Laws of Returns

Production is the result of application of various input factors. In the process of production, the farmers combine the required input factors in various proportions. This type of usage of inputs by the farmers gives way for the operation of the laws of returns. In the production process, when a single input factor is varied keeping other required factors constant, the relationship that takes place between single variable input and the consequent output pertains to either one or a combination of the following relationships.

1. Law of increasing returns
2. Law of constant returns; and
3. Law of decreasing returns

LAW OF INCREASING RETURNS

The addition of each successive unit of the variable factor to the fixed factors in the production processes, adds more to the total output than the previous unit i.e., each successive unit of variable factor adds more and more to the total output. The relevant data are presented in Table 17.1.

TABLE 17.1 Law of Increasing Returns.

Fertilizer (kg) (X)	Total output (Q) (Y)	ΔX	ΔY	Marginal output $\frac{\Delta Y}{\Delta X}$
1	3			
		1	5	5
2	8			
		1	7	7
3	15			
		1	8	8
4	23			
		1	12	12
5	35			

It is clear from the table that first unit of fertilizer results in three quintals output, second unit adds five quintals and so on. When the data is graphed the resultant curve is convex to X-axis (Figure 17.1).

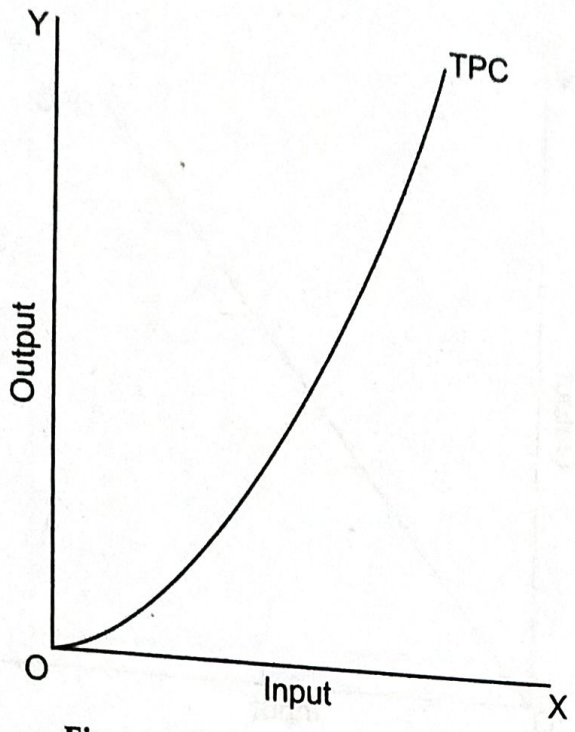

Figure 17.1 Increasing returns.

The relationship is algebraically shown below:

$$\frac{\Delta_1 Y_1}{\Delta_1 X_1} < \frac{\Delta_2 Y_2}{\Delta_2 X_2} < \ldots\ldots < \frac{\Delta_n Y_n}{\Delta_n X_n}$$

LAW OF CONSTANT RETURNS

The addition of each successive unit of the variable factor to the fixed factors adds the same to the output as observed for the previous unit i.e., each successive unit of variable factor results in an equal quantity of additional output. It is clear from Table 17.2 that each additional unit of fertilizer adds five quintals to the total output.

TABLE 17.2 Law of Constant Returns.

Fertilizer (kg) (X)	Total output (Q) (Y)	ΔX	ΔY	Marginal output $\frac{\Delta Y}{\Delta X}$
1	5			
		1	5	5
2	10			
		1	5	5
3	15			
		1	5	5
4	20			
		1	5	5
5	25			

The production function is linear (straight line) (Figure 17.2).
The algebraic form is as follows:

$$\frac{\Delta_1 Y_1}{\Delta_1 X_1} = \frac{\Delta_2 Y_2}{\Delta_2 X_2} = \ldots\ldots = \frac{\Delta_n Y_n}{\Delta_n X_n}$$

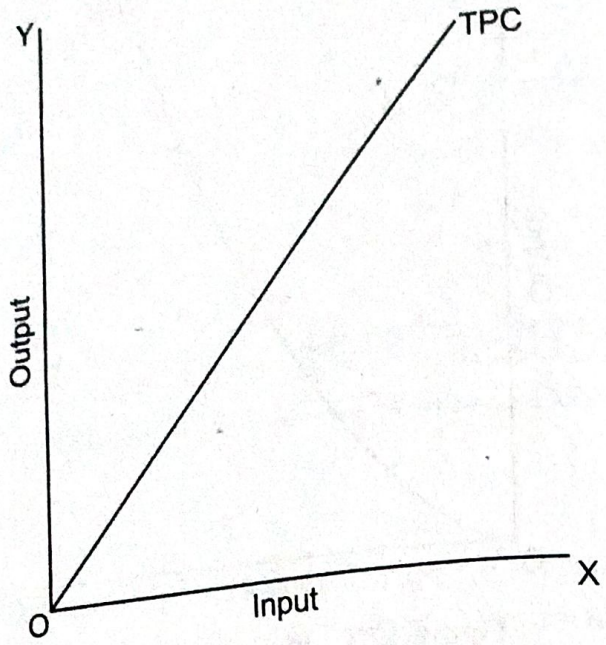

Figure 17.2 Constant returns.

