

# CLASS - XI

# ECONOMICS

# LESSON - 4



# Cost and Revenue Analysis

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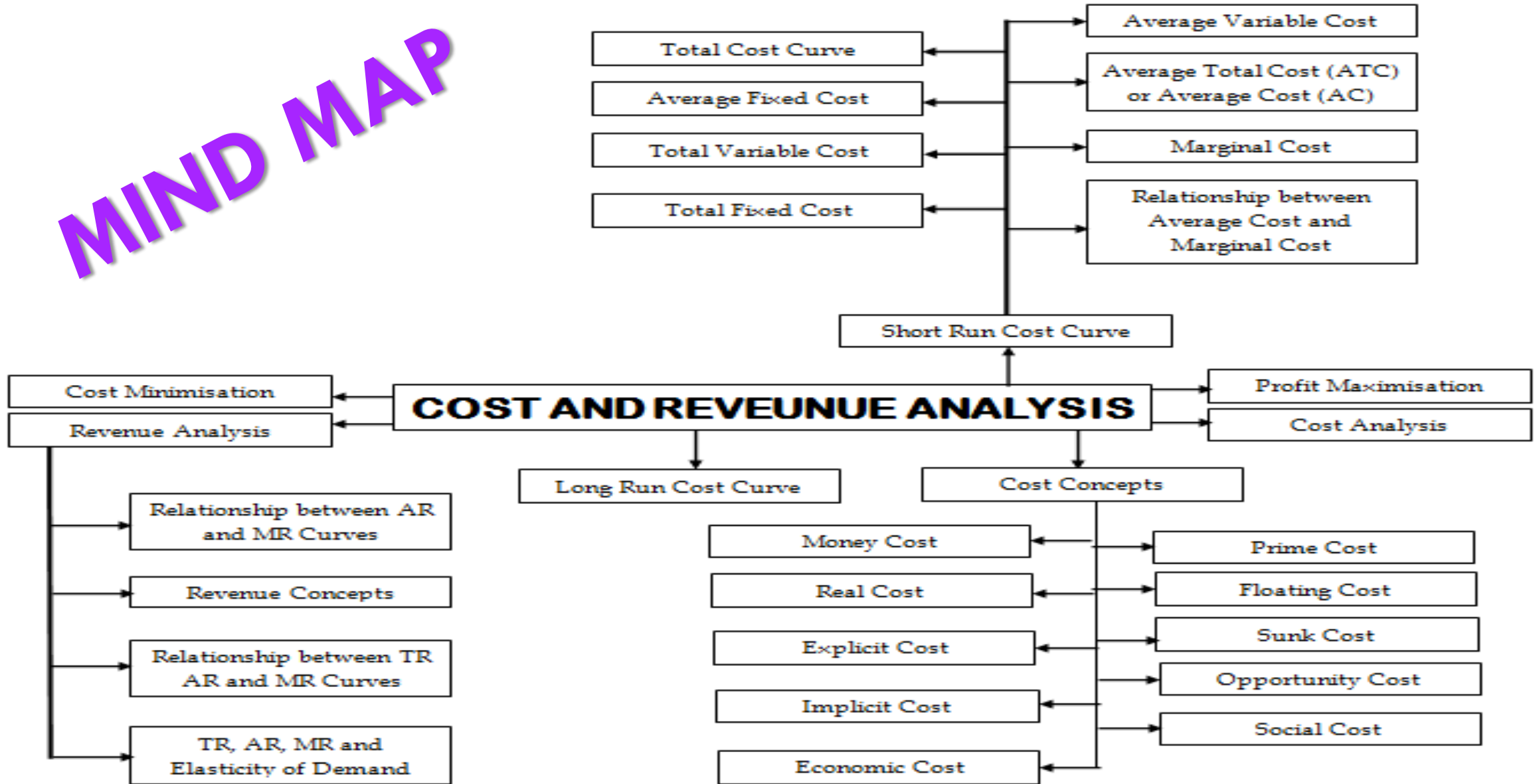
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# MIND MAP





# The big hurdle is going out and raising the revenue ”

*–Tyler Cowen*

## Learning Objectives

1. To identify the cost involved in the production of any commodity or service and to present the ways in which it is utilized, combining with revenue in the calculation of profit of the firm; and
- 2 To point out how revenue is realized at the sale of the goods and services produced at the various types of market.

## 4.1. Introduction :

- ❖ Cost and revenue analysis refers to examining the cost of production and sales revenue of a production unit or firm under various conditions.
- ❖ The objective of a firm is to earn profit, and not to make loss.
- ❖ However, a firm's profit or loss is primarily determined by its costs and revenue.
- ❖ In simple terms, profit / loss is defined as the difference between the total revenue and the total cost i.e., Profit (or) Loss = Total Revenue - Total Cost.
- ❖ As costs and revenue are very important to decide the production behaviour of a firm and its supply behaviour in the market, it is necessary to understand the cost and revenue concepts .

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## 4.2 Cost Analysis

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- Cost refers to the total expenses incurred in the production of a commodity.
- Cost analysis refers to the study of behaviour of cost in relation to one or more production criteria, namely size of output, scale of production, prices of factors and other economic variables.
- The functional relationship between cost and output is expressed as 'Cost Function'.
- A **Cost Function** may be written as
  - **$C = f(Q)$**
  - Eg.  $TC = Q^3 - 18Q^2 + 91Q + 12$

where,

- $C$ =Cost and  $Q$ =Quantity of output.
- Cost functions are derived functions because they are derived from Production Functions.
- We shall discuss the basic cost concepts and their behaviour below.

# 4.3. COST CONCEPTS

- 4.3.1 Money Cost
- 4.3.2 Real Cost
- 4.3.3 Explicit Cost
- 4.3.4 Implicit Cost
- 4.3.5 Economic Cost
- 4.3.6 Social Cost
- 4.3.7 Opportunity Cost
- 4.3.8 Sunk Cost
- 4.3.9 Floating Cost
- 4.3.10 Prime Cost
- 4.3.11 Fixed Cost
- 4.3.12 Variable Cost



## 4.3.1 Money Cost

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- ❑ Production cost expressed in money terms is called as money cost.
- ❑ In other words, it is the total money expenses incurred by a firm in producing a commodity.
- ❑ Money cost includes the expenditures such as cost of raw materials, payment of wages and salaries, payment of rent, interest on capital, expenses on fuel and power, expenses on transportation and other types of production related costs.
- ❑ These costs are considered as out of pocket expenses.
- ❑ Money costs are also called as Prime Cost or Direct Cost or Nominal Cost or Accounting Cost or Explicit Cost or Out of Pocket Cost, suiting to context.



## 4.3.2 Real Cost

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- ❑ Real cost refers to the payment made to compensate the efforts and sacrifices of all factor owners for their services in production.
- ❑ It includes the efforts and sacrifices of landlords in the use of land, capitalists to save and invest, and workers in foregoing leisure.
- ❑ Adam Smith regarded pains and sacrifices of labour as real cost of production.

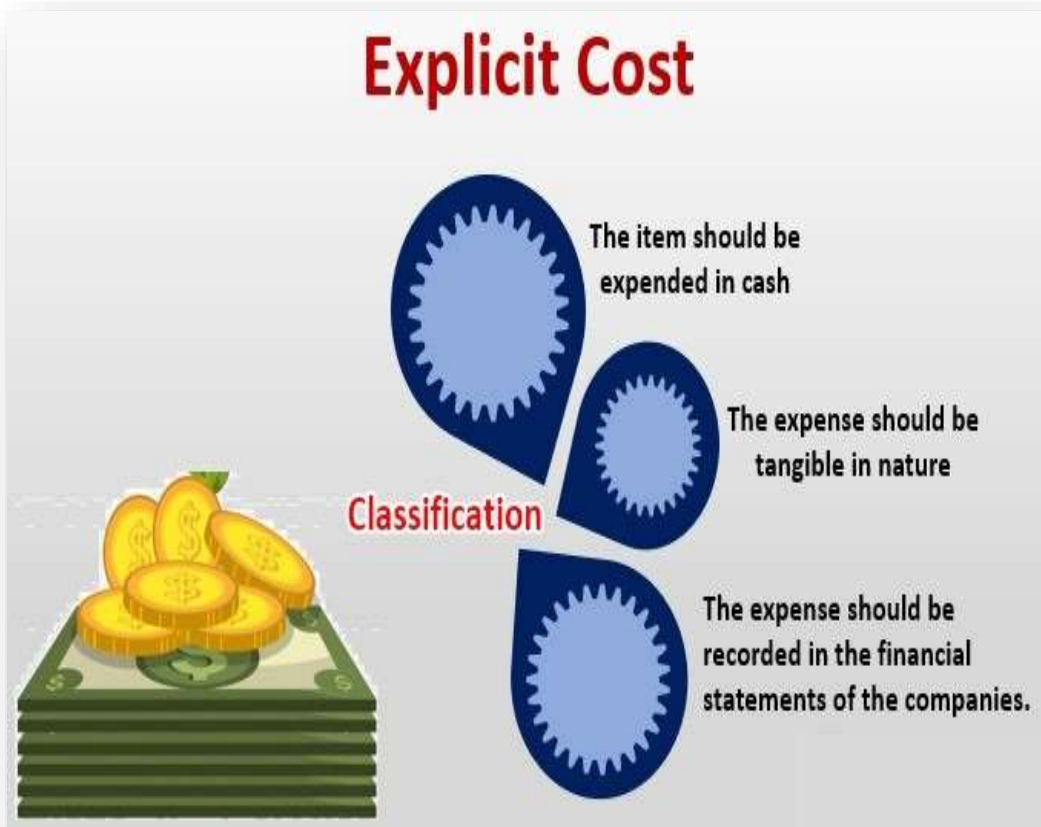


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## 4.3.3 Explicit Cost (Paid out cost)

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- Payment made to others for the purchase of factors of production is known as Explicit costs. It refers to the actual expenditures of the firm to purchase or hire the inputs the firm needs.
- Explicit cost includes,
  - i) wages,
  - ii) payment for raw material,
  - iii) rent for the building,
  - iv) interest for capital invested,
  - v) expenditure on transport and advertisement
  - vi) other expenses like license fee, depreciation and insurance charges, etc.
- It is also called Accounting Cost or Out of Pocket Cost or Money Cost.



