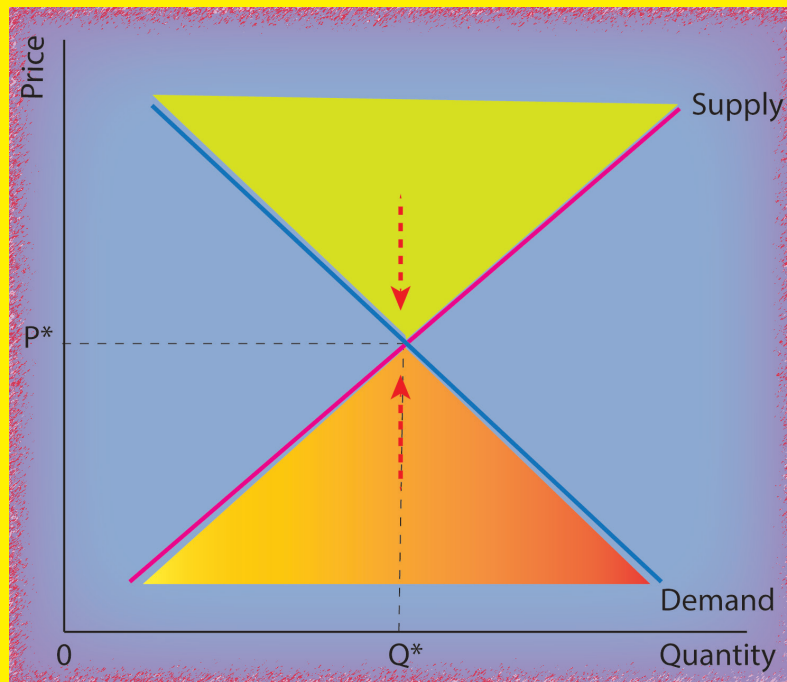# ECONOMICS
Grade 10
Distance Module I

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF EDUCATION

ECONOMICS

Distance Module I

GRADE 10

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FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF EDUCATION

HAWASSA UNIVERSITY

Table of Contents

Module I

Module Introduction

Dear distance learners, we welcome you to this exciting module for Grade 10 Economics. As you know Economics starts at grade 9, thus this book is subsequent to that. You will learn subsequent content similar to that of the previous grade. Accordingly, there is a little depth and width in terms of theories and applications.

Dear distance learner, this material is organized in to two modules. Each module divided in to four units. The first unit deals with the Theory of Consumer Behavior, under which you will learn from the definition of utility up to an illustration of the optimum of the consumer using the cardinal utility approach. The second unit deals with the Theories of Demand and Supply, in which you will learn from evaluating the effects of changes in demand and supply on equilibrium price and quantity to computing elasticities of demand and supply.

The third unit covers the Theory of Production and Cost, in which you will learn everything from short- and long-run production to cost of production mapping. The fourth unit deals with the market structures, under you will discuss various concepts, from basic features of different markets to understanding the sources of monopoly power.

Each unit begins with an introduction that states the lessons and the outcomes. It also provides a list of the key words and concepts you will encounter in the unit. The objectives are listed at the beginning of each lesson. The start-up activities are to introduce you to the lesson. On many pages, you will find tables and figures that illustrate the topic you are studying. There are also examples that aim to elaborate on the concept you are studying. Each lesson has at least one set of questions linked to the objective of the lesson. At the end of each unit, there is a unit summary of what you have read. This will help you revise. Finally, unit review exercises enable you to test your knowledge and understanding of the unit content.

Finally, this module is just one resource that you will use to learn economics at this level. Additional reference materials, books, and documents are listed at the end of the module. You are expected to complete this subject in a total of 52 hours. When you read the materials you will see questions. They provide you the opportunities to apply your previous knowledge. These in text questions have also motivational value. Try to answer them in order to develop critical thinking.

There are self-check tasks at the end of each section that allow you to assess your understanding of the topics covered in relation to the objectives provided at the beginning of the section. The final task of each section is a self-test. Try to respond to them without consulting your notes. At the conclusion of each module, the answers to the exercises and the self-test will be provided. After finishing them, compare your response to the answer key provided at the end of the module. Fill them out and submit them to your tutor.

Icons in the Module

Throughout each module, you will find the following icons or graphic symbols that alert you to a change in activity within the module. Onlythe icons that are required are used in each module.

Text or Reading Material	provides information aboutthe topics that are covered.
Self-check	requests that you double-check your comprehension. If you mark any box under the 'No' column, please look at the corresponding item to the left and go back to your text and read about it.
Summary	highlights or provides an overview of the most important points covered.
Overview	introduces you to focus on the content that will be discussed.
Suggested Answers	allows you to evaluate your learning by providing sample answers to assessments and activities
Objective	indicates what you should know after completing a section or unit.
Self-Assessment	enables you to check your understanding of what you have read and, in some cases,to apply the information presented in the unit to new situations.
	In text Question.
Recall for prior learning	requires you to focus on thecontent that will be discussed in a section or unit

Unit 1

Theory of Consumer Behaviour

Unit Introduction

A consumer is a decision making unit (an individual or a household) who uses or consumes a commodity or service. The theory of consumer behavior is concerned with how a consumer decides on the basket of goods and services he/she consumes in order to maximize his/her satisfaction. In this unit, we will learn how the consumer decides to spend his/ her income on different goods.

The theory of consumer behavior, set out with the following important assumptions;

- The consumer has a limited income.
- The consumer is assumed to be rational. Given the consumer's income and the market prices of the commodities, he/she spends the income on goods and services that give the highest possible satisfaction or utility.

The consumer has relevant information to make a decision, is aware of his or her income, and is aware of the commodities available and their prices.

Unit Outcomes

After completing this unit, you will be able to:

- Define utility
- Explain cardinal utility
- Discuss the law of diminishing marginal utility
- Illustrate the consumer optimum under the cardinal approaches
- Mention the assumptions of ordinal utility theory

The Required Study Time: 10 hours

Unit Learning Strategies

Dear distance learner, remember each unit has a self-study format. The following learning strategies will help you study this unit.

- Reading the topics
- Doing various activities
- Completing written exercises
- Activities based on the learner's experience
- Extra-curricular learning
- Scenario-based activity
- Auto tutorial instruction

1.1 The Concept of Utility

Dear Distance learners, in this section you will learn about the term '**Utility**'; and you will also learn definition and some characteristics of utility.

Learning Outcomes

At the end of this section, you will be able to:

- Define the term utility
- Explain the basic characteristics of utility
- Discuss relativity of utility

Key Concepts: Commodity, Satisfaction, Utility

Start Up Activity:

Dear distance learner why do you buy goods and services?

1.1.1 Definition of utility

Dear Distance learners, in our everyday lives, we buy different goods and services for consumption. Utility is the level of satisfaction or pleasure derived from the consumption of a good or service. Thus, utility is the power of a commodity to satisfy human wants. For example, bread has the power to satisfy hunger, while water quenches our thirst.

1.1.2 Characteristics of utility

Start Up Activity

Dear distance learner, do you think utility of tea is the same for you and for your friends?

In defining utility, it is important to bear in mind the following characteristics of utility

- Utility is Relativity: The utility of a commodity is subjective to a person's needs. It is not absolute (objectively determined).The same commodity provides different utilities to different consumers. For example, non-smokers do not derive any utility from cigarettes.

- The utility of a product can be different at different places and times. For example, the utility that we get from wearing jackets during the cold season is not the same as during the hot season. For the same consumer, utility varies from unit to unit, from time to time, and from place to place. For example, the utility we get from drinking tea early in the morning may be different from the utility we get during lunch time.

- 'Utility' and 'usefulness' are not synonymous: usefulness is the concern of a product whereas utility is the concern of the consumer.

Self-Test Exercise 1.1

Dear distance learner, how do you define utility? Did you try? Great job!

Utility is the power of a commodity to satisfy human wants.

Activity 1.1

1. What features characterize utility?
2. Why is the level of utility obtained by consuming the same product by different individuals different?

1.2 The Cardinal Utility Theory

Overview

According to Cardinal Utility theory, utility is measurable in monetary units (i.e., by the amount of money that the consumer is willing to pay for another unit of a commodity).

Dear Distance learners, in this section you will learn assumption of cardinal utility theory, how to measure utility, the law of marginal utility, and finally how to drive optimum of the consumer.

Learning outcomes:

At the end of this section, you will be able to:

- Discuss the cardinal utility and its key assumptions
- Compute total utility
- Calculate marginal utility
- State law of diminishing marginal utility
- Derive consumer optimum

Key Concepts': utils, cardinal utility

Start Up Activity:

Dear distance learner, how do you measure the satisfaction level (utility) that you get from goods and services?

To get a higher level of satisfaction, the consumer must be able to compare the utility of the various baskets of goods that can be bought with the available income. According to Cardinal Utility theory, utility is measurable like weight, height, and temperature, and they suggested a unit of measurement of satisfaction called 'utils'. The Cardinal School postulated that utility can be measured in monetary units (i.e., by the amount of money that the consumer is willing to pay for another unit of a commodity) or by subjective units called 'utils'. Thus, the school assumes that the level of utility can be expressed in numbers.

1.2.1 Assumptions of Cardinal Utility Theory

I. The consumer is Rational: The main objective of the consumer is to maximize his/her satisfaction given his/her limited budget or income. Thus, in order to maximize his/her satisfaction, the consumer has to be rational.

