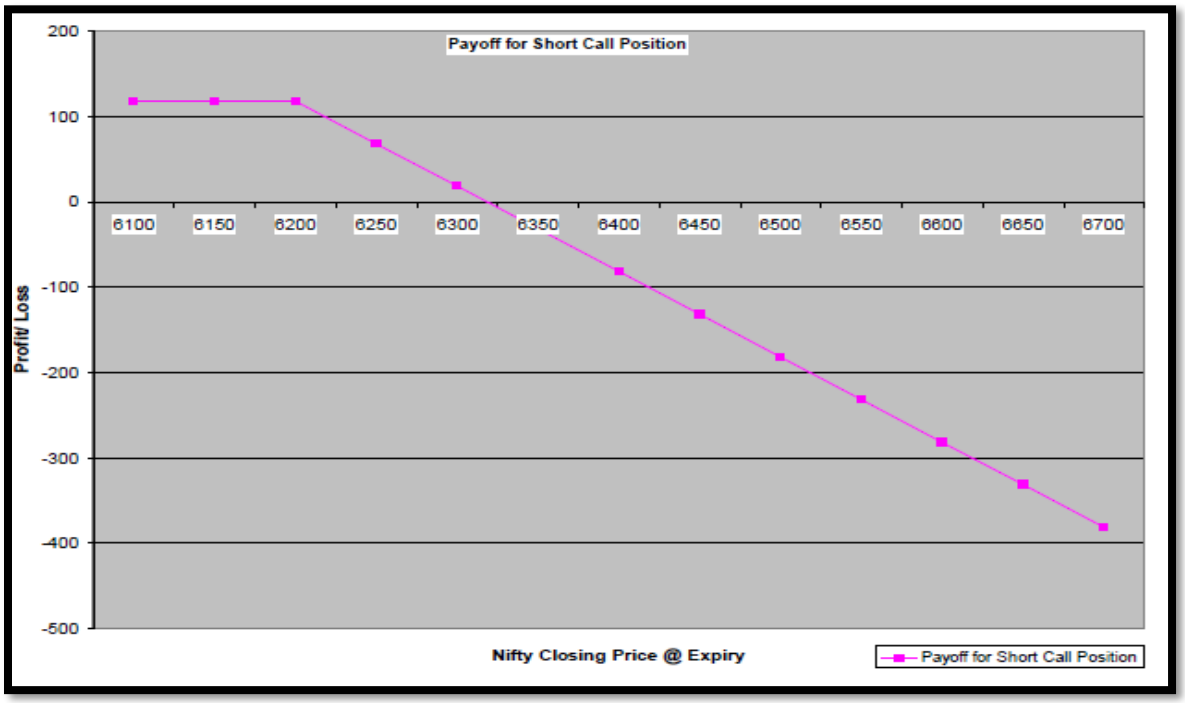


1. Below 6200, the buyer will not exercise the option so the buy price and sell price remains zero
2. Above 6200 the buy price will remain 6200 because buyer has the option to buy Nifty at 6200 from the seller of the option irrespective of what the price in the market is. The selling price will be the price of the Nifty
3. **For Buyer**, the **breakeven point** i.e. the point at which no profit or loss is made would be **strike price + Option premium** i.e. 6200 + 118.35 = 6318.35
4. Between 6200 and 6318.35 your losses will reduce as you would start recovering the option premium
5. Below 6200 you will always have limited loss of 118.75. If it stays below 6200 there is no point in exercising the option
6. So, **profit is unlimited but loss is limited for the buyer of the call option**

- **Graph of Profit/Loss of Seller of Call Option**

Example: Same as above

Strike Price (X)			6200	
Premium			118.35	
Nifty at Expiry	Premium Received	Buy Nifty at	Sell Nifty at	Payoff for Short Call Position
	A	B	C	D = A+B+C
6100	118.35	0	0	118.35
6150	118.35	0	0	118.35
6200	118.35	-6200	6200	118.35
6250	118.35	-6250	6200	68.35
6300	118.35	-6300	6200	18.35
6350	118.35	-6350	6200	-31.65
6400	118.35	-6400	6200	-81.65
6450	118.35	-6450	6200	-131.65