## 4.3.4 Implicit Cost

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- ❑ Payment made to the use of resources that the firm already owns, is known as Implicit Cost.
- ❑ In simple terms, Implicit Cost refers to the imputed cost of a firm's self-owned and self-employed resources.
- ❑ A firm or producer may use his own land, building, machinery, car and other factors in the process of production.
- ❑ These costs are not recorded under normal accounting practices as no cash payment takes place.
- ❑ However, the value of the own services are imputed and considered for preparing the profit and loss accounts.
- ❑ Implicit Cost is also called as Imputed Cost or Book Cost.

# Implicit Cost

**An income a company foregoes when it chooses to do or not to do something.**

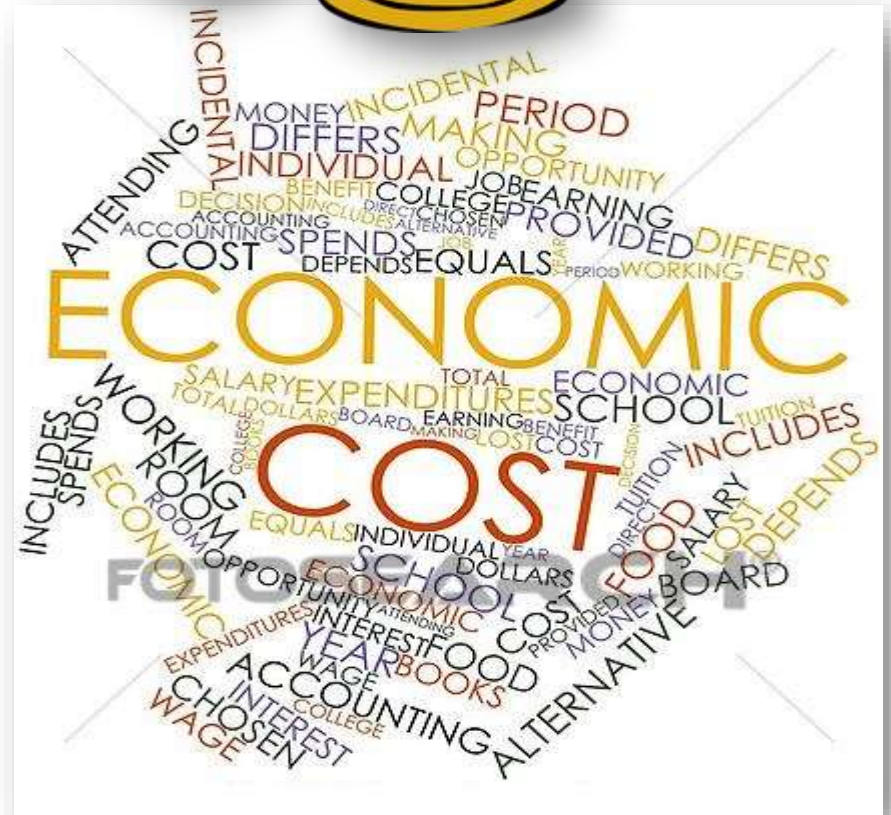




## 4.3.5 Economic Cost

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- ❑ It refers to all payments made to the resources owned and purchased or hired by the firm in order to ensure their regular supply to the process of production.
- ❑ It is the summation of explicit and implicit costs.
- ❑ Economic Cost is relevant to calculate the normal profit and thereby the economic profit of a firm.
- ❑  $\text{Economic Cost} = \text{Implicit Cost} + \text{Explicit Cost}$





## 4.3.6 Social Cost

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- ❑ It refers to the total cost borne by the society due to the production of a commodity.
- ❑ Alfred Marshall defined the term social cost to represent the efforts and sacrifices undergone by the various members of the society in producing a commodity.
- ❑ Social Cost is the cost that is not borne by the firm, but incurred by others in the society.
- ❑ For example, large business firms cause air pollution, water pollution and other damages in a particular area which involve cost to the society.
- ❑ These costs are treated as social cost.
- ❑ It is also called as External Cost.



## 4.3.7 Opportunity Cost

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- ❑ It refers to the cost of next best alternative use. In other words, it is the value of the next best alternative foregone.
- ❑ For example, a farmer can cultivate both paddy and sugarcane in a farm land.
- ❑ If he cultivates paddy, the opportunity cost of paddy output is the amount of sugarcane output given up.
- ❑ Opportunity Cost is also called as 'Alternative Cost' or 'Transfer Cost'.

**Opportunity cost**

**Defination** The next best alternative that is forgone is called opportunity cost or alternative cost.

Or

the next best alternative is forgone when any choice is made.

**Example 1**



The illustration shows a cartoon character with blonde hair, wearing a grey jacket and red pants, standing on a pink circular shadow. He has a thoughtful expression with his hand on his chin. To his left is a pink piggy bank with several gold coins scattered around its base. Two black arrows point from the character towards two options: a burger labeled with a red '1' and a pizza labeled with a red '2'.

## 4.3.8 Sunk Cost

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- ❑ A cost incurred in the past and cannot be recovered in future is called as Sunk Cost.
- ❑ This is historical but irrelevant for future business decisions.
- ❑ It is called as sunk because, they are unalterable, unrecoverable, and if once invested it should be treated as drowned or disappeared.
- ❑ For example, if a firm purchases a specialized equipment designed for a special plant, the expenditure on this equipment is a sunk cost, because it has no alternative use and its opportunity Cost is zero.
- ❑ Sunk cost is also called as 'Retrospective Cost'.

# Sunk Costs

Costs that have already been incurred by past actions  
They cannot be recovered  
They are not relevant to future decisions

## Examples

\$400 spent last year to replace a water pump

\$2 million spent five years ago on a new manufacturing plant

\$1m million spent on Research and Development two years ago



***When what is done cannot be undone***



## 4.3.9 Floating Cost

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- ❑ It refers to all expenses that are directly associated with business activities but not with asset creation.
- ❑ It does not include the purchase of raw material as it is part of current assets.
- ❑ It includes payments like wages to workers, transportation charges, fee for power and administration.
- ❑ Floating cost is necessary to run the day-to-day business of a firm.



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## 4.3.10 Prime Cost

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- All costs that vary with output, together with the cost of administration are known as Prime Cost.

In short,

- Prime cost = Variable costs + Costs of Administration.



Prime Cost Formula = Raw Material Cost + Direct Labor Cost





## 4.3.11 Fixed Cost

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- ❑ Fixed Cost does not change with the change in the quantity of output. In other words, expenses on fixed factors remain unchanged irrespective of the level of output, whether the output is increased or decreased or even it becomes zero.
- ❑ For example, rent of the factory, watchman's wages, permanent worker's salary, payments for minimum equipments and machines insurance premium, deposit for power, license fee, etc fixed cost is also called as 'Supplementary Cost' or 'Overhead Cost'.

### Examples of fixed costs

- Rent & rates
- Salaries
- Advertising
- Insurance, banking & legal fees
- Software
- Consultant and adviser costs
- Design and development



# FIXED COST

Fixed cost is expense that does not change very frequently and is recurring.  
For Example : Company paying fixed rent every month is a fixed cost for that company

## IMPORTANT POINTS

- A high level of fixed cost usually requires an entity to maintain a higher level of revenue.
- A point to note is that the concept for fixed costs is for short-run only. In the long-term, all costs will tend to vary
- The fixed cost would also increase or decline if a company goes for restructuring.