II. Cardinal Utility: Utility is a cardinal concept, which means the utility of each commodity is measurable, with the most convenient measure being money.

III. Constant Marginal Utility of money: the utility that one derives from each successive unit of money income remains constant.

IV. Diminishing Marginal Utility: The utility gained from the successive units of a commodity diminishes. In other words, the marginal utility of a commodity diminishes as the consumer consumes larger quantities of it. This is the law of diminishing marginal utility.

V. The total utility of a basket of goods depends on the quantities of the individual commodities. If there are n commodities in the bundle with quantities X_1, X_2,...X_n, the total utility is given by TU = f (X_1, X_2; ......X_n).

1.2.2 Measurement of Utility (Total and Marginal Utility)

Total Utility (TU): refers to the total amount of satisfaction a consumer gets from consuming or possessing some specific quantities of a commodity (X) at a particular time. As the consumer consumes more of a good (X) per time period, his/her total utility increases. However, there is a saturation point for that commodity after which the consumer will not be capable of enjoying any greater satisfaction from it. Therefore, TUn refers to the total utility derived from consuming *n* units of a commodity X.

Marginal Utility (MU): refers to the additional utility obtained from consuming an additional unit of a commodity. In other words, marginal utility is the change in total utility resulting from the consumption of one more unit of a product per unit of time. Mathematically, the formula for marginal utility is:

$$MU = \frac{\Delta TU}{\Delta Q}$$

Where, TU is the change in total utility, and, Q is change in the amount of product consumed.

Suppose Beka gets 10 utils of total utility by consuming 2 quantities of orange, and his total utility increases to 12 utils as he consumes 3 quantities of orange. Thus, consumption of the

3rd quantity of orange has caused total utility to increase by 2 utils (12 utils minus 10 utils). Therefore, the marginal utility of the 3rd orange is 2 utils.

$$Thus, MU = \frac{\Delta TU}{\Delta Q} = \frac{12utils - 10utils}{3 - 2} = 2\,utils$$

Self-Test Exercise 1.2

Find the missed value of total utility (TU) and marginal utility (MU) in the following table.

Table 1.1 Numerical Values of marginal and total utility derived from consumption of hypothetical commodity (X).

Quantity consumed (Q$_b$)	0	1	2	3	4	5	6	7	8	9	10
Total Utility (TU)	0	8	15	20		24	24	22	19		5
Marginal Utility (MU)	-		7	5	3	1	0		-3	-6	-8

Did you try? Great job! The missed value of total utility (TU) and marginal utility (MU) are:

Quantity consumed (Q$_b$)	0	1	2	3	4	5	6	7	8	9	10
Total Utility (TU)	0	8	15	20	23	24	24	22	19	13	5
Marginal Utility (MU)	-	8	7	5	3	1	0	-2	-3	-6	-8

Example: Given Table 1.2 Numerical Values of marginal and total utility derived from consumption of hypothetical commodity (banana).

Quantity consumed (Qb)	0	1	2	3	4	5	6	7	8	9	10
Total Utility (TU)	0	12	22	29	34	36	37	37	36	34	30
Marginal Utility (MU)	-	12	10	7	5	2	1	0	-1	-2	-4

Table 1.2 As a consumer consumes only one quantity of banana, both the marginal utility and total utility are equal, which is 12 utils. When a consumer consumes 2 quantities of banana, he/she gets 10 additional utils (marginal utility). The total utility from 2 quantities of banana is 22 utils (12 from the first quantity of banana and 10 from the second quantity of banana). Finally, at 7 unit of quantity, the saturation point of total utility, marginal utility becomes zero. After this maximum point of total utility, if he/she consumes more quantity of banana, his/her total utility decreases, which leads to dissatisfaction. Figure 1.1 is the graphical representation of table 1.2, and it shows the relationship between total utility and marginal utility.
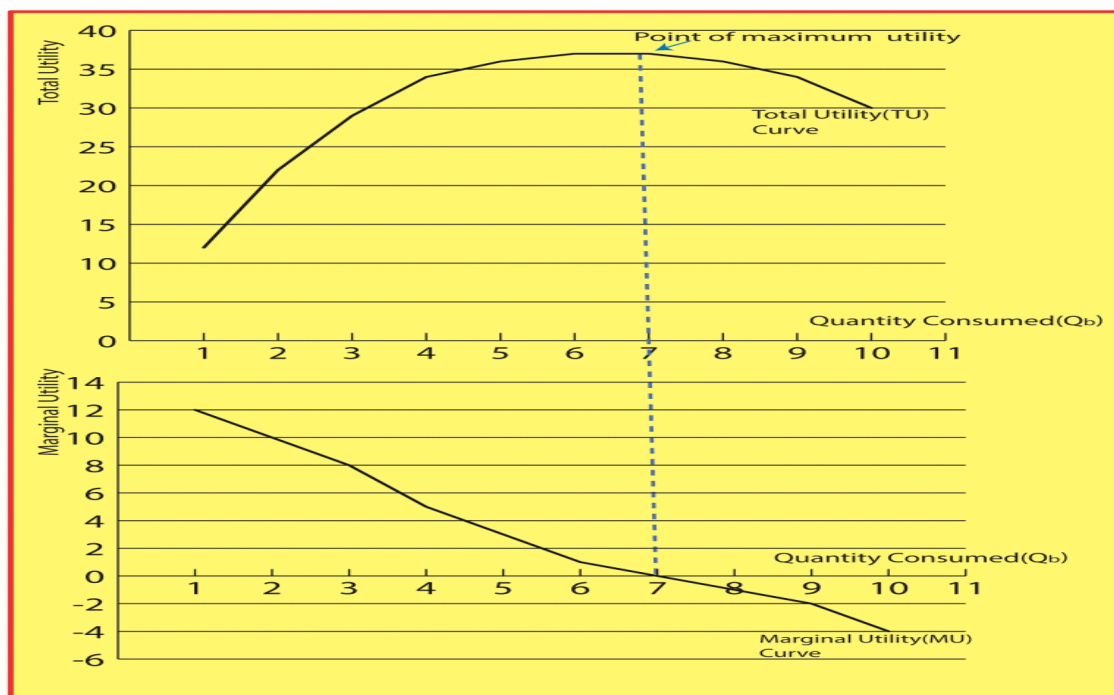
Figure 1.1: Relationship between total utility and marginal utility

Fig.1.1 shows that total utility initially increases, and reaches 'its pick (saturation) point'. This saturation point indicates that by consuming 7 quantities of banana, the consumer attains its highest satisfaction level of 37 utils. However, consumption beyond this point results in dissatisfaction, because consuming the 8th and more quantities of banana brings negative additional utility.

On the other hand, the marginal utility continuously diminished and became zero when the total utility reached maximum, and then became negative as consumption increased beyond the saturation point of the total utility.

1.2.3 The Law of Diminishing Marginal Utility (LDMU)

⍰ **Start Up Activity:**

> Dear Distance learners, do you get the same utility from drinking the first glass of water and the second glass of water?

📖 The utility that a consumer gets by consuming a commodity for the first time is not the same as the consumption of the good for the second, third, fourth, etc.

LDMU is central to the cardinal utility analysis of consumer behavior. This law states that as the quantity consumed of a commodity increases over a unit of time, the utility derived by the consumer from the successive units goes on decreasing, provided the consumption of all other goods remains constant. The above (table 1.2) shows a numerical illustration of the law of diminishing marginal (LDMU). Here, TU increases with an increase in consumption of banana, but at a decreasing rate. It means that MU decreases with an increase in consumption.

⬚ Self-Test Exercise 1.3

Table 1.3 the total utility (TU) of hypothetical commodity Y,

Quantity(Y) consumed	0	1	2	3	4	5	6
TU_Y	0	10	16	20	22	22	20

From the given table (1.3)

a) Find marginal utility (MU_Y)
b) Find quantity (Q_Y) where total (TU_Y) reach maximum point and MU_Y will be zero.

Dear Distance learners, did you try? Great!

⬚ Marginal utility (MU_Y)

a.

Units of Quantity(Y) consumed	0	1	2	3	4	5	6
TU_Y	0	10	16	20	22	22	20
MU_Y	-	10	6	4	2	0	-2

b. The table shows that total utility reach its maximum point and marginal utility reach zero ($MU_Y=0$), where the consumer consume the 5th unit of commodity Y.

1.2.4 The Consumer Maximization Problem

? Start Up Activity

Dear distance learner, how should a consumer spend his/her income on different com-modities?

📖 A consumer that maximizes utility reaches his/her equilibrium position when the allo-cation of his/her expenditure is such that the last birr spent on each commodity yields the same utility.

A consumer budget (income) is the actual purchasing potential with which a consumer can purchase a set of goods or services, provided their prices. A consumer has limited income therefore the consumer's budget shows the number of goods and services he/she can afford.

Assumptions: Economists have developed the concept of consumer equilibrium based on the following assumptions.

- The consumer is rational. She/he aims at the maximisation of her/his utility or satisfaction,
- Cardinal measurement of utility is possible,
- If utility is measured in terms of money, the marginal utility of money remains constant,
- The law of diminishing marginal utility operates,
- The Consumer income is given and remains constant,

- Commodity prices given and remain constant.
  I. Consumer Equilibrium: The Case of one commodity

Let's assume that the consumer consumes a single commodity, X. The consumer can either buy x or retain his money income Y. Under these conditions, the consumer is in equilibrium when the marginal utility of X is equated to its market price (p_x).