LAW OF DECREASING RETURNS

The addition of each successive unit of the variable factor to the fixed factors in the production process, adds less to the total output than the previous unit i.e., each successive unit of variable factor adds less and less to the total output. It is evident from the table that the first unit gives 15 units, second adds 12 units, third unit adds 8 units and so on as shown in Table 17.3.

TABLE 17.3 Law of Decreasing Returns.

Fertilizer (kg) (X)	Total output (Q) (Y)	ΔX	ΔY	Marginal output $\frac{\Delta Y}{\Delta X}$
1	15			
		1	12	12
2	27			
		1	8	8
3	35			
		1	6	6
4	41			
		1	4	4
5	45			

The production function is concave to X-axis as shown in Figure 17.3. This relationship is algebraically shown as follows:

$$\frac{\Delta_1 Y_1}{\Delta_1 X_1} > \frac{\Delta_2 Y_2}{\Delta_2 X_2} > \ldots\ldots > \frac{\Delta_n Y_n}{\Delta_n X_n}$$

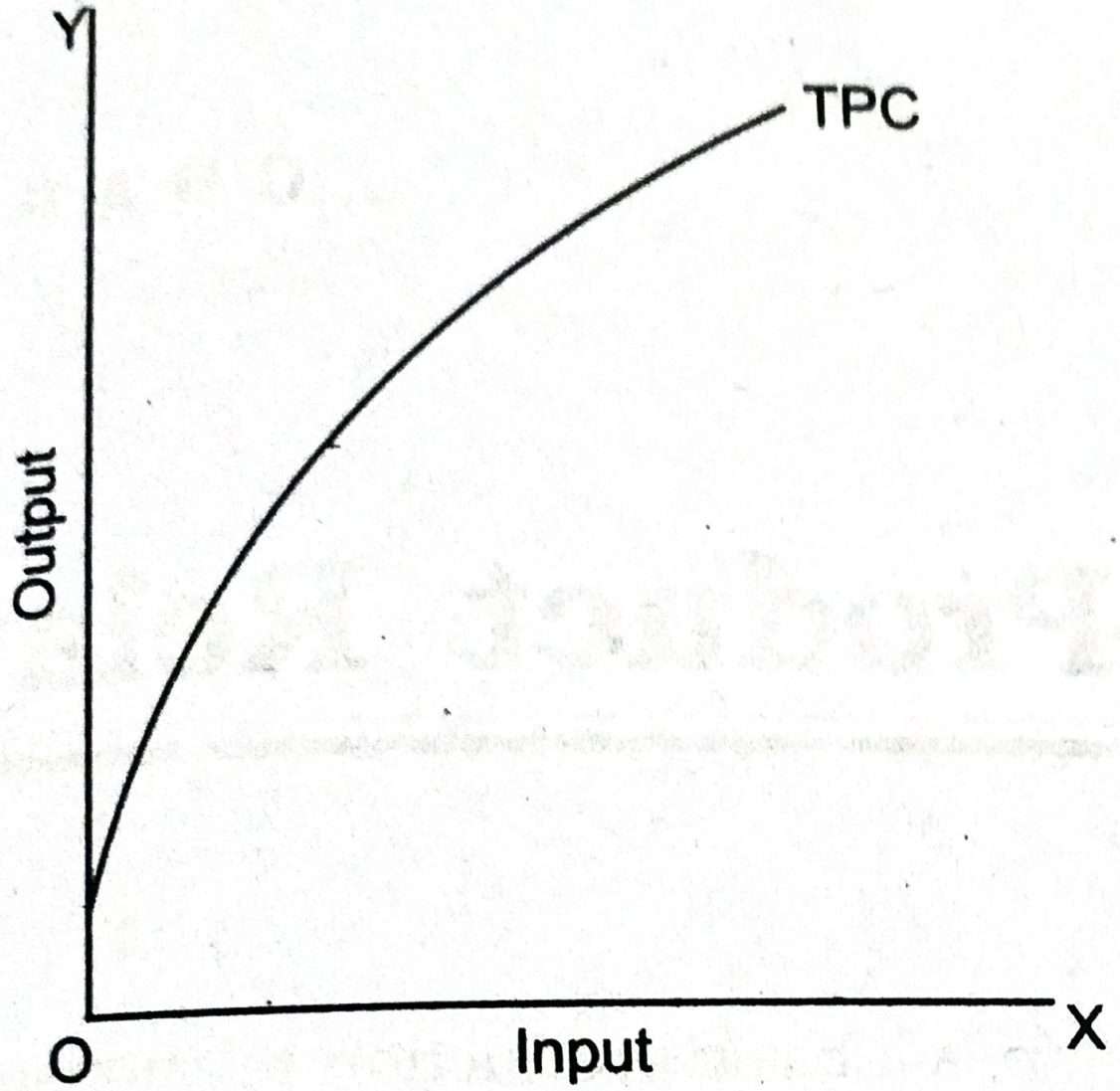

Figure 17.3 Decreasing returns.