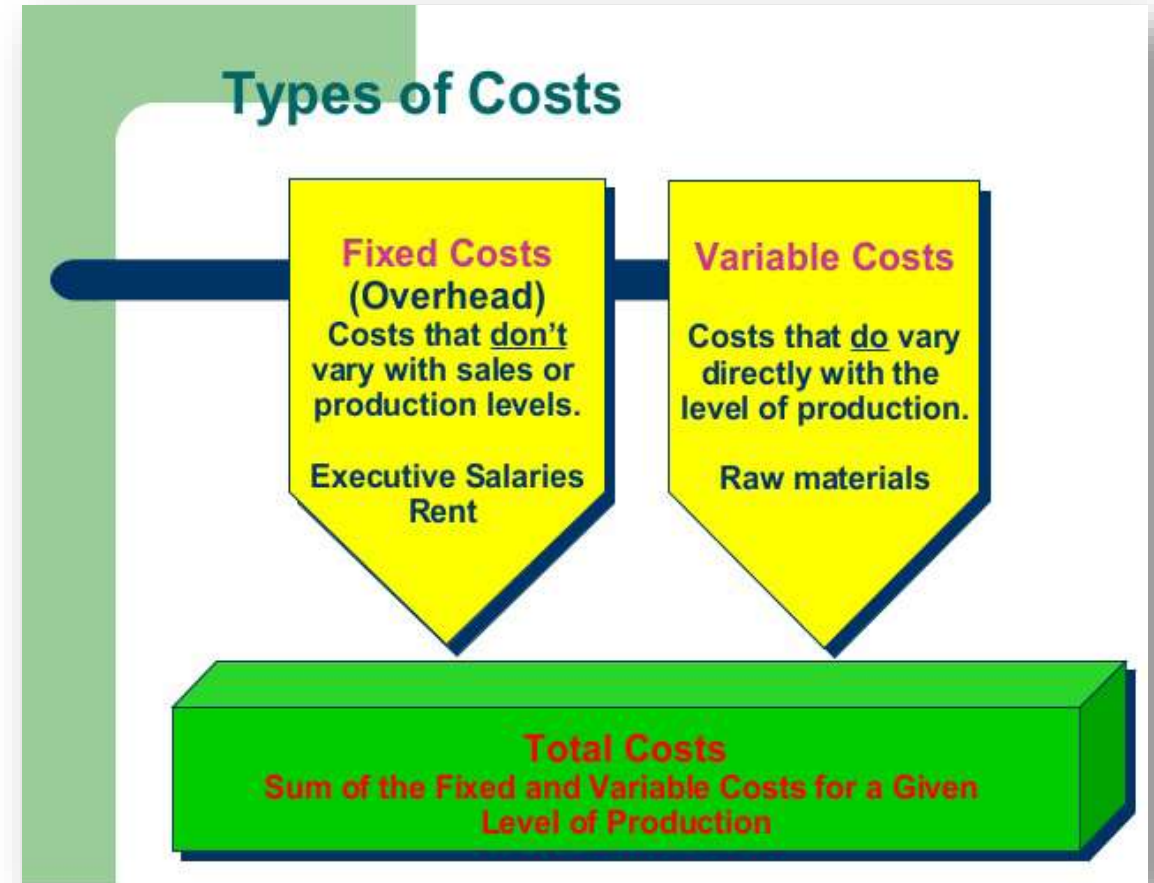
## IMPORTANCE

- ✓ A firm with massive fixed cost will see a drastic fall in the profit margin in case the sales fall.
- ✓ It can result in economies of scale
- ✓ It helps in calculation of Cost of Goods Manufactured, which in turn help in cost of product.
- ✓ It helps to take a decision on number of product sold in comparison to cost that incurred on fixed equipment.

## 4.3.12 Variable Cost

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- ❑ These costs vary with the level of output.
- ❑ Examples of variable costs are: wages of temporary workers, cost of raw materials, fuel cost, electricity charges, etc.
- ❑ Variable cost is also called as Prime Cost, Special Cost, or Direct Cost.



# 4.4 Short run Cost Curves

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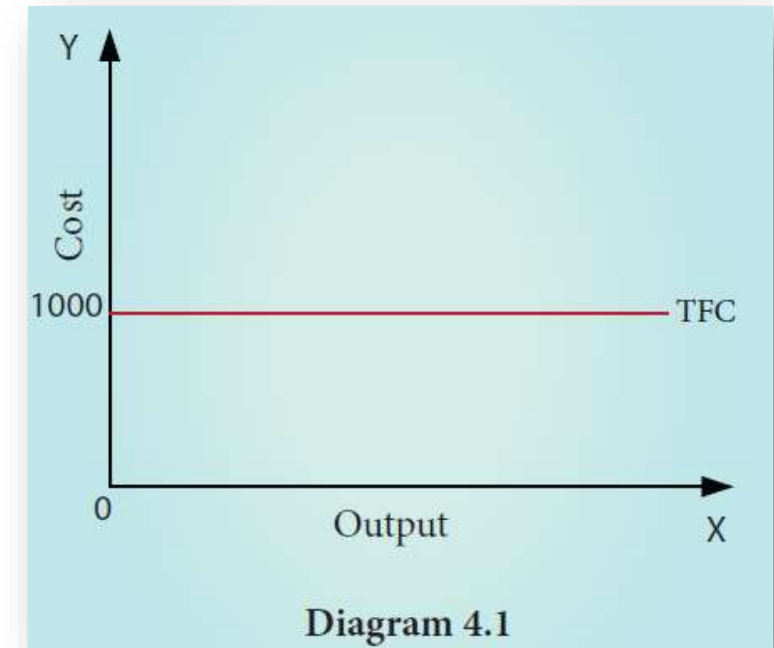
- 4.4.1 Short run Cost Curves**
- 4.4.2 Total Variable Cost (TVC)**
- 4.4.3 Total Cost Curves**
- 4.4.4 Average Fixed Cost (AFC)**
- 4.4.5 Average Variable Cost (AVC)**
- 4.4.6 Average Total Cost (ATC) or Average Cost (AC)**
- 4.4.7 Marginal Cost (MC)**
- 4.4.8 The relationship between Average Cost and Marginal cost**

## 4.4.1 Total Fixed Cost (TFC)

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- ❑ All payments for the fixed factors of production are known as Total Fixed Cost. A hypothetical TFC is shown in table 4.1 and diagram 4.1
- ❑ For instance if  $TC = Q^3 - 18Q^2 + 91Q + 12$ , the fixed cost here is 12.
- ❑ That means, if  $Q$  is zero, the Total cost will be 12, hence fixed cost.
- ❑ It could be observed that TFC does not change with output.
- ❑ Even when the output is zero, the fixed cost is ₹.1000.
- ❑ TFC is a horizontal straight line, parallel to  $X$  axis.

Output (in unit)	Total fixed Cost (In ₹)
0	1000
1	1000
2	1000
3	1000
4	1000
5	1000



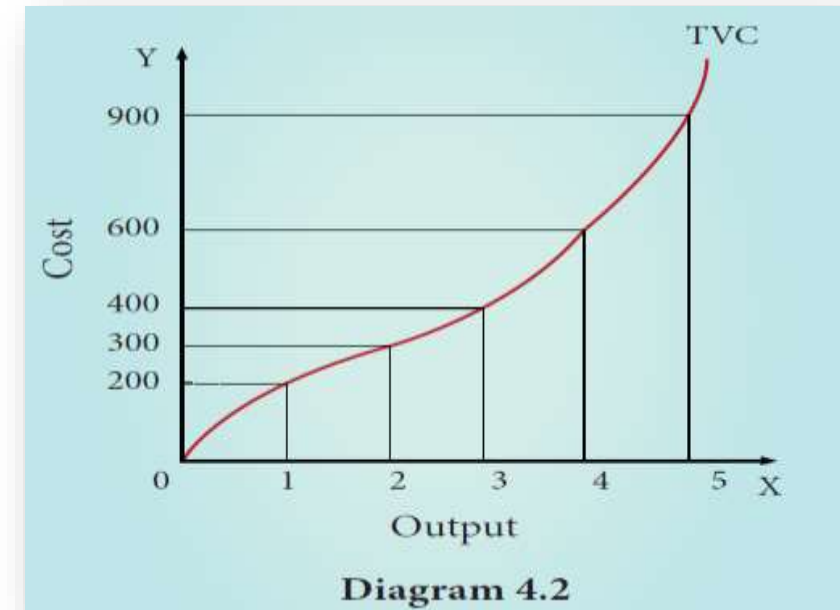


## 4.4.2 Total Variable Cost (TVC)

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- ❑ All payments to the variable factors of production is called as Total Variable Cost.
- ❑ Hypothetical TVC is shown in table-4.2 and Diagram 4.2
- ❑ In the diagram the TVC is zero when nothing is produced.
- ❑ As output increases TVC also increases.
- ❑ TVC curve slopes upward from left to right.
- ❑ For instance in  $TC = Q^3 - 18Q^2 + 91Q + 12$ , variable cost,  $TVC = Q^3 - 18Q^2 + 91Q$

Output (in unit)	Total Variable Cost (In ₹)
0	0
1	200
2	300
3	400
4	600
5	900



## 4.4.3 Total Cost Curves

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- Total Cost means the sum total of all payments made in the production.
- It is also called as Total Cost of Production.
- **Total cost is the summation of Total Fixed Cost (TFC) and Total Variable Cost (TVC).**
- **It is written symbolically as**
  - $TC = TFC + TVC$ .

For example,

- when the total fixed cost is ₹ 1000 and the total variable cost is ₹ 200 then the Total cost is = ₹ 1200 (₹ 1000 + ₹ 200).
- If  $TFC = 12$  and
- $TVC = Q^3 - 18Q^2 + 91Q$
- $TC = 12 + Q^3 - 18Q^2 + 91Q$

**Table 4.3 Total Cost Curves**

Output (in unit)	Total Fixed Cost (TFC) (in ₹)	Total Variable Cost (TVC) (in ₹)	Total Cost TFC+TVC (In ₹)
0	1000	0	1000
1	1000	200	1200
2	1000	300	1300
3	1000	400	1400
4	1000	600	1600
5	1000	900	1900