Symbolically,

$$MU_x = P_x$$

- If $MU_x > P_x$, the consumer can increase his/her welfare by purchasing more units of X, and

- If the $MU_x < P_x$, welfare can be increased by reducing the consumption of X.
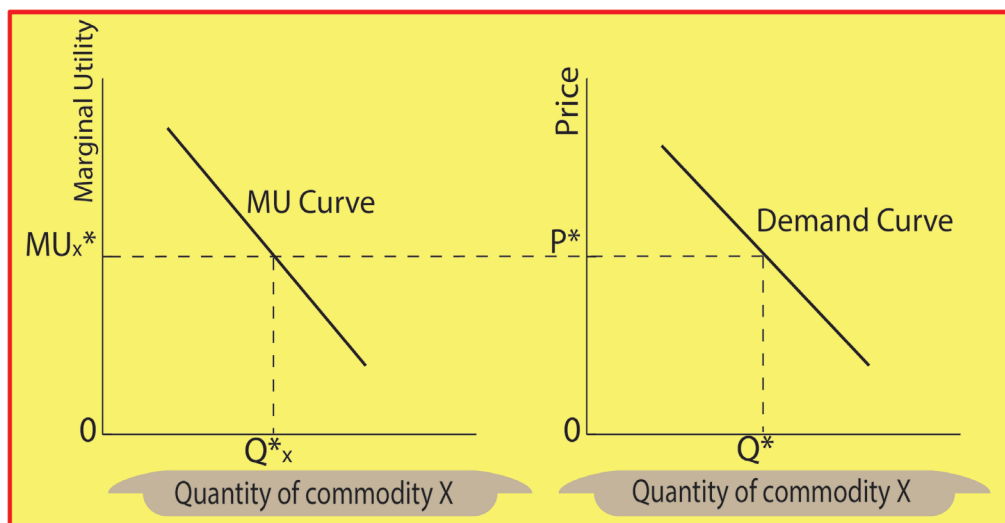
Figure 1.2: Consumer equilibrium and derivation of demand curve

At Q^*_x the marginal utility is MU^*_x which is equal to P^*_x. Hence, at P^*_x consumer demands Q^*_x and this forms the demand curve for commodity X. The demand curve is simply the graphical representation of the relationship between price and quantity demanded. Thus, the expenditure on a single commodity X is: $P_X Q_X$ =Income/budget of the consumer, which is called consumers' budget equation.

  II. Consumer Equilibrium: the case of more than one commodity

In the case where there are more commodities, the condition for the optimality of the consumer is the equality of the ratios of MU of the individual commodities to their prices, i.e. the utility derived from spending an additional unit of money must be the same for all commodities. For example, if the consumer consumes a bundle of N commodities, i.e A, B, C,... N, he/she would be in equilibrium or utility is maximized if and only if:

$$\frac{MU_A}{P_A} = \frac{MU_B}{P_B} = \frac{MU_C}{P_C} \dots\dots = \frac{MU_N}{P_N} = MU_M$$

Where, MU_M =marginal utility of money

MU_A = Marginal utility of commodity A;

MU_B= Marginal utility of commodity B;

MU_N= Marginal utility of commodity N,

P_A= Price of commodity A

P_B = Price of commodity B

Thus, the consumer's budget equation will be:

Consumer's Income=Expenditure on A + Expenditure on B + Expenditure on C... + Expenditure on N. Mathematically: Consumer's Income= $AP_A + BP_B + CP_C$ +--------+NP_N

P_N = Price of commodity N.

Therefore, in the situation of a consumer's equilibrium, the utility derived from spending an additional unit of money must be the same for all commodities. If the consumer derives greater utility from any one commodity, he/she can increase his/her satisfaction by spending more on that commodity and less on the others. It will continue till the above equilibrium condition is reached.

Suppose a single commodity (bread) and its price (p) is equal to Birr 2 per unit and consumer equilibrium is computed as in table 1.4 below.

Table1.4. Utility schedule for a single commodity (bread)				
Quantity of bread	Total utility (TU)	Marginal utility (MU)	Marginal utility per Birr (price=2 birr)	Marginal utility of money
0	0	-	-	1
1	4	4	2	1
2	6	2	1	1
3	7	1	0.5	1
4	7	0	0	1
5	6	-1	-0.5	1

For consumption levels of less than 2 quantities of bread, since the marginal utility of bread is higher than the price, the consumer can increase his/her utility by consuming more quantities of bread. On the other hand, for quantities greater than 2, since the marginal utility of bread is less than the price, the consumer can increase his/her utility by reducing their consumption of bread.

i.e $MU_{bread} = p_{bread} = 2$ or $\dfrac{MU_{bread}}{P_{bread}} = \dfrac{2}{2} = 1 = MU_{Money}$

Thus, the consumer will be at equilibrium when he/she consumes 2 quantities of bread at a price where the marginal utility of bread (MU_{bread}) is equal to the Price of bread (p_{bread}).

Suppose that an individual, whose income is Birr 22 consumes two types of goods, bread (X) and injera (Y), whose prices are Px = Birr 2 and Py =Birr 4, spend all his/her income on these goods. By using the above information and the utility table for the two goods, determine the following questions.

Unit 1: Theory of Consumer Behaviour

1. Indicate how much of X & Y, should the individual purchase to maximize utility.
2. Show that the condition for utility maximization is achieved.
3. Determine how much total utility the individual receives when he /she maximizes utility.

Table 1.5 Utility schedules for two commodities (bread and injera)							
Quantity (X)	TU	MU	MU/P_x	Quantity (Y)	TU	MU	MU/P_y
0	0	-	-	0	0	-	-
1	6	6	3	1	12	12	3
2	10	4	2	2	19	7	1.75
3	12	2	1	3	24	5	1.5
4	12	0	0	4	28	4	1
5	11	-1	-0.5	5	28	0	0
6	9	-3	-1.5	6	26	-2	-0.5

Solution:

As we have discussed, a consumer maximizes his/her total utility when the marginal utility of one commodity divided by its market price is equal to the marginal utility of the other commodity divided by its market price, i.e. $\dfrac{MU_1}{P_1} = \dfrac{MU_2}{P_2}$. Thus, the consumer will be in equilibrium when he consumes 3 quantities of commodity X (bread) and 4 quantities of commodity Y (injera) , because:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \frac{2}{2} = \frac{4}{4} = 1$$

1 At the equilibrium of the consumer,
   Expenditure on X (bread) + Expenditure on Y(injera)= Consumer's Income (I).

Thus, PxX + PyY = I

- 2(3) + 4(4) = 22
- 22 = 22

2 Maximum total utility obtained from consumption of these commodities is;

TU = ∑MUs = ∑MUx + ∑MUy

- TU = (6+4+2)$_x$ + (12+7 +5+ 4)$_y$
- TU = (12)$_x$ + (28)$_y$
- TU = 40 utils

Self-Test Exercise 1.4

Table 1.6 Utility schedule for two commodities (X and Y)			
Qx	MUx	Qy	MUy
1	10	4	5
2	6	5	4
3	4	6	3
4	2	7	2
5	0	8	1

Assume that an individual, whose income is birr 10, consumes two types of goods, X and Y, whose prices are Px = 2 and Py = 1, and that the consumer spends all his/her income on these goods. Use the information in table 1.6 to determine the following things/ answer the following questions.

Indicate how much of X & Y the individual should purchase to maximize utility.

1 Show that the condition for constrained utility maximization is achieved.
2 Determine how much total utility the individual receives when he /she maximizes utility.
   Dear distance learner, we hope you did it. Good!

1. The consumer purchases X=2, and Y =6 at maximize utility, X=2 and Y=6; and the condition to be satisfied for constrained utility maximization is:
    $\Rightarrow$ Px.X +Py.Y= M (income)
    $\Rightarrow$ (2x2) + (1x6) = 10
2. The total utility the individual derived as he /she maximizes utility is:
    $\Rightarrow$ TU= TUx+TUy

    =(10+6) +(5+4+3)=28

Activity 1.2

1. What are the key assumptions of cardinal utiliy?
2. Suppose 4 bananas give us 20 utility and the 5th banana give us 5 utility.
   a. Find total utility
   b. Calculate marginal utility of the 5th banana.
3. Explain law of diminishing marginal utility.

1.3 Introduction to the Ordinal Utility Theory

Overview

Dear Distance learners, in this section you will learn definition and assumption of Ordinal utility theory.

Learning outcomes:

At the end of this section, you will be able to:

- ♦ Explain ordinal utility.
- ♦ State the assumptions of ordinal utility theory.

Key Concepts: Ordinal, ordinal utility, marginal rate of substitution

Start Up Activity:

Dear Distance learners, suppose you have just eaten an orange and a banana. Can you tell how much you are satisfied with each of these items?

You can probably tell which item you liked more. But, it is very difficult to express "how much" you liked one over the other. In the ordinal utility approach, utility cannot be measured absolutely, but different consumption bundles are ranked according to preferences. The concept is based on the fact that it may not be possible for consumers to express the utility of various commodities they consume in absolute terms, like, 1 util, 2 util, or 3 util, but it is always possible for consumers to express the utility in relative terms. It is practically possible for the consumers to rank commodities in the order of their preference, as 1st, 2nd, 3rd, and so on.