1. **For Seller,** the **breakeven point** i.e. the point at which no profit or loss is made would be **strike price + Option premium** i.e. 6200 + 118.35 = 6318.35
2. As Nifty goes above 6318.35 seller starts making loss. The more Nifty increases the more losses seller will make
3. Between 6200 and 6318.35 the profits of seller will reduce as he would have to part away with the option premium
4. Below 6200 sellers will always have limited profit of 118.75
5. **So, profit is limited but loss is unlimited for the seller of the call option**

- **Put Option:** A put option is an option contract giving the owner **the right, but not the obligation, to sell** a specified amount of an underlying security at a specified price within a specified time. Buyer of the Put option believes that price of share will **decrease** over the time

- In the Put option, **the buyer** of the put option is said to be **long** into the option and **the seller** of the option is said to be **short** into the option
- **Example:** The price of stock in the market today is 500. Ram thinks the price will move to 400. So he decides to buy a put option of Rs. 500 from Sham, with the expiry date of 1 month from now by paying Rs 20.
  1. Here, Ram is the buyer of the put option or the holder of the put option and Sham is the writer of the option
  2. Buying a put option will give Ram the right, not an obligation to sell the shares at 500 one month from now

3. Option Premium is Rs 20. Strike price of the options contract is 500 and the expiration date is 1 month from the date of the contract
4. Selling a call option will make obligation on Sham, to buy the shares at 500 one month from now if Ram exercises the option

Case 1: When the price of the share decreases to 400 at expiry then

1. Ram is in Profit and Sham is in loss
2. Ram will exercise the option and will sell the shares at 500 to Sham. So the profit from this to Ram would be 100.
3. The loss to Sham would be also 100 because Sham has buy shares at 500 though they are available in the market at 400
4. But since Ram has paid 20 to sham as the option premium so the net profit for Ram would be 100-20 = 80. The net loss to sham would also be 80

Case 2: When the price of the share increases to 600 at expiry then

1. Ram is in loss and Sham is in Profit
2. Ram will not exercise the option and option would expire as it is.
3. The loss to Ram would be also 20 i.e. the price paid for option premium.
4. The profit for sham would also be 20 i.e. the price he got for option premium

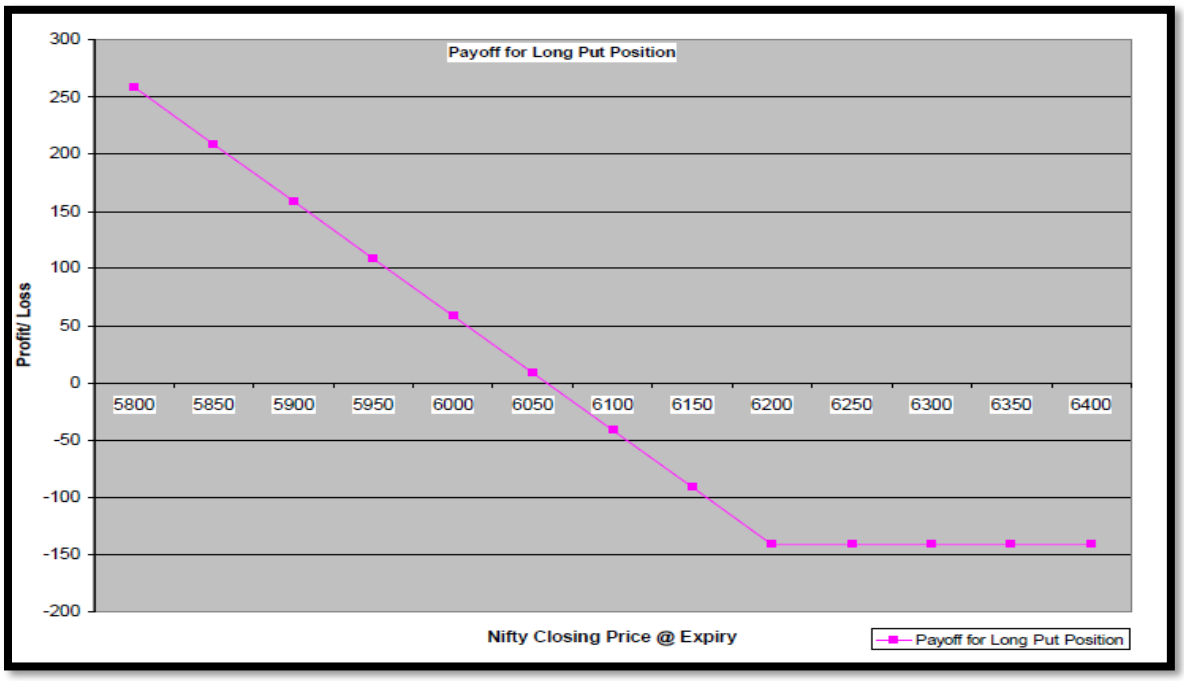
- **In Put Option, buyer has huge profit potential but limited loss potential and seller has huge loss potential but limited profit potential**