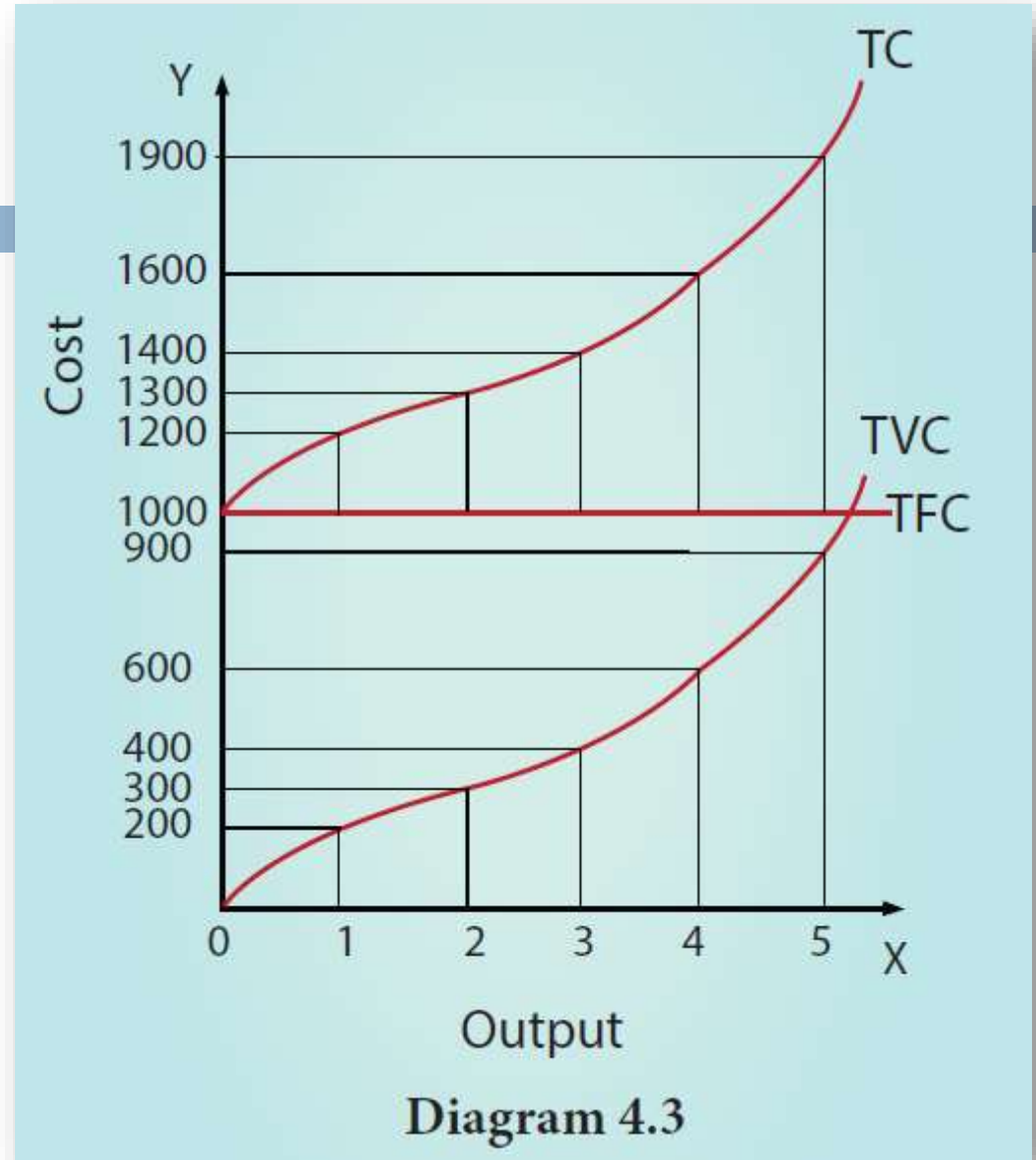
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It is to be noted that

- The TC curve is obtained by adding TFC and TVC curves vertically.
- TFC curve remains parallel to x axis, indicating a straight line.
- TVC starts from the origin and moves upwards, as no variable cost is incurred at zero output.
- When TFC and TVC are added, TC starts from TFC and moves upwards.
- TC curve lies above the TFC curve
- TVC and TC curves are the same shapes but beginning point is different.



## 4.4.4 Average Fixed Cost (AFC)

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- ❑ It refers to the fixed cost per unit of output.
- ❑ It is obtained by dividing the total fixed cost by the quantity of output.
- ❑  $AFC = TFC / Q$  where, AFC denotes average fixed cost, TFC denotes total fixed cost and Q denotes quantity of output.
- ❑ For example, if TFC is 1000 and the quantity of output is 10, the AFC is ₹ 100, obtained by dividing ₹ 1000 by 10. AFC is shown in table 4.4 and diagram 4.4.

**Table 4.4 Average Fixed Cost**

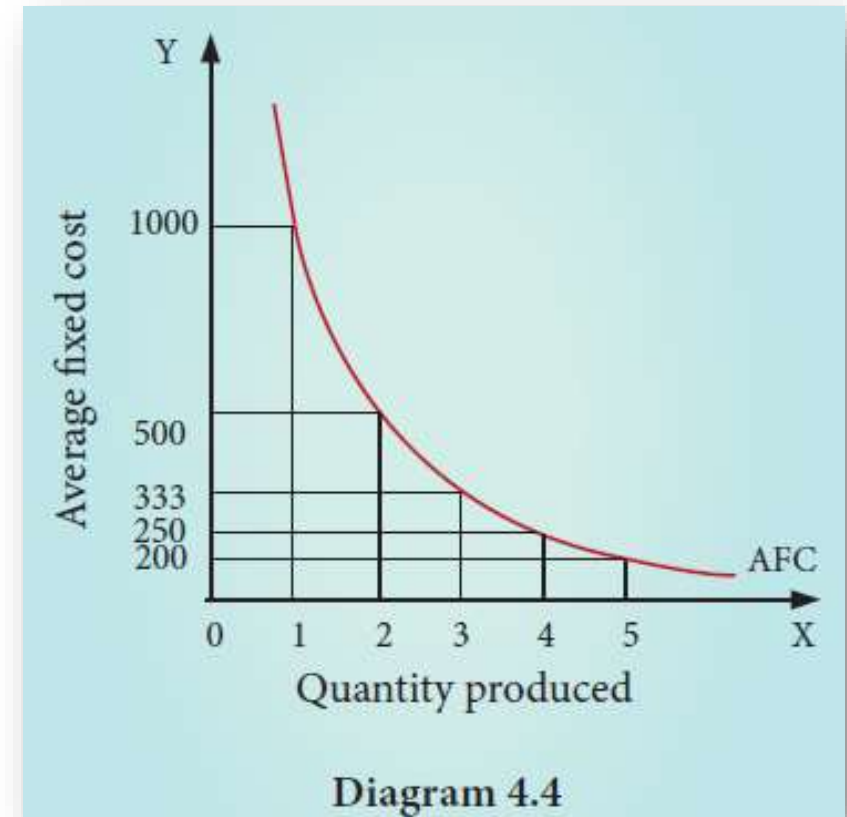
Q (in unit)	Total Fixed Cost (TFC) (in ₹)	AFC = Total Fixed Cost / Q (in ₹)
0	1000	$1000/0 = \infty$
1	1000	$1000/1 = 1000$
2	1000	$1000/2 = 500$
3	1000	$1000/3 = 333$
4	1000	$1000/4 = 250$
5	1000	$1000/5 = 200$

# Continue...

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It is to be noted that

- a) AFC declines as output increases, as fixed cost remains constant
- b) AFC curve is a downward sloping throughout its length, never touching X and Y axis. It is asymptotic to both the axes.
- c) The shape of the AFC curve is a rectangular hyperbola.





## 4.4.5 Average Variable Cost (AVC)

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- ❑ It refers to the total variable cost per unit of output.
- ❑ It is obtained by dividing total variable cost (TVC) by the quantity of output (Q).
- ❑  **$AVC = TVC / Q$  where, AVC denotes Average Variable cost, TVC denotes total variable cost and Q denotes quantity of output.**
- ❑ **For example, When the TVC is ₹ 300 and the quantity produced is 2, the AVC is ₹ 150, ( $AVC = 300/2 = 150$ ) AVC is shown in table 4.5 and Diagram 4.5.**
- ❑ **If  $TVC = Q^3 - 18Q^2 + 91Q$**
- ❑  **$AVC = Q^2 - 18Q + 91$**

**Table 4.5 Average Variable Cost**

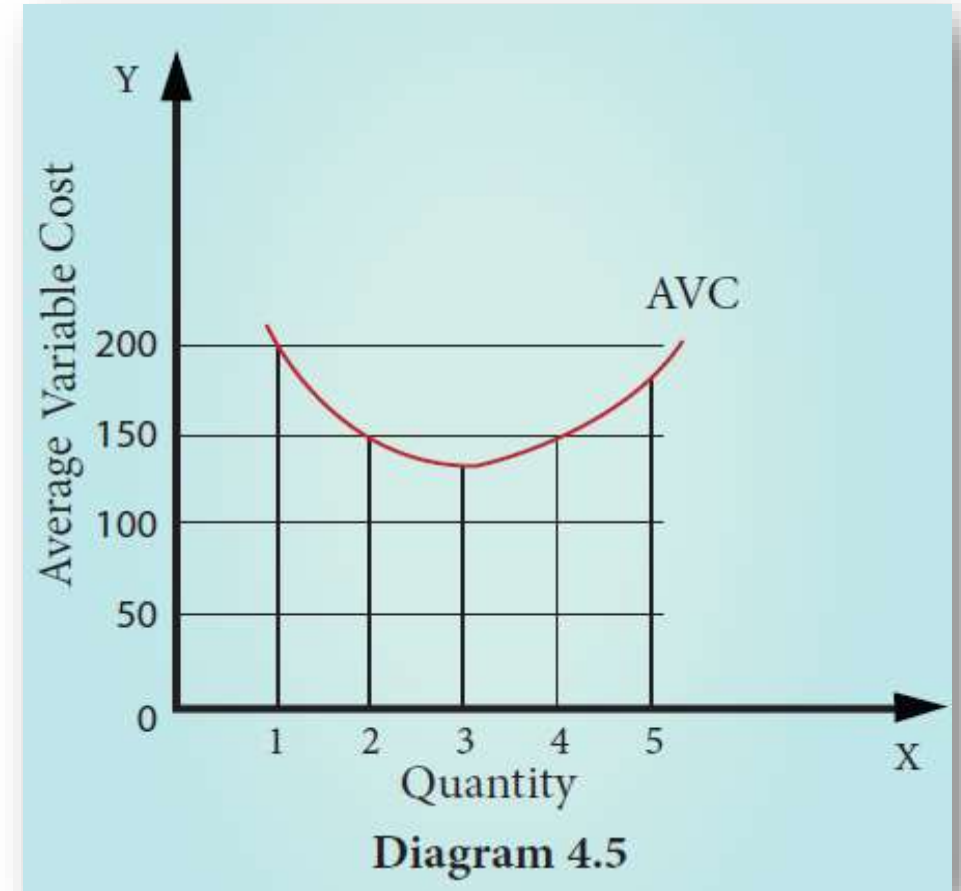
Q (in unit)	Total Variable Cost (TVC) (in ₹)	AVC = Total Variable Cost (TVC) / Q (in ₹)
0	0	$0/0 = 0$
1	200	$200/1 = 200$
2	300	$300/2 = 150$
3	400	$400/3 = 133$
4	600	$600/4 = 150$
5	900	$900/5 = 180$