That is, to make his/her choice, the consumer needs not know the utility of various commodities in a specific unit, but be able to rank the various baskets of goods (order of preference) according to the satisfaction that each bundle gives.

Assumptions

- Rationality: The consumer is assumed to be rational. The main objective of rational consumer is to maximize his/her satisfaction or utility given his/her income and market prices.

- Utility is ordinal: utility is not absolutely (cardinally) measurable. The consumer can rank his/her preference (order the various baskets of goods) according to the satisfaction of each basket.

- The Diminishing marginal rate of substitution (DMRS): The marginal rate of substitution is the rate at which a consumer is willing to substitute one commodity for another commodity so that his/her total satisfaction remains the same. The rate at which one good can be substituted for another in a consumer's basket of goods diminishes as the consumer consumes more and more of the good. This means that as the consumer substitutes

more and more of one commodity (say Y) for another commodity (say X), he/she will be prepared to give up fewer units of the latter (X) for each additional unit of the former (Y).

- The total utility of the consumer depends on the quantity of the commodity consumed: The total utility of a consumer is measured by the amount (quantities) of all items he/she consumes from his/her consumption basket.

- Consistency and transitivity of choices: is assumed that the consumer is consistent in his/ her choice, that is, if he/she chooses bundle A over B in one period, he/she will not use B over A in another period if both bundles are available to him/her, under exactly the same conditions.

The consistency assumption may be symbolically written as follows:

=> If bundle A>B, then B is not greater than A

Similarly, it is assumed that consumers' choices are characterized by transitivity: if bundle A is preferred to B and B is preferred to C, then bundle A is preferred to C.

Symbolically, we may write the transitivity assumption as follows:

=> If bundle A >B and B>C, then A>C.

Self-Test Exercise

Dear distance learner, what makes ordinal utility theory differ from cardinal utlity theory in measuring utility? Did you try? Great!

According to Cardinal utlity theory, utility is measurable in cardinal number, where as Ordinal utlity theory states that utility is ordinal, it is not cardinally measurable.

Activity 1.3

1. What is ordinal utility?
2. What are the assumptions of ordinal utility theory?

📖 Unit Summary

The theory of consumer behavior is concerned with how consumers decide on the basket of goods and services they consume in order to maximize their satisfaction/utility. Utility is the power of a commodity to satisfy human wants. There are two approaches for the measurement of utility: the Cardinal Utility and Ordinal utility approaches.

The cardinal utility approach argues that utility is measurable and quantifiable with a unit of measurement of 'utils' while the ordinal utility approach argues that utility has only ordinal value and could only be ordered and ranked. The law of diminishing marginal utility states that as the amount consumed of a commodity increase, the utility derived by the consumer from the additional units (marginal utility) goes on decreasing.

Under the cardinal utility approach, the consumer reaches equilibrium when the marginal utility of the commodity is equal to its price in the case of one commodity ($MU_x = P_x$), and when the ratio of the marginal utilities of the commodities to their prices is equal for all commodities.

In the ordinal utility approach, utility cannot be measured absolutely, but different consumption bundles are ranked according to preferences. The concept is based on the fact that it may not be possible for consumers to express the utility of various commodities they consume in absolute terms, like, 1 util, 2 util, or 3 util, but it is always possible for consumers to express the utility in relative terms. It is practically possible for the consumers to rank commodities in the order of their preference, as 1st, 2nd, 3rd, and so on.

☑ Check List

Dear distance learner, we hope you enjoyed working on this section. Now it is time to check your understanding about evolution of money. Read each question and put a tick (√) mark in the 'yes' or 'no' box, which helps you decide on your level of understanding of the points presented so far.

Objectives	Yes	No
Can you define utility?		
Can you explain cardinal utility?		
Can you describe the law of diminishing marginal utility?		
Can you illustrate the consumer optimum under the cardinal approaches?		
Can you mention the assumptions of ordinal utility theory?		

Dear distance learner, did you mark any box under the 'No' column? If so, please look at the corresponding item to the left and go back to your text and read about it.

Unit Review Exercise

Part I: Write 'True' if the statement is correct or 'False' if the statement is incorrect.

1. Utility is the ability of good or service to satisfy the human want.
2. The same commodity gives the same utility to different consumers.
3. According to Cardinal utility approach consumer is rational.
4. The power of a product to satisfy the human wants can be different at different places and time.
5. The concept of "marginal utility" is common for both Cardinal and Ordinal approaches.

Part II: Multiple-choice items.

Direction: Read the following questions and choose the correct answer from the given alternatives.

1. Which of the following statements about the characteristics utility is correct?

   A . utility is that it is a relative concept   C . utility is free from moral values
   B . utility is that it is a subjective concept   D . All of the above

2. Which of the following statements about the utilities is correct?

   A . The summation of utility that is obtained from all the units of a good or service is called the marginal utility
   B . The additional of utility that is obtained from each the unit of a good or service is called the total utility.
   C . The additional of utility that is obtained from each units of a good or service is called the marginal utility
   D . The addition of utility that is obtained from all the units of a good or service is called the maximum satisfaction

3. Which of the following statements is true?

   A . The capability of any commodity to satisfy human wants is known as utility
   B . The capability of any commodity to satisfy human wants is known as taste
   C . The capability of any commodity to satisfy human wants is known as consumption
   D . The capability of any commodity to satisfy human wants is known as quality

4. Which of the following about the relationship between marginal utility and price is correct?

   A . The marginal utility of a commodity or service must be equal to its price to ensure maximum satisfaction of the consumer
   B . The marginal utility of a commodity or service must be greater than its price to ensure maximum satisfaction of the consumer
   C . The marginal utility of a commodity or service must be lesser than its price to ensure maximum satisfaction of the consumer
   D . There is no relationship between the marginal utility of a commodity or service and its price

5. Which of the following is true about the relationship between total utility and marginal utility?

   A. The total utility of a product or service is maximum when the marginal utility is negative

   B. The total utility of a product or service decreases when the marginal utility is negative

   C. The total utility of a product or service increases at a decreasing rate when the marginal utility is negative

   D. None of the above

Part III: Write detail answers to the following.

1. Mention at least one assumption that is common for both the cardinal and ordinal utility approaches.
2. What is meant by the marginal rate of substitution? Discuss with examples the principles of the diminishing marginal rate of substitution.
3. Assume a hypothetical consumer consumes good X and good Y. The price of good X is 1 and price of good Y is 3 and the consumer budget is birr 10 for the two goods. Where: Q_X is quantity of good X, Q_Y is quantity of good Y and TU_X and TU_Y is total utility from consuming good X and good Y respectively, MUx and MUy are marginal utilities for good X and good Y respectively.

Q_X	TU_X	Q_Y	TU_Y	MUx	MUy
0	0	0	0		
1	10	1	24		
2	19	2	45		
3	27	3	63		
4	34	4	78		
5	40	5	87		
6	44	6	90		
7	41	7	91		
8	41	8	91		
9	40	9	90		

Based on the given information (from the above table), answer the following questions.

A. Calculate the marginal utility of the two goods
B. Determine the quantities of the two goods that the consumer should buy in order to maximize his total utility.

 Answers to Activities

Activity 1.1

1. Utility is the power of a commodity to satisfy human wants. It is the satisfaction or subjective pleasure that one gets from consuming a good or service.
2. The utility of a product will vary from person to person. The utility of a commodity is subjective to a person's need. It is not absolute (objectively determined).

Activity 1.2

1. The main assumptions of the cardinal utility theory are:
   i. consumer is rational
   ii. cardinal utility: utility is a cardinal concept; which means the utility of each commodity is measurable, with the most convenient measure being money
   iii. constant marginal utility of money
   iv. diminishing marginal utility

2. a. Total utility (TU)= 20+5=25

   b. marginal utility is additional utility due to one more 5ᵗʰ unit of banana.

   Thus marginal utility (MU) = 5

3. The Law of Diminishing Marginal Utility States that as the quantity consumed of a commodity increases per unit of time, the utility derived from each successive unit decreases, consumption of all other commodities remaining constant.

Activity 1.3

1. The ordinal utility approach implies that different consumption bundles are ranked according to preferences. It is practically possible for the consumers to rank commodities in the order of their preference as $1^{st}\ 2^{nd}\ 3^{rd}$ and so on.
2. The possible answer is:

   i. Rationality: the consumer is assumed to be rational.
   ii. Utility is ordinal
   iii. Diminishing marginal rate of substitution (DMRS):

The total utility of the consumer depends on the quantities of the commodity consumed.

Part I

1	true	2	false	3. true
4	true	5	true	

Part II

1	D	2	C	3. A
4	A	5	B	

Part III

1. Consumer is Rational. The main objective of the consumer is to maximize his/her satisfaction given his/her limited budget or income. Thus, in order to maximize his/her satisfaction, the consumer has to be rational.

2. The marginal rate of substitution is the rate at which a consumer is willing to substitute one commodity for another commodity so that his/her total satisfaction remains the same. The rate at which one good can be substituted for another in consumer's basket of goods diminishes as the consumer consumes more and more of the good. This means that as the consumer substitutes more and more of one commodity (say Y) for another commodity (say X), he/she will be prepared to give up lesser units of the later (X) for each additional unit of the former (Y).

3.

   a. Compute the marginal utility of the two goods.

