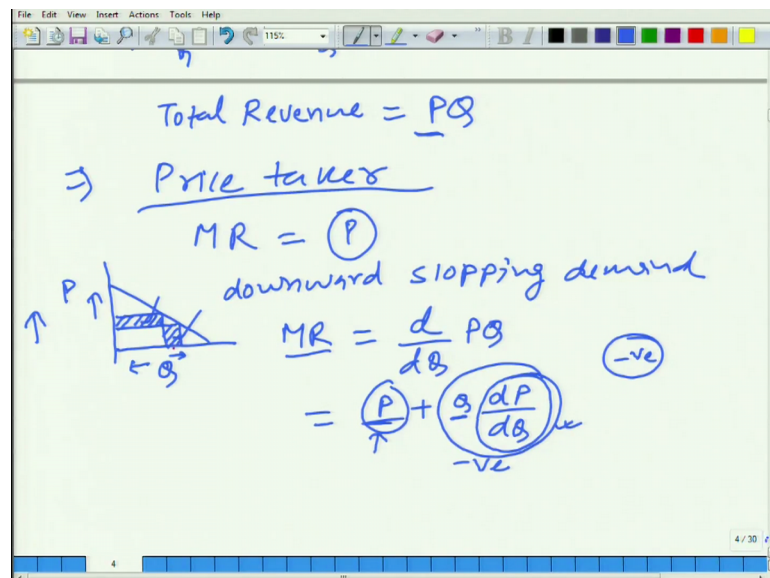


**An Introduction to Microeconomics**  
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**Lecture - 110**  
**Marginal Revenue**

Now, let us pay a little attention to total revenue.

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We are going to study it more in more detail, but let us little bit attention we should pay here. Now there are different kind of firms in the market and there are different kind of market environment that we will spend considerable amount of time talking about these different environment.

In one of the environment firms, take price as given firms act as price taker means a simple way to understand it is that they cannot change the prices in the market. They do not have any control over the prices in the market think about you know big [FL] where let us say 100 a large number of sellers are selling a same kind of banana.

There a seller unilaterally cannot change the price the seller will take the price of banana as given and of course, we are going to talk about the reasons and how does it work little later, but right now, what is important is that this firm takes P as given. So, what will be the marginal revenue?

Student: Q.

Q; marginal revenue is going to be Q.

Student: P.

Sorry P, if you sell one more of banana how much will you get? P and that is the marginal revenue, fine. There is another kind let us say that firm is facing we already talked about downward sloping, downward sloping demand curve the demand is downward sloping. When a firm is selling of course, firm has fulfilling the demand and Q is typically dependent on price you know. So, what I am saying here that in this case let me say here downward. what is happening here is that if firm is firm is should firm is able to set the price.

But when the firm increases the price what happens higher the price lower will be the demand of it is good ok. If you increase P you will move in this direction so in that case we cannot say that marginal revenue is equal to P why because when this firm sells one of more unit of good it is able to do so only because it has reduced it has reduced the price.

So, firm will get little more because it is selling one more good, but it will get little less for all the goods sold because the price is lesser now. So, in this case what is going to be the marginal revenue if we use calculus we get very clearly here P plus and we can see it if we do not use calculus we can let us interpret it and that will give us the idea that what is this P, this P is same as this P this because this firm is able to sell one more unit so it will get P. But what is this?

Student: This is;

$\frac{dP}{dQ}$  is negative and Q is the amount of goods sold and this is definitely little less than you know, it is negative of it is a negative entity minus V. So, in this case marginal revenue is definitely less than P. Now think of it again here what is happening, let us look at it in the graph, how much is the revenue let us say a price is P revenue is going to be this box P multiplied by Q. Now let us say if Q increases Q is here. How much is going to be the total revenue? Total revenue will be in;

Student: Purple box.

Purple box. Now let me erase it little bit and just let me redraw it and let me just say here the difference will depend on this area and this area, if this area is more than this area what will happen decrease in revenue ok. Here because we have increased Q this firm is able to sell you know able to earn more at the new price, but at the same time firm is losing revenue from each of the good and that is captured by this term, fine.

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$$\epsilon = -\frac{dQ}{dP} \frac{P}{Q}$$

$$= \frac{P}{Q} + \frac{Q}{P} \frac{dP}{dQ}$$

$$= P \left[ 1 + \frac{Q}{P} \frac{dP}{dQ} \right]$$

$$= P \left[ 1 - \frac{1}{\epsilon} \right]$$

$\Rightarrow \epsilon > 1 \Rightarrow$   
 $\epsilon < 1 \Rightarrow$   
 $\epsilon = 1 \Rightarrow \text{No change}$