# Continue...

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It is to be noted that

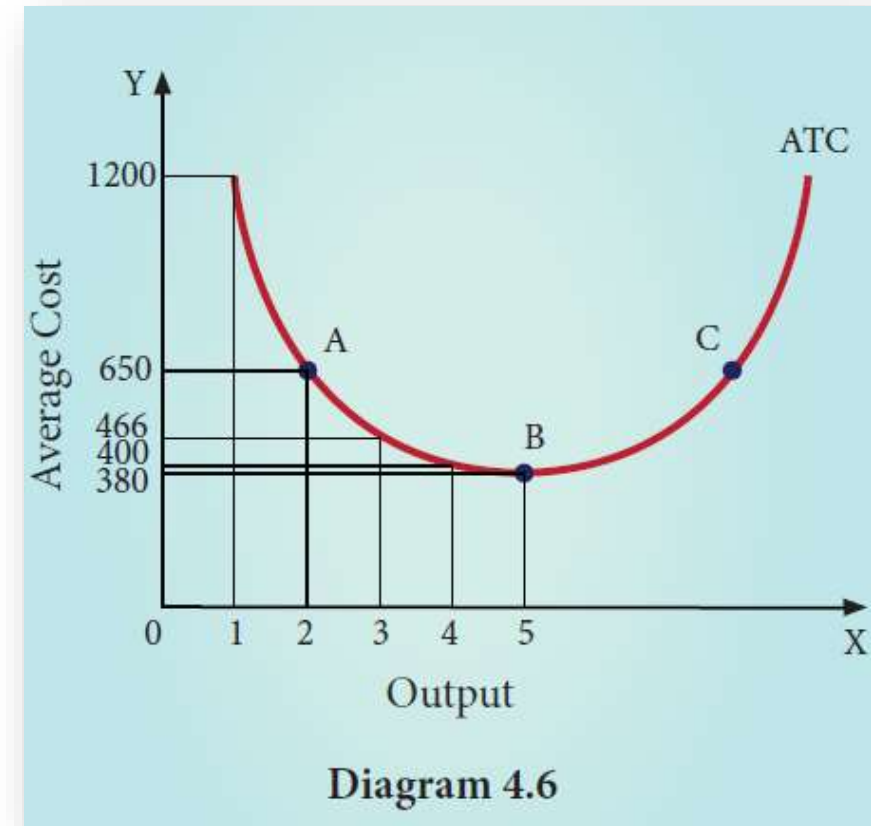
- a. **AVC declines initially and then increases with the increase of output.**
- b. **AVC declines up to a point and moves upwards steeply, due to the law of returns.**
- c. **AVC curve is a U-shaped curve.**



## 4.4.6 Average Total Cost (ATC) or Average Cost (AC)

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- ❑ It refers to the total cost per unit of output.
- ❑ It can be obtained in two ways.
- ❑ **1. By dividing the firm's total cost (TC) by the quantity of output (Q).**
  - ❖  $ATC = TC / Q$ .
  - ❖ For example, if TC is ₹ 1600 and quantity of output is  $Q=4$ , the Average Total Cost is ₹ 400.
  - ❖  $(ATC = 1600/4 = 400)$
  - ❖ If ATC is  $Q^3 - 18Q^2 + 91Q + 12$ , then  $AC = Q^2 - 18Q + 91 + 12/Q$
- ❑ **2. By ATC is derived by adding together Average Fixed Cost (AFC) and Average Variable Cost (AVC) at each level of output.**
  - ❖  $ATC = AFC + AVC$ .
  - ❖ For example, when  $Q= 2$ ,  $TFC = 1000$ ,  $TVC=300$ ;  $AFC=500$ ;  $AVC=150$ ;  $ATC=650$ . ATC or AC is shown in table 4.6 and Diagram 4.6



# Continue...

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It should be noted that

- ATC curve is also a 'U' shaped curve.**
- Initially the ATC declines, reaches a minimum when the plant is operated optimally, and rises beyond the optimum output.**
- The 'U' shape of the AC reflects the law of the variable proportions.**

Q (in Unit)	TFC (in ₹)	TVC (in ₹)	TC = TFC + TVC (in ₹)	ATC = TC/Q (in ₹)	AFC (in ₹)	AVC (in ₹)	ATC = AFC+AVC (in ₹)
0	1000	0	1000	$1000/0 =$	0	0	$0+0 = 0$
1	1000	200	1200	$1200/1=1200$	1000	200	$1000+200=1200$
2	1000	300	1300	$1300/2=650$	500	150	$500+150=650$
3	1000	400	1400	$1400/3=466$	333	133	$333+133=466$
4	1000	600	1600	$1600/4=400$	250	150	$250+150=400$
5	1000	900	1900	$1900/5=380$	200	180	$200+180=380$

## 4.4.7 Marginal Cost (MC)

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- ❑ It is the cost of the last single unit produced. It is defined as the change in total costs resulting from producing one extra unit of output.
- ❑ In other words, it is the addition made to the total cost by producing one extra unit of output.
- ❑ Marginal cost is important for deciding whether any additional output can be produced or not.
- ❑  $MC = \Delta TC / \Delta Q$  where MC denotes Marginal Cost,  $\Delta TC$  denotes change in total cost and  $\Delta Q$  denotes change in total quantity.
- ❑ For example, a firm produces 4 units of output and the Total cost is ₹ 1600. When the firm produces one more unit ( $4 + 1 = 5$  units) of output at the total cost of ₹ 1900, the marginal cost is ₹ 300.
- ❑  $MC = ₹ 1900 - ₹ 1600 = ₹ 300$ .
- ❑ The other method of estimating MC is :  $MC_n = TC_n - TC_{n-1}$

**Table 4.7 Marginal Cost**

Q (in unit)	Total Cost (TC) (in ₹)	Marginal Cost MC (in ₹)
0	1000	-
1	1200	$1200 - 1000 = 200$
2	1300	$1300 - 1200 = 100$
3	1400	$1400 - 1300 = 100$
4	1600	$1600 - 1400 = 200$
5	1900	$1900 - 1600 = 300$

# Continue...

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- where, 'MC' denotes Marginal Cost, 'TC<sub>n</sub>' denotes Total cost of 'n' th item, TC<sub>n-1</sub> denotes Total Cost of 'n-1'th item.

For example,

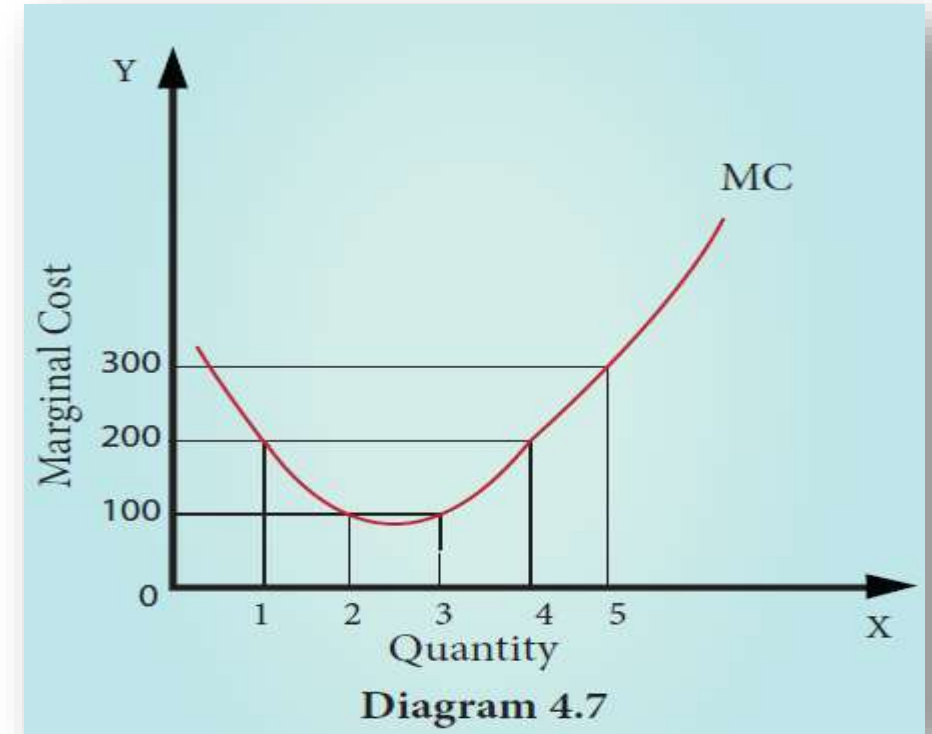
- when  $TC_4 = ₹.1600$ ,  $TC(4-1)=₹1400$  and then  $MC = ₹200$ , ( $MC=1600-1400$ )
- MC schedule is shown in Table 4.7 and MC Curve is shown in diagram 4.7.

It is to be noted that

- MC falls at first due to more efficient use of variable factors.**
- MC curve increases after the lowest point and it slopes upward.**
- MC curve is a U-shaped curve.**
- The slope of TC is MC.**

If

- $TC = Q^3 - 18Q^2 + 91Q + 12$
- $MC = 3Q^2 - 36Q + 91$ .