Q_X	TU_X	MUx		Q_Y	TU_Y	MUy	
0	0	-	-	0	0	-	-
1	10	10	10	1	24	24	8
2	19	9	9	2	45	21	7
3	27	8	8	3	63	18	6
4	34	7	7	4	78	15	5
5	40	6	6	5	87	9	3
6	44	4	4	6	90	3	1
7	44	0	0	7	91	1	1/3
8	43	-1	-1	8	91	0	0
9	41	-2	-2	9	90	-1	-1/3

   b. Determine the quantities of the two goods that the consumer should buy in order to maximize his total utility. From

   From $$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \frac{7}{1} = \frac{21}{3} = 7$$

   Thus, PxX + PyY = I

   $\Rightarrow$ 1(4) + 3(2) = 10

Unit 2: Theories of Demand and Supply

Unit Introduction

The tools of demand and supply can take us far in understanding not only specific economic issues but also how the entire economy works. As you recall, the circular flow model in your grade 9 course identified the participants in the product and resource markets. There, we asserted that prices were determined by the "interaction" between demand and supply in these markets. In this unit we examine that interaction in detail explaining how prices and output quantities are determined, determinates and elasticies of demand and supply.

Market is a place, condition, or mechanism, which brings together both buyers (demanders) and sellers (suppliers) in order to exchange their goods and services. All situations which link potential buyers with potential sellers are markets. Thus, the market means the system in which sellers and buyers of a commodity interact to settle its price and the quantity to be bought and sold.

Unit Outcomes

After completing this unit, you will be able to:

- Explain the theory of demand.
- Describe the theory of supply
- Identify factors that affect demand and supply
- Distinguish between individual and market demand
- Distinguish between individual and market supply
- Demonstrate market equilibrium both graphically and mathematically
- Evaluate the effect of changes in demand and supply on equilibrium price and quantity.
- Define elasticity
- Calculate and interpret the different types of elasticity

The Required Study Time :15 hours

Unit Learning Strategies

Dear distance learner, remember each unit has a self-study format. The following learning strategies will help you study this unit.

- Reading the topics
- Doing various activities
- Completing written exercises

- Activities based on the learner's experience
- Extra-curricular learning
- Scenario-based activity
- Auto tutorial instruction

2.1 Theory of Demand

Overview

Theory of demand define demand, explain factors affect demand, and drive individual and market demands. Therefore; under this section you will learn the definition of demand, how demand affected by several factors and the difference between individual and market demands.

Learning Outcomes

At the end of this section, you will be able to:
- Define the concept of demand
- Examine factors affecting demand.
- Explain demand schedule and demand curve
- Interpret demand equations and the slope of a demand curve.
- Distinguish between changes in demand and changes in quantity
- Determine individual and market demand

Key Concepts: Demand, Demand schedule, Demand curve, Market demand

Start Up Activity:

Dear distance learner, what do we mean by 'demand'? Do you think it is synonymous with 'desire' or 'want'?

Definition: Demand means the ability and willingness to buy a specific quantity of a commodity at the prevailing price in a given period of time. Therefore, demand for a commodity implies a desire to acquire it, along with the willingness and ability to pay for it. Thus, Demand = Willingness to buy + Ability to pay.

2.1.1 The Demand Schedule, Demand Function and the Demand Curve

Demand could be expressed in the form of schedules, functions, or curves. Demand Schedule is a table showing different quantities of commodity that consumer is willing to buy at different level of prices, during a given period of time. Demand expresses the nature of functional relationship between the price of a commodity and its quantity demanded. $Q_d = f(P) = a - bP$; whereas 'Q_d' is quantity demanded, 'P' is price, 'a' is constant, 'b' coefficient of price, As quantity is function of price, or these variables are expressed in tabular form/

schedules, and can be transformed into curves. A demand curve is a curve that represents the relationship between the quantity of the good chosen by a consumer and the price of the good. The independent variable (price) is measured along the vertical axis, and dependent variable (quantity) is measured along the horizontal axis. The demand curve shows the quantity demanded by the consumer at each price.

Let's consider the relationship between the price of coffee and the quantity of coffee demanded using a hypostatical example. Table 2.1 shows how many kgs of coffee Amina buys each month at different prices per kg. If coffee is free (assume the price is zero), she buys 9 kg. At birr 5.00, she buys 8kg of coffee. As the price rises further, she buys fewer and fewer kgs of coffee. When the price reaches birr 45.00, Amina doesn't buy any coffee at all.

Table 2.1. Amina's Demand Schedule. The deman schedule shows the quantity demanded at each price.										
Price of coffee in Birr (per kilo gram)	0	5	10	15	20	25	30	35	40	45
Quantity demanded (in kg)	9	8	7	6	5	4	3	2	1	0
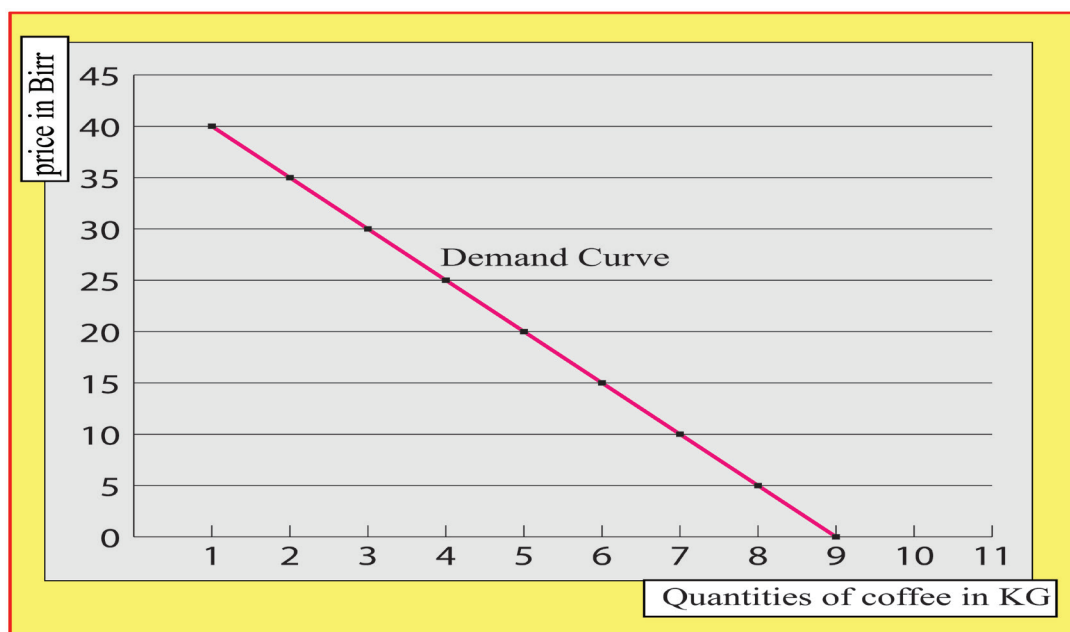
Figure 2.1 Amina's Demand Curve

Table 2.1 is a demand schedule, a table that shows the relationship between the price of coffee per kg and the quantity of coffee demanded per kg. It shows how the quantity demanded of the good (coffee) changes as its price varies, ceteris paribus (all other things remain constant).

The demand curve in figure 2.1 above, which graphs the demand schedule in table 2.1., shows how the quantity demanded of the good changes as its price varies. Because a lower price increases the quantity demanded, the demand curve slopes downward.

The slope of a demand curve: the law of demand states (recall from your grade 9) quantity and price are inversely related: quantity demanded of a good (X) goes up when its price goes down. That is, the function has a negative slope, or the curve slopes downward. This important property is given the name of downward sloping demand. The law of demand can

be stated as, all other things remaining constant, the quantity demanded of a commodity increases when its price decreases and decreases when its price increases.

2.1.2 Factors affecting demand

Determinants of demand are factors that cause the consumer to increase or decrease their demand for a particular commodity. Demand is a multi-variety function in a sense that it is determined by many factors/variables. There are various factors affecting the demand for a commodity. Some of these are:

- Price of the good: the price of a commodity is an important determinant of demand. Price and demand are inversely related. The higher the price, the lower the demand and vice versa.

- Price of related goods: the price of related goods like substitutes and complementary goods also affect the demand.

  ➢ Substitute goods are goods that can be used in place of each other to satisfy a given want. (For example, coffee and tea, pens and pencils, butter and oil, etc.).
  ➢ Complementary goods are goods used together to satisfy a given want. (For example, tea and sugar, phone and sim-card, cars and petrol, gun and bullet etc.)

In the case of substitutes, rise in the price of one commodity leads to an increase in the demand for its substitute. In the case of complementary goods, a fall in the price of one commodity leads to a rise in demand for both the goods.

- Consumer income: is directly related to demand. A change in the consumer's income significantly influences his demand for most commodities. If the consumers' income increases, demand will be greater.

- Taste and habits: these are very effective factors affecting demand for a commodity. When there is a change in the consumer's taste, habits, or preferences, their demand will change.

- Population: if the size of the population is greater, demand for goods will be greater. The market demand for a commodity substantially changes when there is a change in the total population.

- Season: The demand for a commodity is also affected by the season. For example, demand for woolen clothes increases in the cold seasons. On the other hand, demand for cotton clothes increases in hot seasons.

- Consumer's future price expectation: If a consumer expects prices to rise in the future, he may buy more at the current price, and thus his/her demand rises.