- **Graph of profit/loss of Buyer of Put Option**

Example: On October 1, 2010, Nifty is at 6143.40. You buy a put option with strike price of 6200 at a premium of Rs. 141.50 with expiry date October 28, 2010

Strike Price (X)		6200		
Premium		141.5		
Nifty at Expiry	Premium Paid	Buy Nifty at	Sell Nifty at	Payoff for Long Put Position
	A	B	C	D = A + B + C
5800	-141.5	-5800	6200	258.5
5850	-141.5	-5850	6200	208.5
5900	-141.5	-5900	6200	158.5
5950	-141.5	-5950	6200	108.5
6000	-141.5	-6000	6200	58.5
6050	-141.5	-6050	6200	8.5
6100	-141.5	-6100	6200	-41.5
6150	-141.5	-6150	6200	-91.5
6200	-141.5	-6200	6200	-141.5
6250	-141.5	0	0	-141.5

6300	-141.5	0	0	-141.5



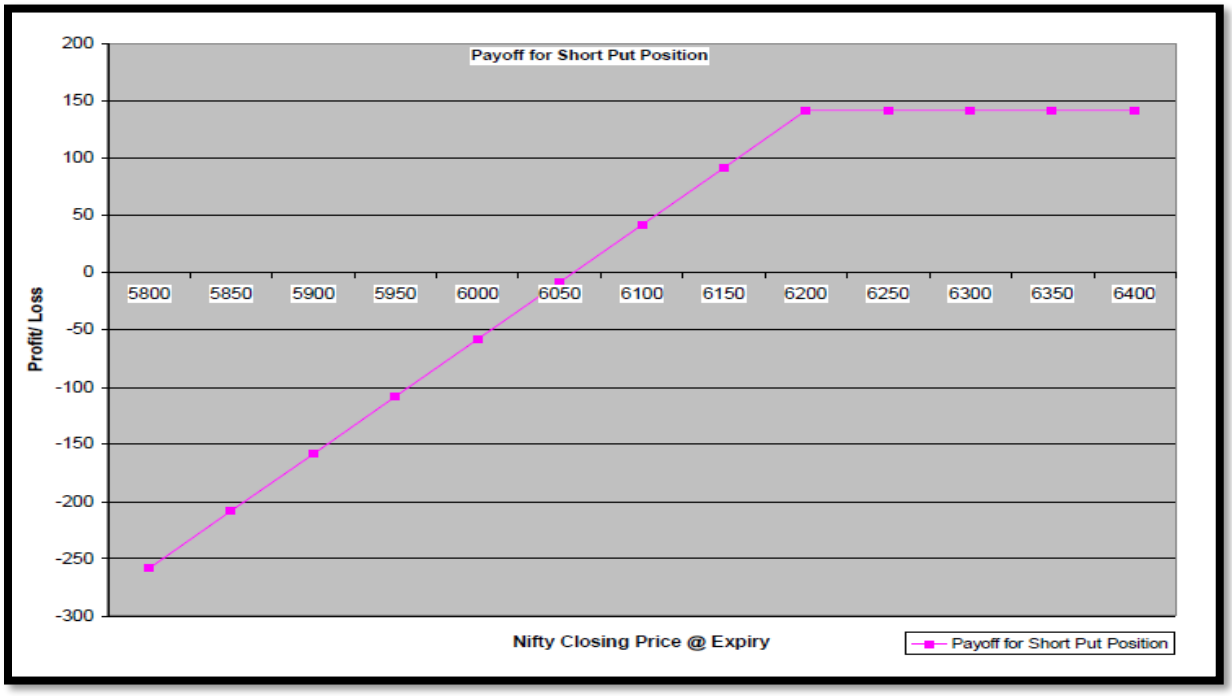
1. Above 6200, the buyer will not exercise the option so the buy price and sell price remains zero
2. Below 6200 the sell price will remain 6200 because seller has the option to sell Nifty at 6200 to the seller of the option irrespective of what the price in the market is. The buying price will be the price of the Nifty
3. The **breakeven point** i.e. the point at which no profit or loss is made would be **strike price -Option premium** i.e. 6200 – 141.5 = 6058.5
4. As Nifty goes below 6058.5 buyers start making profit on exercising the option. The more it decreases the more profit you will make
5. Between 6200 and 6058.5 buyer's losses will reduce as you would start recovering the option premium
6. Above 6200 buyers will always have limited loss of 141.5. If it stays above 6200 there is no point in exercising the option
7. **So, profit is unlimited but loss is limited for the buyer of the put option**