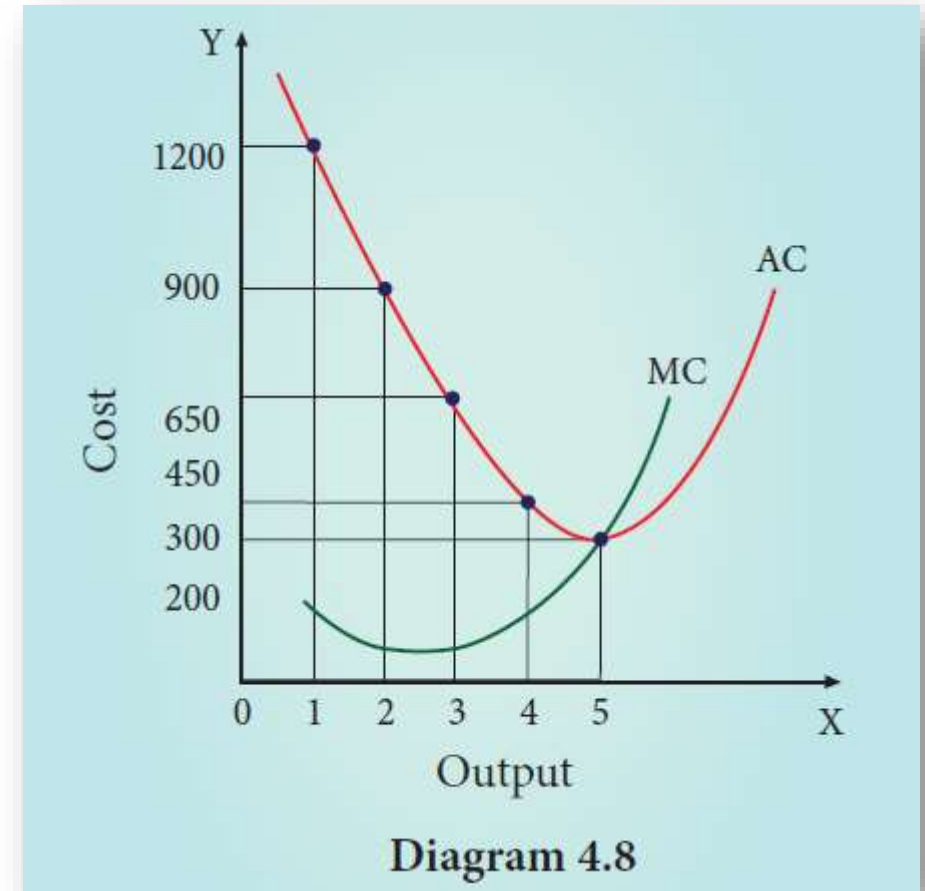


## 4.4.8 The relationship between Average Cost and Marginal cost

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There is a unique relationship between the AC and MC curves as shown in diagram 4.8.

- 1) When AC is falling, MC lies below AC.
- 2) When AC becomes constant, MC also becomes equal to it.
- 3) When AC starts increasing, MC lies above the AC.
- 4) MC curve always cuts AC at its minimum point from below.



# 4.5 Long Run Cost Curve

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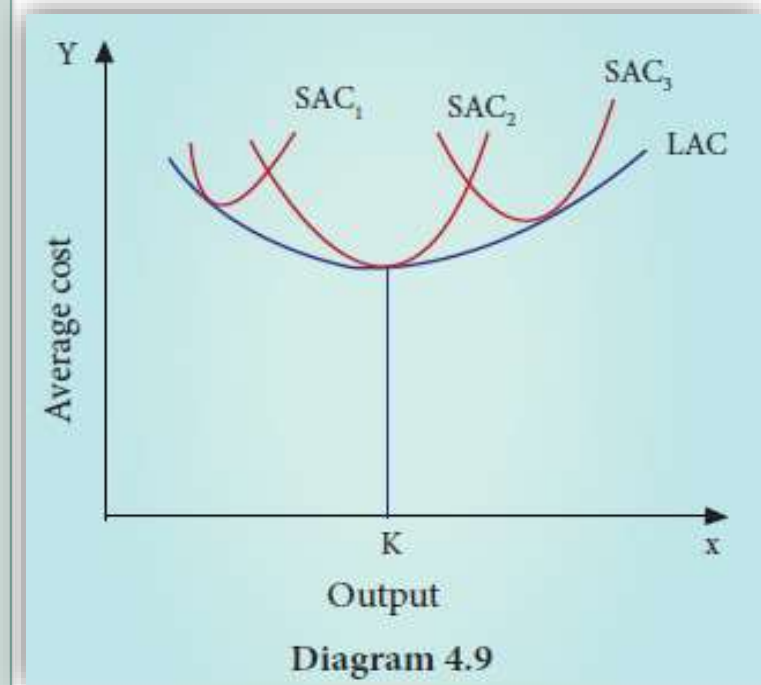
- ❑ In the long run all factors of production become variable.
- ❑ The existing size of the firm can be increased in the case of long run.
- ❑ There are neither fixed inputs nor fixed costs in the long run.
- ❑ Long run average cost (LAC) is equal to long run total costs divided by the level of output.

$$\text{LAC} = \text{LTC}/Q$$

where,

- ❑ LAC denotes Long-Run Average Cost,
- ❑ LTC denotes Long-run Total Cost and
- ❑ Q denotes the quantity of output.
- ❑ The LAC curve is derived from short-run average cost curves.
- ❑ It is the locus of points denoting the least cost curve of producing the corresponding output.
- ❑ The LAC curve is called as 'Plant Curve' or 'Boat shape Curve' or 'Planning Curve' or 'Envelop Curve'.

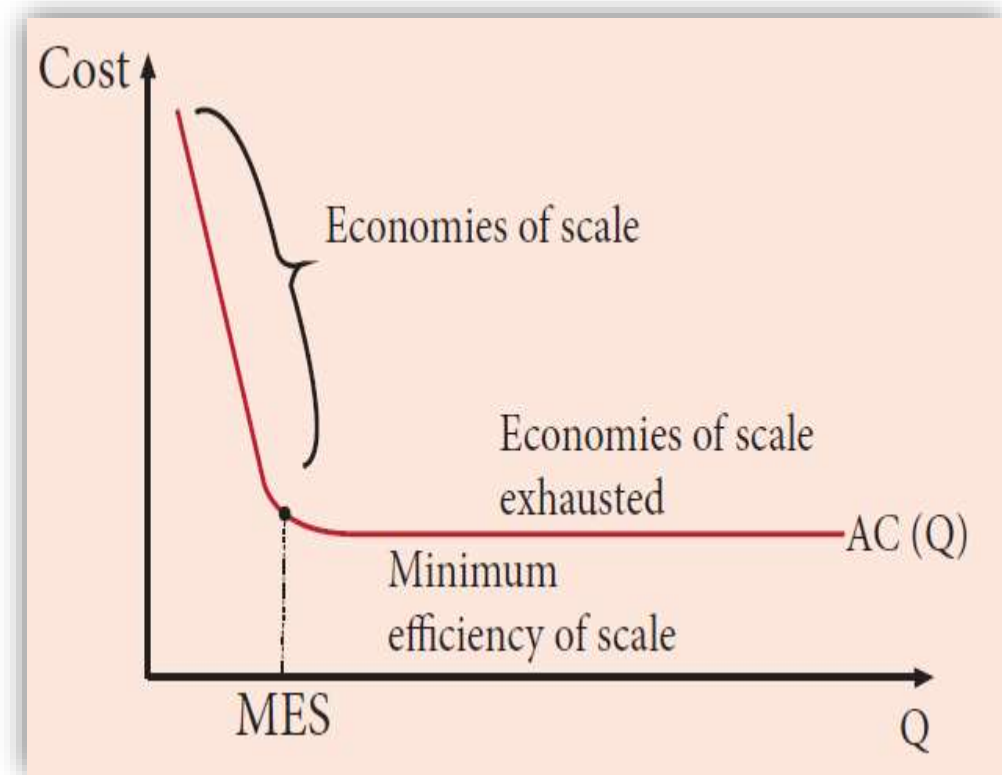
LAC is given in diagram 4.9.



# Important...

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- ❑ A significant recent development in cost theory is that the long-run average cost curve is L-shaped rather than U-shaped.
- ❑ The L-shape of the long-run average cost curve implies that in the beginning when output is expanded through increase in plant size and associated variable factors, cost per unit falls rapidly due to economies of scale.



## 4.6 Revenue Analysis

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- ❑ The amount of money that a producer receives in exchange for the sale of goods is known as revenue.
- ❑ In short, revenue means sales revenue. It is the amount received by a firm from the sale of a given quantity of a commodity at the prevailing price in the market.
- ❑ For example, if a firm sells 10 books at the price of ₹100 each, the total revenue will be ₹1000.