2.1.3 Changes in quantity demanded and changes in demand

Change in quantity demanded: Other things being equal, it designates the movement

from one point to another point from one price quantity combination to another on a fixed demand schedule or demand curve. The cause of such a change is an increase or decrease in the price of the product being considered. Downward movement along the demand curve is called an extension of demand, while the upward movement is a contraction of demand.
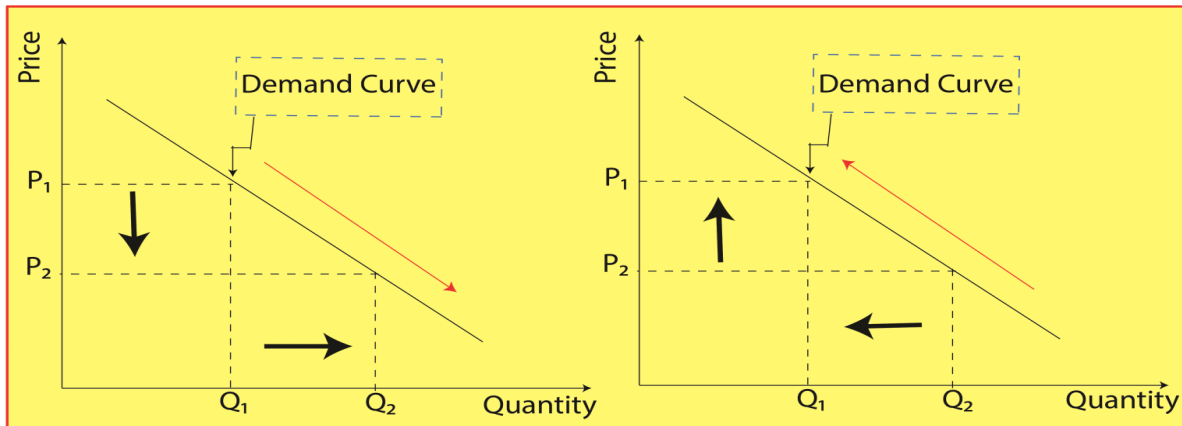
Figure 2.2: Extension of demand   Figure 2.3: Contraction of Demand

Change in Demand: A change in one or more of the determinants of demand (other than their own price) will change the demand data (the demand schedule). A change in the demand schedule, or more graphically, a *shift* in the location of the demand curve, is called a change in demand. An increase in demand causes the demand curve to shift upward to the right; whereas, a decrease in demand causes the demand curve to shift downward to the left. In other words, while an increase in demand is explained by an outward shift of the demand curve, a decrease in demand is explained by an inward shift of the demand curve.
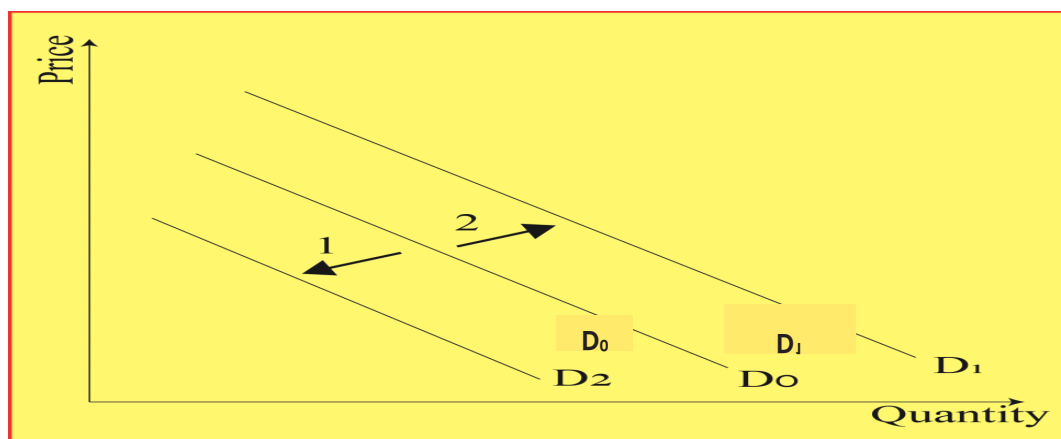
Figure 2.4: Shift in demand curve

Figure 2.4 shows that when demand increases, demand curve shifts upward (D_1) and a decrease in demand shifts the demand curve downwards (D_2). The factors affecting demand, except for their own price, are called shifting factors.

2.1.4 Derivation of market demand

Based on the number of consumer, demand is classified as individual demand and market demand.

Individual Demand: Individual demand may be defined as the quantity of a commodity that a person is willing and able to buy at given prices over a specified period of time. Suppose Mr. Adamu purchases a kg of banana when the price is Birr 25, and he purchases 2 kg for a week when the price drops to Birr 20. And when the price further decreases to Birr 15 per kg, he buys 3 kg banana for a week, but when the price rises to Birr 30 per kg, he buys zero kg of banana. This can be shown in the table 2.2 below.

Table 2.2: The hypothetical demand schedule for banana

Price of banana in Birr/kg	10	15	20	25	30
Quantity demanded in kg	5	3	2	1	0

Market Demand: Market demand refers to the total quantity that all the users of a commodity are willing and able to buy at a given price over a specific period of time. The market demand for the commodity is simply the horizontal summation of the demand of all the consumers in the market. In other words, the quantity demanded in the market at each price is the sum of the individual demands of all consumers at that price.

Assume that there are three consumers (say A, B, and C) in the market for a particular commodity X (say wheat). Their demand at each price is given as follows:

Table 2.3: The individual and market demand schedule for wheat

Price per quintal of wheat (Birr)		12	9	6	3	1
Quantity demanded per year (in quintals)	A	2	3	4	6	9
	B	1	2	4	5	6
	C	0	1	2	4	5
	Market (Total)	**3**	**6**	**10**	**15**	**20**
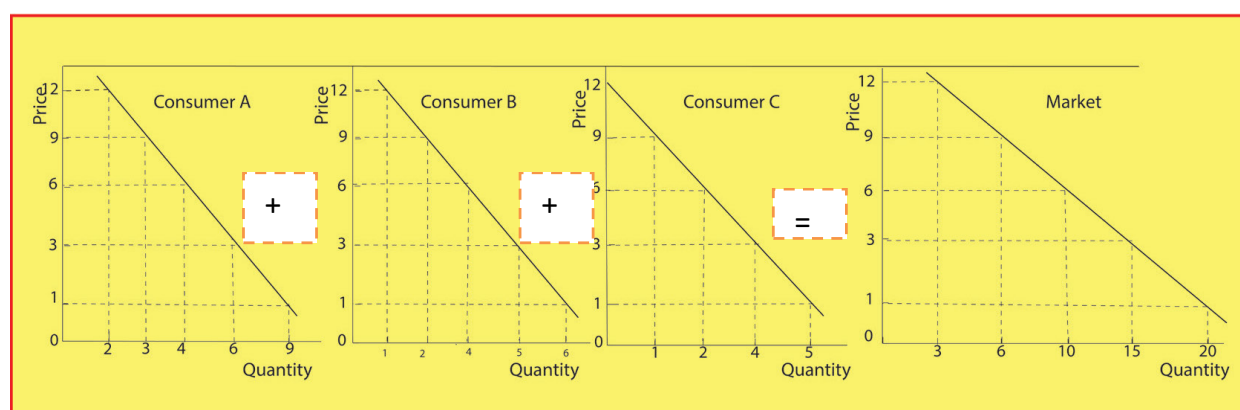
Figure 2.5 summation of demand curves

Thus, the market demand for a commodity shows the various quantities of the commodity demanded in the market per unit of time at an alternative price for the commodity holding everything else constant. However, if individual demand schedules were expressed as demand curves, the market demand curve would be derived by taking the *horizontal summation* of individual demand curves.

Numerical Example: Suppose the individual demand function of a product is given by:

$Q_I = 50 - 5P$ and there are about 100 identical buyers in the market. Then the market demand function is given by:

$Q_m = (50 - 5P)\ 100$

Market Demand $(Q_m) = 5000-500P$

Self-Test Exercise 2.1

Suppose there are three individuals (A, B, and C) purchase coffee at price of Birr 250 per kilo gram in the market. They purchase 10 kg, 15kg and 20kg respectively. Find market demand of coffee.

Dear distance learner, we hope you did it. Good!

The market demand is the summation of individual demands, i.e.:

Market demand of coffee is=10kg +15kg+20kg= 45kg

Activity 2.1

1. Define demand.

2. What factors in your surroundings affect demand?

3. Explain the demand schedule and demand curve concepts.

4. What is the difference between changes in quantity demanded and changes in demand?

5. What do you mean by individual demand and market demand? Can you give examples?

2.2 Theory of Supply

Overview

In a market, while buyers of a product constitute the demand side of the market, sellers of that product make supply side of the market. Therefore in section you will learn about the supply side of the market, definition of supply, factors affects supply, supply law, and how to drive market supply from individual supply.

Learning Outcomes

At the end of this section, you will be able to:

♦ Define the concept of supply.

♦ Explain supply function, supply curve, and supply schedule.

♦ Interpret the slope of a supply curve.

- Differentiate changes in quantity supply and changes in supply.
- State factors that affect supply.
- Derive market supply curve.

Key Concepts: Supply, supply schedule, supply curve

?Start Up Activity

Dear distance learner, what comes to your mind when you hear the term "supply"?

