The word **Marginal** in Economics means **Additional**.

Marginal Benefit: Additional benefit. This measures the additional benefit we gain from consuming one more unit of a good (product) or service. (Example: suppose that I am eating a pizza that is divided into 8 slices. Marginal benefit will measure the benefit, i.e. the pleasure I will gain from each separate slice of pizza.)

Marginal Cost: Additional cost. This measures the additional cost we incur from consuming one more unit of a good (product) or service.

Suppose that it is a very hot day (40 degrees!), and you want nothing more than to gulp down a bottle of Coke. Each bottle of coke costs Tk. 22. Before you decide whether or not to buy the (first) bottle of Coke, you weigh the expected benefits from consuming it against the cost you would have to incur. Since you are extremely thirsty, you assume the expected benefit will be much greater than cost of TK. 22 that you will have to bear. Thus since the benefit you will gain from the first bottle of Coke is likely to be greater than the cost you incur to buy the first bottle of coke, you decide to buy it.

Suppose that you are not fully satisfied after that first bottle of Coke, and you are craving a second bottle. Again, before you decide whether or not to purchase the second bottle, you weigh the expected benefits against the cost to pay for the second bottle. You are going to assess whether the benefit you except to receive from the second bottle of Coke will be greater than the TK. 22 you have to pay to acquire it. Recall, you have already consumed one bottle of Coke, so chances are that the second bottle will not give you as much pleasure as the first. So the additional benefit you will gain from consuming the second bottle will not be as much as the benefit you gained from consuming the first bottle. However, the cost of buying the second bottle is the same as the cost of buying the first bottle (TK. 22).

Therefore, although Marginal Benefit from consuming an additional unit of Coke is decreasing, the Marginal Cost to consume that additional unit of Coke remains the same.

You will decide to buy the second bottle of Coke only if you believe that the Marginal Benefit from consuming the second bottle of Coke will be greater than the Marginal Cost to buy the second bottle. If you think the Marginal Benefit does not justify the Marginal Cost of TK. 22, then you will not buy.

In summary, if

$MB > MC \rightarrow Consume\ the\ additional\ unit$

$MB < MC \rightarrow Do\ not\ consume\ the\ additional\ unit$

This behavior is what we refer to in Economics as Decisions at the Margin.

Example from the Book:

<u>Marginal Benefit, Marginal Cost and Efficiency</u>

What is the right amount of time to study for a test?

This "right amount" in Economics is called "optimal" or "efficient" amount.

In theory, the efficient amount is achieved when Marginal Benefit = Marginal Cost.

Marginal Benefit − Marginal Cost = Net Benefit

Suppose that you have a big exam tomorrow. You have started to study for the test at 8:00 pm the night before.

In the first hour of your study (8:00 pm – 9:00 pm), you expect to be extremely productive. Your brain will be able to absorb all information very quickly. However, you will also be incurring a cost – you will be gradually becoming tired. But since this is just the first hour, you do not expect to become that exhausted.

Hence, the benefit is the amount of information you are absorbing for your test. Since your mind is fresh and productive in the first hour, you will be able to absorb a lot of information. Your cost is the amount of energy you have to spend to study the first hour. The more energy you spend the more tired you will get. But since it was the first hour, you will not have to spend a lot of energy because you were fresh and productive. However, in the second hour, your productivity will decline and so the amount of information you will be able to absorb in the second hour will be less than the amount of information you were able to in the first hour. At the same time, since you are becoming tired you have to spend more and more energy to continue studying. Hence the additional benefit (information absorbed) is declining with every hour but the additional cost (energy spent studying) is increasing with every hour.

Therefore, the benefit you expect to gain from studying the first hour is greater than the cost you expect to incur from studying the first you. So, you decide that you will study the first hour.

After studying for one hour, you now decide whether you should study for another hour (9:00 pm – 10:00 pm). Again, before taking your decision, you weigh the expected benefits of studying the second hour against the expected costs. By now, you think you are not going to be as productive as you were in the first hour, but still you will be able to absorb a good amount of information. You also know that studying the second hour will make you more tired than studying the first hour because you are gradually getting sleepier. But if you compare, then you realize the additional benefit gained from studying the second hour (marginal benefit) will be greater than the additional cost incurred from studying the second hour (marginal cost). Hence you decide to study the second hour as well.

Notice that the Marginal Benefit is decreasing because your productivity is decreasing with every hour you study (benefit gained from studying the first hour is greater than the additional benefit gained from studying the second hour; additional benefit gained from studying the second hour will be greater than the additional benefit of studying the third hour).

On the other hand, Marginal Cost is increasing because you grow more and more tired with every passing hour (cost incurred from studying the first hour is less than the cost incurred from studying the second hour; cost incurred from studying the second hour is less than the cost incurred from studying the first hour).

Suppose we can measure benefit and cost using an artificial unit of measure called utils. The hourly record of marginal benefit and marginal cost is presented in utils in the table below:

| Hour spent studying	Marginal Benefit	Marginal Cost
8:00 pm – 9:00 pm	10	2
9:00 pm – 10:00 pm	8	4
10:00 pm – 11:00 pm	6	6
11:00 pm – 12:00 pm	4	8

Sketch Marginal Benefit and Marginal Cost on the same graph.

As we can see, in the first hour, $MB > MC$, so you will study the first hour. Therefore there is positive Net Benefit. In the second hour again, $MB > MC$, so you will study the second hour. Again, there is positive Net Benefit. In the third hour, $MB = MC$, which means the additional benefit you expect to gain from studying the third hour is exactly equal to the cost you expect to incur by studying the third hour. You will study the third hour as well because Net Benefit may not be positive, but it is zero. You will not study the fourth hour, because now $MB < MC$ so your Net Benefit is negative (Net Loss).