### ❖ 4.6.1 Revenue Concepts

### ❖ 4.6.2 Relationship between AR and MR Curves

### ❖ 4.6.3 Relationship among TR, AR and MR Curves

### ❖ 4.6.4 TR, AR, MR and Elasticity of Demand

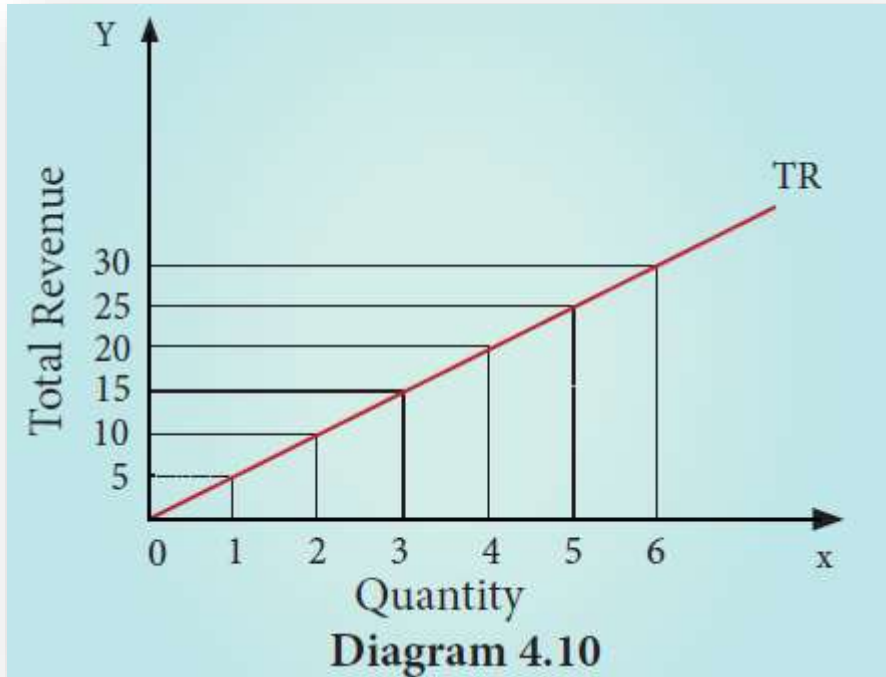
## 4.6.1 Revenue Concepts

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- **The three basic revenue concepts are:**
  - ❖ **a) Total Revenue:**
  - ❖ **b) Average Revenue**
  - ❖ **c) Marginal Revenue**

# a) Total Revenue

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$$TR = P \times Q$$

- ❑ Total revenue is the amount of income received by the firm from the sale of its products. It is obtained by multiplying the price of the commodity by the number of units sold.

where,

- ❑ TR denotes Total Revenue,
- ❑ P denotes Price and
- ❑ Q denotes Quantity sold.

For example,

- ❑ A cell-phone company sold 100 cell-phones at the price of ₹ 500 each.
- ❑ TR is ₹ 50,000. ( $TR = 500 \times 100 = 50,000$ ).



# Table 4.8 Total Revenue - Constant Price

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Quantity Sold (Q)	Price (P)	Total Revenue (TR)
1	5	5
2	5	10
3	5	15
4	5	20
5	5	25
6	5	30

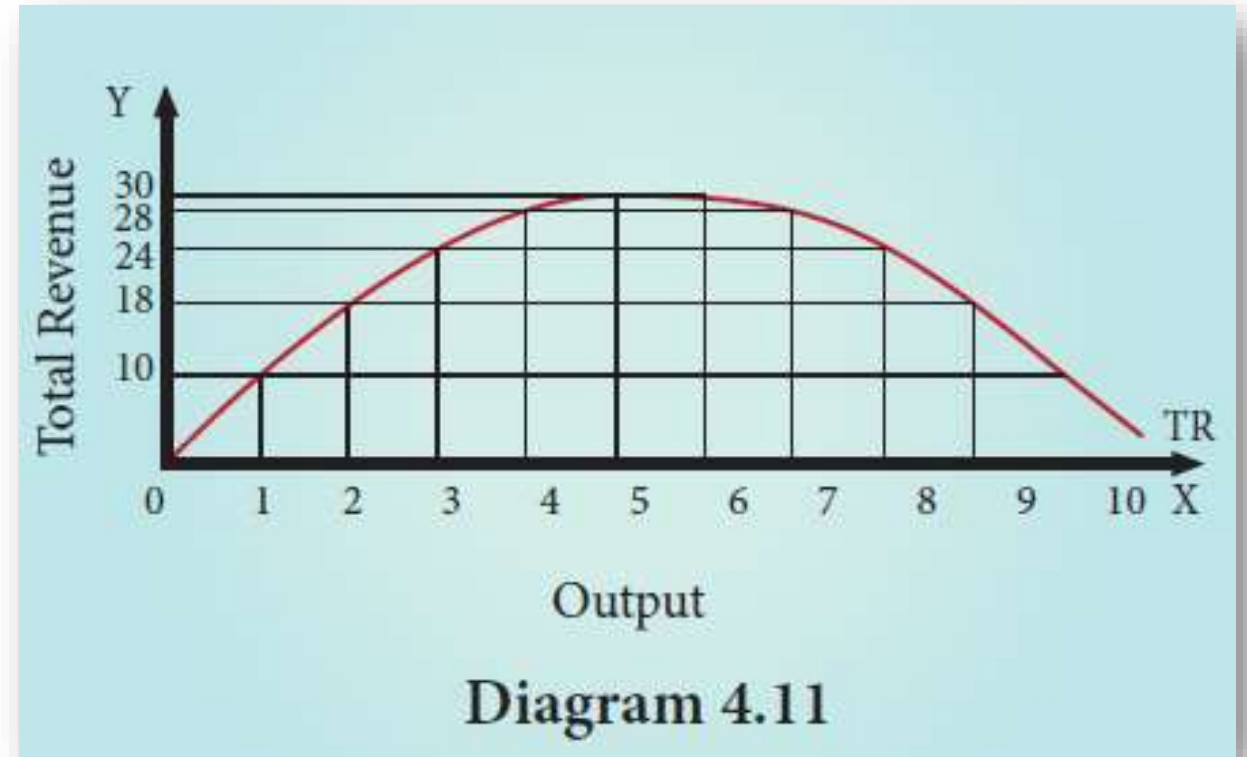
$$TR = P \times Q$$

- When price is constant, the behaviour of TR is shown in table 4.8 and diagram 4.10, assuming  $P=5$ .
- When  $P = 5$ ;  $TR = PQ$
- When price is declining with increase in quantity sold.
- (Eg. Imperfect Competition on the goods market) the behaviour of TR is shown in table 4.9 and diagram 4.11.
- TR can be obtained from Demand function: If  $Q = 11 - P$ ,
  - $TR = PQ = 1 \times 10 = 10$
  - When  $P = 3$ ,  $Q = 8$ ,  $TR = 24$
  - When  $P = 10$ ,  $Q = 1$ ,  $TR = 10$

# Table 4.9 Total Revenue - Price declining

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Quantity Sold (Q)	Price (P)	Total Revenue (TR)
1	10	10
2	9	18
3	8	24
4	7	28
5	6	30
6	5	30
7	4	28
8	3	24
9	2	18
10	1	10



## b) Average Revenue

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- ❑ Average revenue is the revenue per unit of the commodity sold.
- ❑ It is calculated by dividing the Total Revenue(TR) by the number of units sold (Q)
  - ❑  $AR = TR / Q;$
- ❑ if  $TR = PQ$ ,  $AR = PQ/Q = P$
- ❑ AR denotes Average Revenue, TR denotes Total Revenue and Q denotes Quantity of unit sold.

For example,

- ❑ if the Total Revenue from the sale of 5 units is ₹30, the Average Revenue is ₹6.
- ❑ ( $AR = 30/5 = 6$ ) It is to be noted that AR is equal to Price.
  - ❑  $AR = TR/Q = PQ/Q = P$

## c) Marginal Revenue

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- Marginal revenue (MR) is the addition to the total revenue by the sale of an additional unit of a commodity.
- MR can be found out by dividing change in total revenue by the change in quantity sold out.
- $MR = \Delta TR / \Delta Q$  where MR denotes Marginal Revenue,  $\Delta TR$  denotes change in Total Revenue and  $\Delta Q$  denotes change in total quantity.
- The other method of estimating MR is:
- **$MR = TR_n - TR_{n-1}$  (or)  $TR_{n+1} - TR_n$  where, MR denotes Marginal Revenue,  $TR_n$  denotes total revenue of  $n$ th item,  $TR_{n-1}$  denotes Total Revenue of  $n-1$ th item and  $TR_{n+1}$  denotes Total Revenue of  $n+1$ th item.**
- If  $TR = PQ$   $MR = \Delta TR / \Delta Q = P$ ,
- which is equal to AR.

## 4.6.2 Relationship between AR and MR Curves

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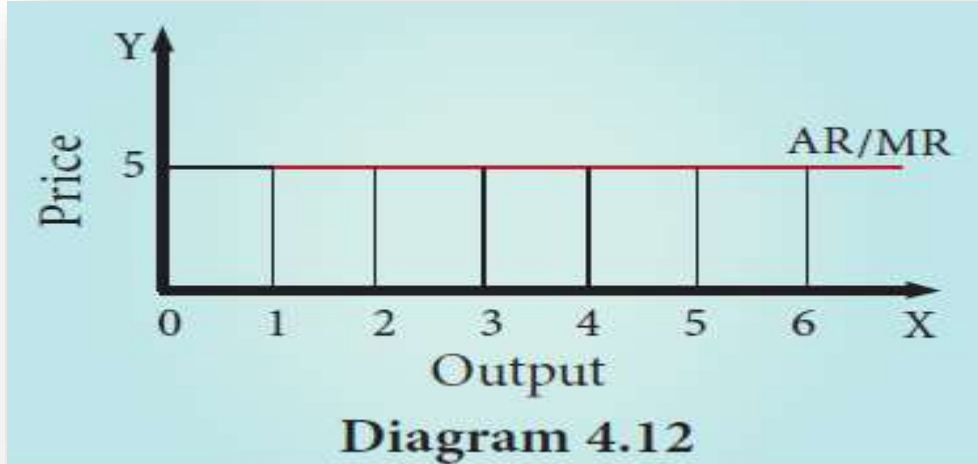
- ❑ If a firm is able to sell additional units at the same price then AR and MR will be constant and equal.
- ❑ If the firm is able to sell additional units only by reducing the price, then both AR and MR will fall and be different .
  - ❑ **Constant AR and MR (at Fixed Price)**
  - ❑ **Declining AR and MR (at Declining Price)**