📖 Supply may be defined as the various amounts of a product that a producer (firm) is willing and able to produce and make available for sale in the market over a specific time period, at given prices, ceteris paribus. Holding other factors constant, the quantity supplied of a good or service is the amount offered for sale at a given price.

2.2.1 Supply function, Supply schedule, and Supply curve

A Supply function: is a statement that states the relationship between the quantity supplied (as a dependent variable) and its determinants (say price, as independent variable). Suppose that a single producer's supply function for commodity X is given as: $Q_x = f(P_x) = a + bP$, ceteris paribus.

The supply schedule: is a tabular presentation of the (law of) supply. By substituting various "relevant" prices of X into the above supply equation, we get the producer's supply schedule shown in table 2.4 below.

Table 2.4 supply schedule

Price per unit (in Birr/kg)	0	10	15	22	35	43	56	67	78	106
Quantity supplied (in kg)	0	1	2	3	4	5	6	7	8	9
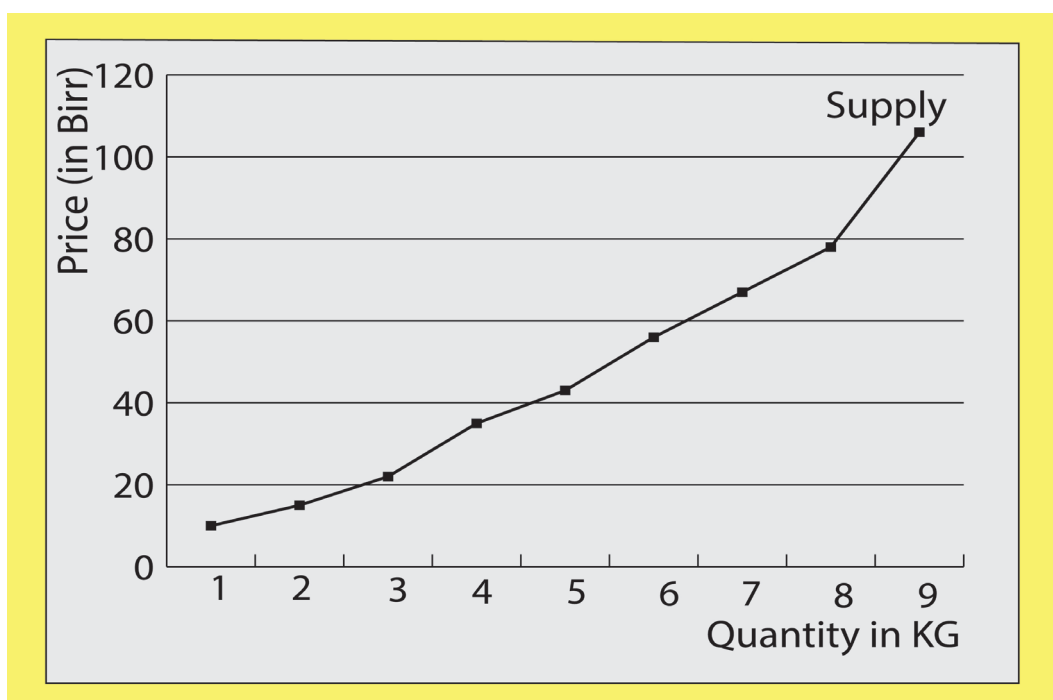
Figure 2.6 supply curve

The supply curve: is a graphical depiction of the supply schedule. Plotting each pair of values from the supply schedule in the table above on a graph and joining the resulting points we get the producer's supply curve, figure 2.6 below.

Table 2.4 illustrates that there is a positive relationship between the quantity supplied and its price. As we can see, the supplier requires a minimum price to start supplying its product, and then increases its quantities as the unit price for its product rises, and vice versa.

Figure 2.6 is a graphic representation of the supply schedule where, conventionally, the price of the product is shown on the vertical axis and the quantity supplied on the horizontal axis. The curve is, more or less functional in accordance with the law of supply, which states that, in general, the higher the price of a good, the greater the quantity of the good suppliers are willing and able to make available in the market.

The slope of a supply curve: the Law of supply expresses the direct relationship between the prices of a commodity and its quantity supplied. Price and supply are positively related. Hence, the slope of the supply curve is positive.

2.2.2 Changes in quantity supplied and changes in supply

A change in quantity supplied: as we stated earlier, as the price of a goods increases, the quantity supplied increases. We call this kind of movement along the supply curve a "change in quantity supplied." Thus, movement along the supply curve is caused by a change in the commodity's own price. In such a situation, the supply curve remains the same. Other things being constant, the movement along the (same) supply curve is caused by a change in the price of the good. For example, movement from A to B, B to C, C to A, etc., refers to a change in quantity supplied.

Change in supply: this kind of change refers to a shift in the position of the supply curve caused by a change in something other than the commodity's own price. A shift in the supply curve may be caused by change in the prices of other goods, a change in the prices of factors of production, a change in production technique or a change in the goals of the producer.
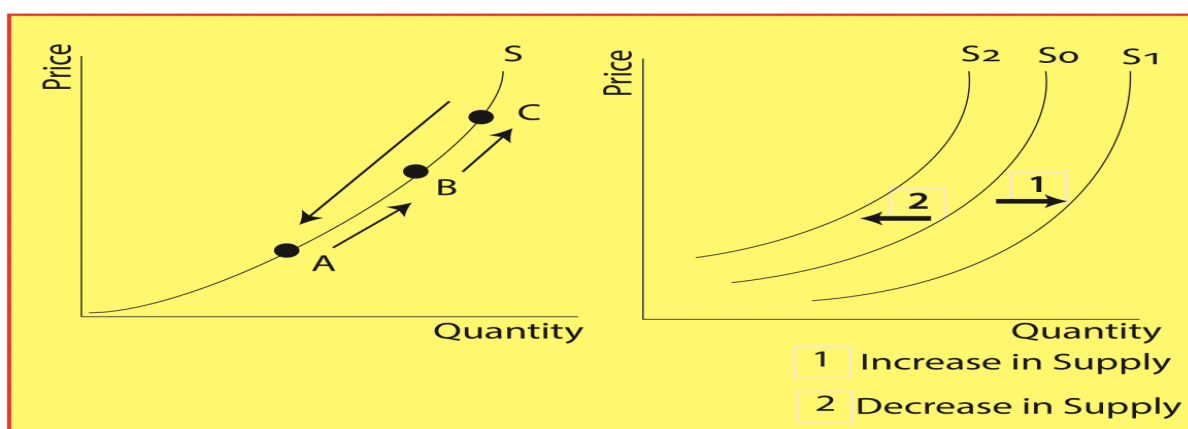
Figure 2.7 Movement on supply curve   Figure 2.8 shift of supply curve

2.2.3 Factors affecting supply

In constructing a supply curve, the economist's assumption is that price is the most significant determinant of the quantity supplied of any product. But factors other than the good's own price can change the relationship between price and quantity supplied. These other factors include:

• The cost of factors of production: the cost depends on the price of factors. An increase in factor cost increases the cost of production, and reduces supply.

• The state of technology: Using advanced technology increases the productivity of the organization and increases its supply.

• External factors: external factors like this influence the supply. If there is a flood, this reduces the supply of various agricultural products.

• Tax and subsidies: an increase in government subsidies results in more production and higher supplies.

• Transport: better transport facilities will increase the supply.

• The price of other goods: if the price of other goods is more than the price of commodity 'X', then the supply of commodity 'X' will be increased.

2.2.4 Derivation of the market supply curve

The derivation of the market supply (schedule and curve) from the individual supply is similar to that of demand. That is, the market supply in a given market is the summation of the individual suppliers in that market. Suppose that there are only four suppliers of a specific type of shirt, and their demand schedule is given below.

Table 2.5 Market Supply for shirt four sellers A, B, C, and D

Unit price (Birr)		1	2	3	4	5	6
	A	0	0	1	2	4	7
	B	0	1	2	3	4	6
Quantity supplied	C	1	2	5	7	10	13
	Total (Market)	**1**	**3**	**8**	**12**	**18**	**26**

As can be seen from the above supply schedule, the market supply schedule could simply be derived by taking the summation of the individual quantities supplied at all possible prices.

Graphically, the market supply is the horizontal summation of the individual supply curves as shown below. Suppose we have only three suppliers in the market for a commodity, say soft drinks, and their supply curves are given as S_A, S_B, and S_C.
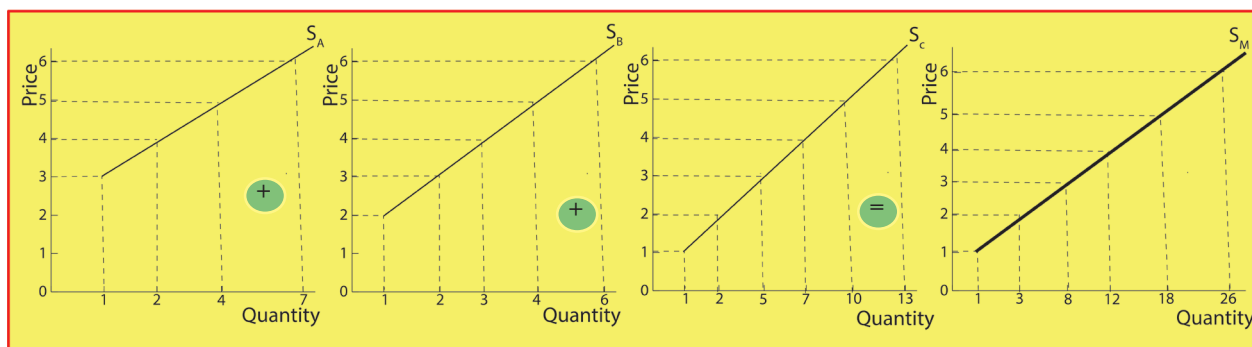
Figure 2.9: Summation of the Supply curves

Note that the market supply curve is flatter than the individual supply curves. We assume that the sellers are identical (perfect competitive market), hence they have the same supply curve. So, we can simply multiply the quantity supplied by a representative supplier by the number of sellers in that market in order to get the market quantity supplied at all possible prices.