Therefore, the most efficient number of hours to study is 3 hours, from 8:00 pm to 11:00 pm. In this way, you are able to maximize your Net Benefits. Maximizing Net Benefits means we achieve Efficiency.

What will happen if you stop studying after the first hour?

If you study for only the first hour, then you only receive Net Benefit of the first hour. You do not gain the Net Benefit from studying the second and the third hour. Humans always want to gain as much Net Benefit as possible.
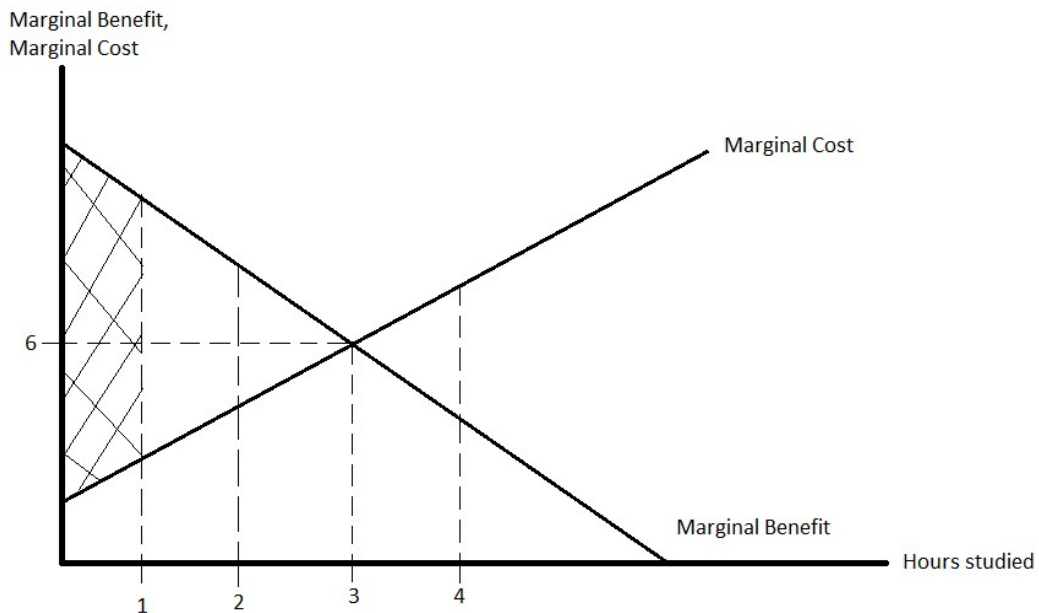
What will happen if you stop studying after the second hour?

If you study for only two hours then you gain the Net Benefit from the first hour plus the Net Benefit from the second hour. But you do not gain the Net Benefit from studying the third hour. Again, humans are always trying to gain as much Net Benefit as possible.
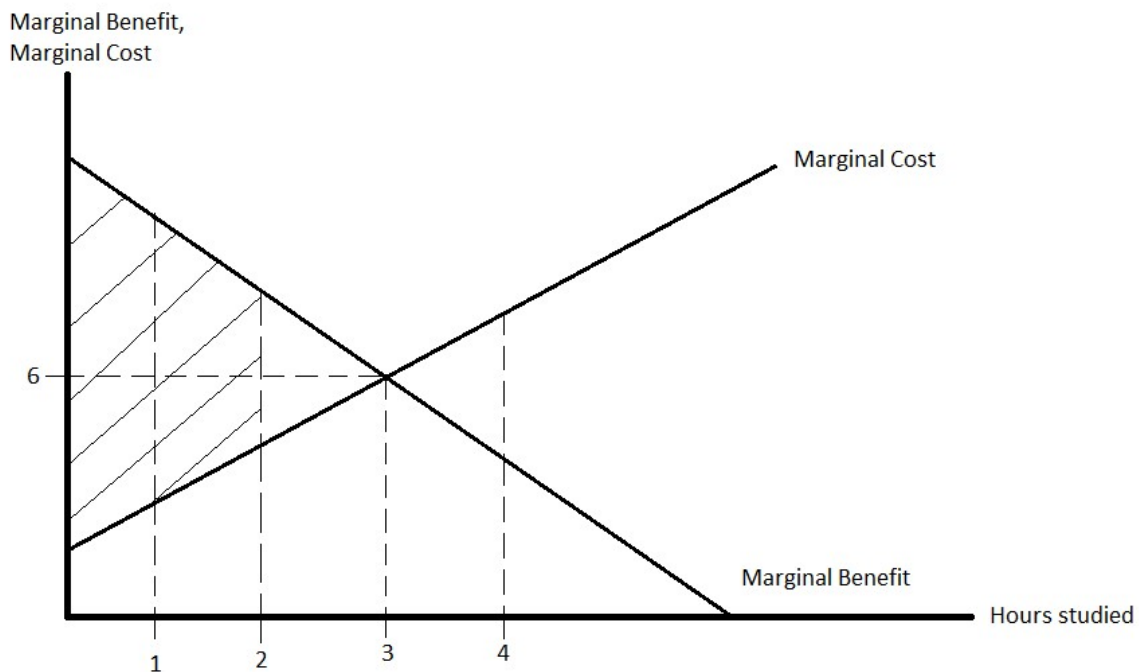
Hence, to get maximum amount of Net Benefit, you have to study till the third hour.

What happens if you study the fourth hour? And beyond?

If you study more than 3 hours, then your Marginal Cost becomes higher than your Marginal Benefit, so you incur negative Net Benefit or in other words Net Loss.

Therefore, to maximize Net Benefit, we try to reach the point of $MB = MC$. Beyond that, we begin to incur Net Loss.