# Constant AR and MR (at Fixed Price)

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- ❑ When price remains constant or fixed, the MR will be also constant and will coincide with AR.
- ❑ Under perfect competition as the price is uniform and fixed, AR is equal to MR and their shape will be a straight **Constant AR and MR (at Fixed Price)**



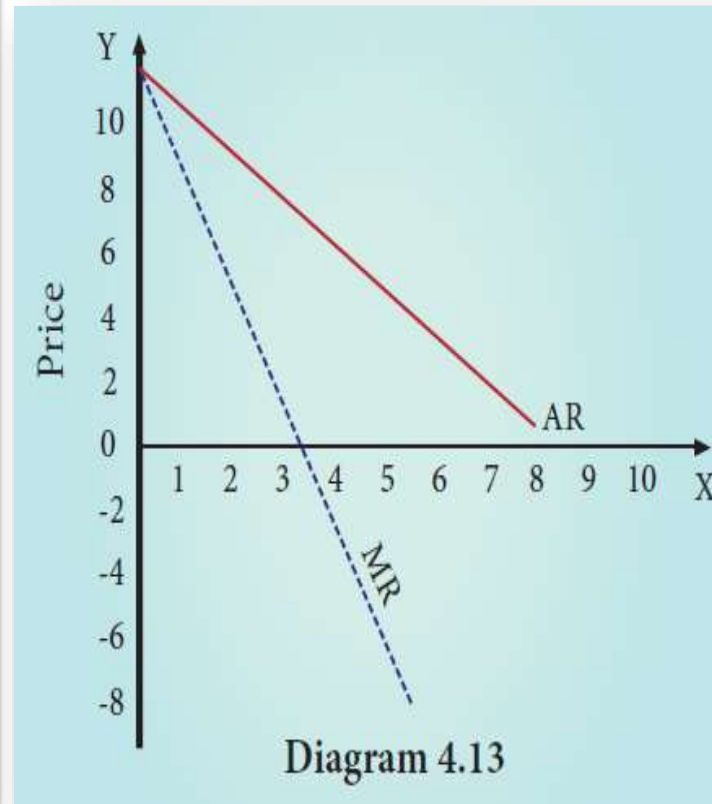
**Table 4.10 TR, AR, MR - Constant price**

Quantity Sold (Q)	Price (P)	Total Revenue (TR)	Average Revenue (AR) ₹	Marginal Revenue (MR) ₹
1	5	5	5	5
2	5	10	5	5
3	5	15	5	5
4	5	20	5	5
5	5	25	5	5
6	5	30	5	5

# Declining AR and MR (at Declining Price)

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- ❑ When a firm sells large quantities at lower prices both AR and MR will fall but the fall in MR will be more steeper than the fall in the AR.
- ❑ It is to be noted that MR will be lower than AR.
- ❑ Both AR and MR will be sloping downwards straight from left to right.
- ❑ The MR curve divides the distance between AR Curve and Y axis into two equal parts. The decline in AR need not be a straight line or linear.
- ❑ If the prices are declining with the increase in quantity sold, the AR can be non-linear, taking a shape of concave or convex to the origin.



**Table 4.11 AR, TR, MR at declining price**

Quantity Sold (Q)	Price (P)/ Average Revenue (AR)	Total Revenue (TR)	Marginal Revenue (MR) ₹
1	10	10	-
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	5	30	0
7	4	28	-2
8	3	24	-4
9	2	18	-6
10	1	10	-8

## 4.6.3 Relationship among TR, AR and MR Curves

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- ❖ When marginal revenue is positive, total revenue rises, when MR is zero the total revenue becomes maximum.
- ❖ When marginal revenue becomes negative total revenue starts falling.
- ❖ When AR and MR both are falling, then MR falls at a faster rate than AR.

## 4.6.4 TR, AR, MR and Elasticity of Demand

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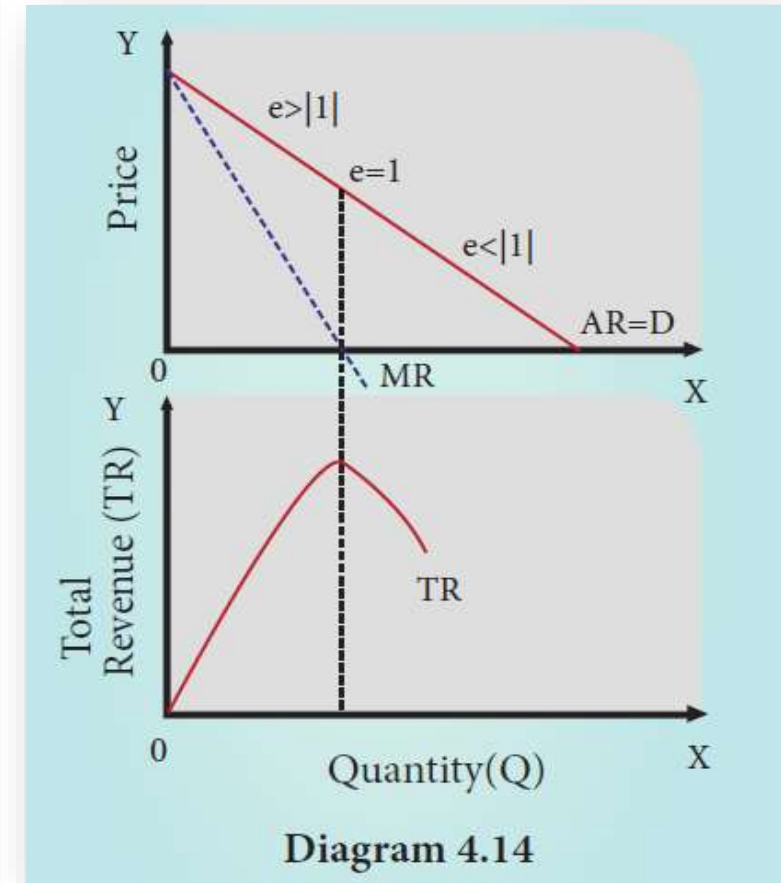
- ❑ The relationship among AR, MR and elasticity of demand ( $e$ ) is stated as follows.
  - ❑  $e = AR/AR - MR$
- ❑ The relationship between the AR curve and MR curve depends upon the elasticity of AR curve ( $AR = DD = Price$ ).
  - a) When price elasticity of demand is greater than one, MR is positive and TR is increasing.
  - b) When price elasticity of demand is less than one, MR is negative and TR is decreasing.
  - c) When price elasticity of demand is equal to one, MR is equal to zero and TR is maximum and constant.
- ❑ It is to be noted that, the output range of 1 to 5 units, the price elasticity of demand is greater than one according to total outlay method.
- ❑ Hence, TR is increasing and MR is positive.

# Table 4.12 TR, AR, MR & Elasticity / Diagram...

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Quantity Sold (Q)	Price (P) ₹	Total Revenue (TR) ₹	Average Revenue (TR) ₹	Marginal Revenue (MR) ₹	Elasticity
1	10	10	10	-	$E > 0$
2	9	18	9	8	
3	8	24	8	6	
4	7	28	7	4	
5	6	30	6	2	
6	5	30	5	0	$E = 0$
7	4	28	4	-2	$E < 0$
8	3	24	3	-4	
9	2	18	2	-6	
10	1	10	1	-8	
11	0	0	0	-10	

- ❑ At the output range of 5 to 6 units, the price elasticity of demand is equal to one.
- ❑ Hence, TR is maximum and MR equals to zero.
- ❑ At the output range of 6 units to 10 units, the price elasticity of demand is less than unity.
- ❑ Hence, TR is decreasing and MR is negative.





# Conclusion

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- This Chapter has analysed the behaviour of Cost Curves and revenue curves under two situations and the relationship among price elasticity of demand , TR, AR and MR.

## Importance terms

Cost	It refers to expenses incurred on production
Revenue	It refers to sales revenue
Explicit Cost	It refers to out of pocket expenses or money cost or accounting costs. They are the payments made to others.
Implicit Cost	The cost imputed for the resources provided by the owner.
Fixed Costs	The costs that remain constant at all levels of output. They do not vary with output.
Variable Cost	The cost that varies with the level of output.
Total Cost	The sum of total fixed cost and total variable costs.
Marginal Cost	The additional cost incurred for producing one more unit of output.
Average Cost	Cost per unit of output produced. It is obtained by dividing total cost by output.
Average Variable Cost	Variable Cost per unit of output, obtained by dividing total variable cost by output.
Average Fixed Cost	Fixed cost per unit of output, obtained by dividing total fixed cost by output.
Average Revenue	Average revenue refers to revenue per unit of output sold. It is obtained by dividing the total revenue by quantity sold.
Marginal Revenue	The additional revenue obtained by selling one more unit of output.

# Know the Important Definitions

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Definition	Explanation
Definition of Accounting Cost (or) Explicit Cost	Accounting costs or explicit costs are the payments made by the entrepreneur to the supplies of various productive factors the accounting cost are only those costs. Which are directly paid out or accounted for by the producers.
Definition of Marginal Cost	Marginal cost is defined as the addition made to the total cost by the production of one additional unit of output.
Definition of Social Cost	According to Alfred Marshall defined the term social cost to represent the efforts and sacrifice undergone by the various members of the society in producing a commodity. Social cost is the cost that is not borne by the firm, but incurred by other in the society.
Definition of <b>'True Cost Economics'</b>	True cost economics is an economic model the includes the cost of negative externalities associated with goods and services.

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# THANKING YOU...