- **Graph of profit/loss of Seller of Put Option**

Example: Same as above

Strike Price (X)	6200
Premium	141.5

Nifty at Expiry	Premium Received	Buy Nifty at	Sell Nifty at	Payoff for Short Put Position
	A	B	C	D = A+B+C
5800	141.5	-6200	5800	-258.5
5850	141.5	-6200	5850	-208.5
5900	141.5	-6200	5900	-158.5
5950	141.5	-6200	5950	-108.5
6000	141.5	-6200	6000	-58.5
6050	141.5	-6200	6050	-8.5
6100	141.5	-6200	6100	41.5
6150	141.5	-6200	6150	91.5
6200	141.5	-6200	6200	141.5
6250	141.5	0	0	141.5
6300	141.5	0	0	141.5



1. The **breakeven point** i.e. the point at which no profit or loss is made would be **strike price -Option premium** i.e. 6200 – 141.5 = 6058.5

2. As Nifty goes below 6058.5 sellers starts making loss. The more it decreases the more loss seller will make
3. Between 6200 and 6058.5 sellers profit will reduce as seller would have to part away with the premium
4. Above 6200 sellers will always have limited profit of 141.5.
5. **So, profit is limited but loss is unlimited for the seller of the put option**

- The number of shares in the contract is called **contract size**
- **The contract** value is equal to price of share* number of shares
- When one enters into an Options Contract, one needs to pay only around 16% or 20% as upfront money to enter into the contract. This is called **Margin Money**

- **In the Money option** is one with strike price better than the spot price for the holder of option
- **Out of the money option** is one with strike price worse than the spot price for the holder of option
- **At the money** is a situation where an option's strike price is identical to the price of the underlying security

Options are said to be **at the money** (ATM) or **in the money** (ITM) or **out of the money** (OTM) as shown below:

	Call option	*Put option*
ATM	Exercise price = Market price	Exercise price = Market price
ITM	Exercise price < Market price	Exercise price > Market price
OTM	Exercise price > Market price	Exercise price < Market price.

- **Rule**: If the movement of price is in same direction of the desired one for the holder of the option then option is **in the money** otherwise it is **out of the money**. For Call option buyer the desired thing is that price increases but for the Put Option buyer the desired thing is that price decreases

- **Option Premium = Intrinsic Value + Time Value**

- **Intrinsic Value** refers to the amount by which option is in the money i.e. the amount an option buyer will realize, before adjusting for premium paid, if he exercises the option instantly
    1. Only in-the-money options have intrinsic value whereas at-the-money and out-of-the-money options have zero intrinsic value
    2. **Intrinsic value of call option** can be calculated as **spot price – exercise price**
    3. **Intrinsic value of put option** can be calculated as **exercise price – spot price**

- **Time Value** refers to the value due to time left in the expiry of the option. Longer the time for expiration greater is the time value. **Time Value is maximum for ATM options and decreases with options becoming ITM or OTM**

- **Example:** Ram bough a Put option Contract from Sham for shares of Geliance at Rs. 500 with expiry date after 1 month. If the Spot Price is 461 and premium is 45 then what is the intrinsic and Time value of the Option

  Solution: Option is in the money, so intrinsic value of money = 500-461 = 39

  Option Premium = Intrinsic Value + Time Value

  45 = 39 + Time Value

  Time Value = 6

- **Participants in the Options Market**

  From Speculators Point of view,

Option	Speculator View
Buy Call	Price would Increase
Sell Call	Price would not increase
Buy Put	Price would decrease
Sell Put	Price would not decrease