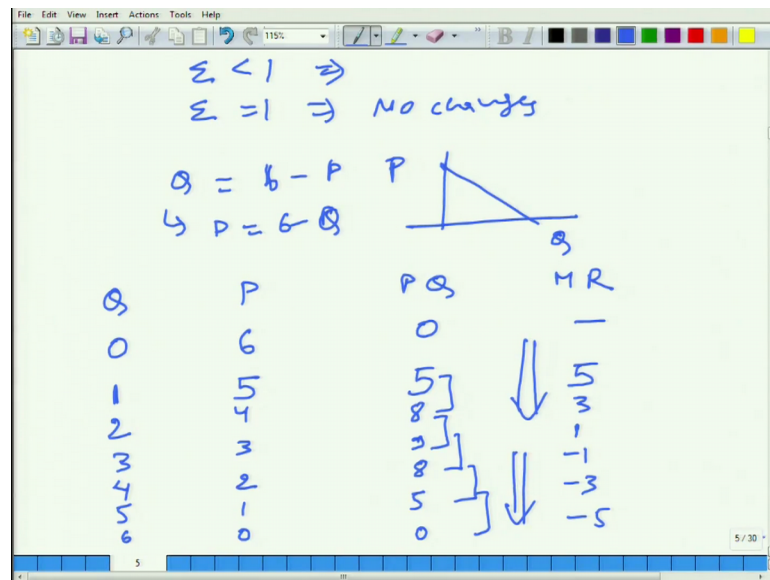
We can rewrite it; we can rewrite it, we can take P out; what will we get 1 plus Q by P d P by d Q. Does this look familiar? It is inverse of elasticity, it is inverse of elasticity is not it; it is nothing, but P of 1 minus 1 by epsilon. If we say epsilon, where epsilon is nothing, but the elasticity price elasticity of demand and that is defined as oh sorry if I put a minus sign here if this is the, I think this is the definition we have used in our discussion.

So, if you are using because if you are using plus sign then here it will be plus fine. So, now you can look at it we have already talked about it if price elasticity of demand is elastic. What does it mean that epsilon is greater than 1 in this case, greater than 1, then what happens that if demand is elastic then total revenue decreases with increasing Q.

Student: Q.

When epsilon is less than 1 then it would increase is it clear and when it is epsilon is equal to 1 no changes fine ok.

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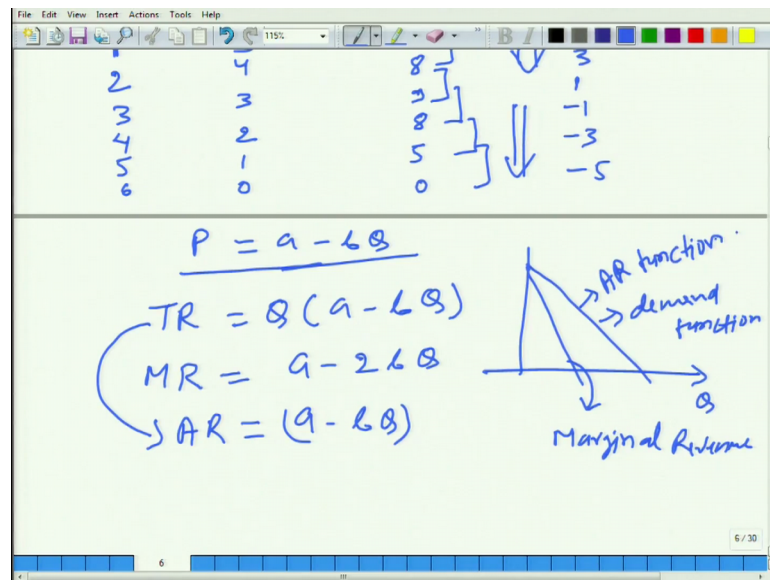
We can do it, we can look at it without using calculus also just for example, if you do not want to use calculus let us take a downward sloping demand curve that is just for example, that is 6 minus P. How would it look like? This is P, this is Q.

Let us see; what happens to the total revenue, how can we get the total revenue Q, P, PQ, and here we can write the marginal revenue. Let us say if Q is 0, P would be equal to 6 and then total revenue is going to equal to 0 marginal revenue, we cannot calculate. Let us say Q is equal to 1, P would be 5, and P Q because you know here we can rewrite it in the inverse demand function form this is going to be 6 minus Q. When we have 1 unit of output then price this form can set is 5, total revenue is going to be 5, marginal revenue is going to be equal to 5.

The key here is this firm cannot set price and quantity both together at best this firm can set one of these two. Similarly, we can do it till 6 and here we will get 4, 3, 2, 1, 0 and what we will get 8, 9, 8, 5, 0. Here marginal revenue is going to be equal to 3, in this case it is going to be equal to 1, in this case it is decreasing is not it minus 1, and here minus 3 and here minus 5.

So, you see in this zone in this zone marginal revenue is positive and increasing, but in this zone marginal revenue becomes negative and it starts decreasing, fine.

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Further we can say that we can derive the formula if we take let us say P is equal to a minus b Q, this is again a linear demand function although I am expressing it as inverse demand function P as a function of Q. What's going to be the total revenue Q multiplied by a minus b Q and then what would be the marginal revenue?

Student: A minus 2 b Q.

A minus 2 b Q; so, if we plot it this is the way it is going to look like, this is the demand function. Here we have Q and this is marginal revenue function, but you should also pay attention, let us look at this at expression TR is equal to Q multiplied by a minus b Q.

If we calculate average revenue what would be the average revenue a minus b Q which is same as the demand function. So, this is also AR function; is it clear?