  From Hedgers point of view,

Option	Example of Hedger Position
Buy Call	Person wants to buy shares of this company in future date but thinks the price might increase by that time
Buy Put	Person wants to sell shares of this company in future but thinks the price might decrease by that time

- **Factors affecting Pricing of Options**
  1. **Spot price of the underlying asset:**
     - ✓ If price of the underlying asset goes up the value of the call option increases while the value of the put option decreases.
     - ✓ Similarly, if the price of the underlying asset falls, the value of the call option decreases while the value of the put option increases
  2. **Strike Price:**

- ✓ If all the other factors remain constant but the **strike price of option increases, intrinsic value of the call option will decrease** and hence its value will also decrease.
- ✓ On the other hand, with all the other factors remaining constant, **increase in strike price of option increases the intrinsic value of the put option** which in turn increases its option value

3. **Volatility:** Higher volatility = Higher premium, Lower volatility = Lower premium (for both call and put options)
4. **Time to Expiration: Longer the maturity** of the option greater is the uncertainty and hence the **higher premiums**
   - ✓ **Time Decay:** If all other factors affecting an option's price remain same, the time value portion of an option's premium will decrease with the passage of time
5. **Interest Rates**: High interest rates will result in an increase in the value of a call option and a decrease in the value of a put option

- **The Black and Scholes Model** calculates the theoretical call price (ignoring the dividends paid during the life of the option) using the five key determinants of an option's price: stock price, strike price, volatility, time to expiration, and short-term (risk free) interest rate

- **Option Greeks:** Option premiums change with changes in the factors that determine option pricing i.e. factors such as strike price, volatility, term to maturity etc.

- **Delta (δ or Δ):**

  Delta = Change in option premium/ Unit change in price of the underlying asset

  1. Delta of call option buyer is positive and seller is negative
  2. Delta of put option buyer is negative and seller is positive

- **Gamma (γ):** It signifies the speed with which an option will go either in-the-money or out-of-the-money due to a change in price of the underlying asset

  Gamma = Change in an option delta/ Unit change in price of underlying asset

- **Theta (θ):** Theta is **negative** for a **long option**, whether it is a call or a put. Other things being equal, options tend to lose time value each day throughout their life

  Theta = Change in an option premium/ Change in time to expiry

- **Vega (ν):**

  Vega = Change in an option premium/ Change in volatility

- **Rho (ρ):**

  Rho = Change in an option premium/ Change in cost of funding the underlying

- **Open Interest**

To understand open interest, we must first explore how options and futures contracts are created. If an options contract exists, it must have had a buyer. For every buyer, there must be a seller since you cannot buy something that is not available for sale

The relationship between the buyer and seller creates one contract. The contract is considered "open" until the counterparty closes it. Adding up the open contracts, where there are a buyer and seller for each, results in the open interest.

If a buyer and seller come together and initiate a new position of one contract, then open interest will increase by one contract. Should a buyer and seller both exit a one contract position on a trade, then open interest decreases by one contract. However, if a buyer or seller passes off their current position to a new buyer or seller, then open interest remains unchanged.

Example:

1. Step 1: Ram and sham enters into contract to buy and sell Futures Contract, respectively. (After Step 1, Open Interest = 1)
2. Step 2: Ram exits the contract by selling it to Ajit. So now Ajit is the new buyer and Sham is anyways the existing seller (After Step 2, Open Interest =1)
3. Step 3: Suresh and Mukesh enters into contract to buy and sell Futures Contract, respectively. (After Step 3, Open Interest = 2)
4. Step 4: Ajit and Sham both exit the contract by closing it with one another (After Step 4, Open Interest =1)

- **Difference between Forward Contract and Options Contract:**

Forwards	Option Contract
The contract must be executed on the expiry date	The option holder has the right to execute the option but has no obligation
There is no extra premium payable in the Forward Contract apart from the quoted rate	There is premium payable from the buyer to the seller at the start
In case of currencies Forward premium is the interest rate differential between two countries	Option premium depends on factors such as strike price, volatility of exchange rates and interest rates
Forward contract is a simple contract for purchase or sale of currency or any other underlying	Several types of options are available with various structures such as in the case of embedded options

- **Currency Options:** A **Currency option** is a contract that grants the buyer the right, but not the obligation, to buy or sell a specified currency at a specified exchange rate on or before a specified rate
- **Interest Rate Options:** Works like any other options contract, the only difference being that the underlying asset is the interest rate