Example: Suppose there are 120 sellers of potatoes (in tons) in a market and the sellers have a more or less similar supply curve of the form (supply equation) Qs = 20p - 5. Driven by the market supply equation. What is the quantity supplied in the market when the price is Birr 4?

Solution:

i.   Market supply is $Q_m = Q_s \times 120$

$$= 120 (20p - 5)$$

$$Q_m = 2400p - 600 \text{ (market supply equation)}.$$

ii. Total quantity (market) supplied at price Birr 4 is;

$$Qm (p=4) = 2400 (4) - 600$$

$$= 9600 - 600$$

$$= 9000 \text{ tons}.$$

Self-Test Exercise 2.2

What is the market supply of 100 identical wheat suppliers if the supply function of a typical supplier is Qs = 3p - 2?.

Dear distance learner, we hope you did it. Good!

The market supply of 100 identical wheat suppliers will be:

$$100 (Qs = 3p - 2)$$

$$\Rightarrow Qs = 300p - 200.$$

Activity 2.2

1. Define supply.
2. What factors in your locality affect supply?

2.3 Market Equilibrium

Overview

Dear distance learner, in this section you will learn how market reaches at equilibrium, market price and market quantity, and also learn factors affect market equilibrium, change market price and market quantity.

Learning Outcomes

At the end of this section, you will be able to:

- Define market equilibrium
- Define surplus and shortage.
- Describe excess demand and excess supply
- Explain how surpluses and shortages cause the price to move towards equilibrium.
- Give practical example about how surpluses and shortages affect price.
- Describe how change in demand and supply affect equilibrium.

Key Concepts: Market equilibrium, Excess demand, Excess supply

Start Up Activity

Dear distance learner, have you ever heard of the term 'Equilibrium'? What comes to your mind whenever you hear the term 'Equilibrium'?

In a general sense, the term 'equilibrium' means the "state of rest". In the context of market analysis, equilibrium refers to the market condition that once achieved, tends to persist. This condition occurs when the quantity demanded of the commodity equals the quantity supplied of the commodity. This equality produces an equilibrium price (market-clearing price).

2.3.1 The derivation of equilibrium

Having seen the theory of demand and supply, we can now bring them together to see how the buying decisions of households and the selling decisions of firms interact to determine the price of a product and the quantity actually bought and sold. Market equilibrium explains the balance between demand and supply for a commodity. That is, equilibrium occurs when the quantity demanded by the buyers equals the quantity supplied by the sellers in a particular market, so that the market clears. It is a condition that once it is achieved, tends to persist because economic agents have no incentive to change their behavior.

The price level at which the market reaches equilibrium is called the 'market clearing/ equilibrium price', and the corresponding quantity is called the 'equilibrium quantity". The equilibrium price in a free market is determined by the market forces of demand and supply. Suppose that the market demand and supply schedules are given as shown in the table below:

Table 2.6 Monthly demand and supply schedules for shirts

Price per shirt	Demand	Supply	Market Position
5(rise)	7	0	shortage (-)
10 (rise)	5	1	shortage (-)
15 (rise)	4	2	shortage (-)
20(stable)	3	3	equilibrium
25(fall)	2	4	surplus (+)
30(fall)	1	5	surplus (+)
35(fall)	0	6	surplus (+)

The above table 2.6 shows how market equilibrium is reached. When the price of a shirt is, say, Birr 15, the quantity demanded is 4 units of shirts, but the quantity supplied is only 2 units of shirts. The result is a shortage of 2 units of shirts. Thus, unsatisfied buyers will bid the price up. Raising the price will reduce the shortage. If, however, the price of shirts rose to, say, Birr 25 per shirt, the quantity supplied is 4 units of shirts while the amount demanded is only 2 units of shirts. The result is a surplus of 2 units of shirts. This surplus will cause the price of shirts to fall as unsatisfied sellers bid the price down. As the price falls, the surplus will diminish. Thus, as the table shows, there is only one price of shirts (Birr 20) at which the market is in equilibrium, i.e. the quantity demanded and quantity supplied are equal at 3 units of shirts. At all other prices, the shirt market is in disequilibrium.

We have already seen that a surplus causes prices to decline and a shortage causes prices to rise. With neither shortage nor surplus (at Br.20), there is no reason for the actual price of shirts to move away from this price. The economists call this the **equilibrium price:** 'equilibrium' means "in balance" or "at rest". Graphically: this is the price at which the quantity demanded and the quantity supplied are equal.
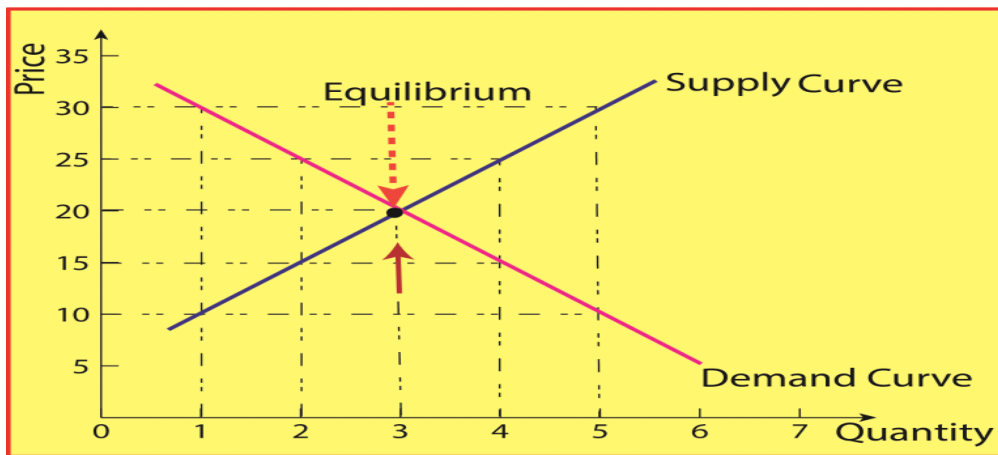
Figure 2.10 Market equilibrium

The intersections of the downward sloping demand curve and the upward sloping supply curve indicate the equilibrium price and quantity (Birr 20 and 3 shirts). The shortage of shirts is which exist below the equilibrium price; and the surplus that occurs above the equilibrium price. In a free market, disequilibrium itself creates the condition for equilibrium.

2.3.2 The concepts of excess demand and excess supply

Excess demand occurs when the quantity demanded is greater than the quantity supplied, which leads to a shortage in the market. Excess supply occurs when the quantity supplied exceeds the quantity demanded, resulting in a market surplus.
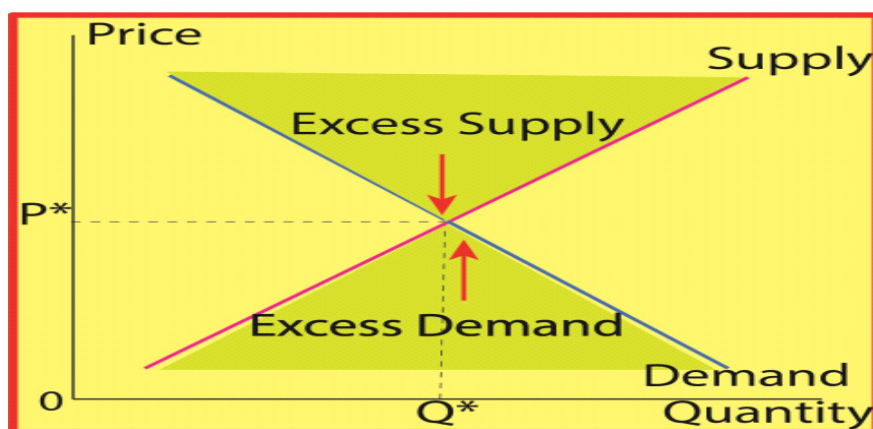
Figure 2.11 Excess demand and Excess Supply

Therefore, graphically, the intersection of the supply and demand curves for a product indicates the market equilibrium (Q^*, P^*). Any price above this intersection will lead to a surplus because sellers will be willing to offer more of the commodity in the market while the buyers cut their demand. On the other hand, any price below the intersection point will discourage the suppliers and reduce the quantity supplied in the market while buyers are willing to buy more, indicating that there is a shortage. However, there is always a tendency for movement towards the equilibrium point. That is, when there is a surplus, there is a tendency for prices to move downward, and when there is a shortage there is a tendency for price to move upward.

Example: If the market demand and supply functions of wheat are given as $Q_d = 80 - 3P$

and

Qs = 9P -40, respectively. Then, what is the market clearing price in Birr/kg and the corresponding quantity in kg?

Solution: Equate $Q_d = Q_s$ to get the equilibrium price

$$Q_d = Q_s$$

$$80 - 3p = 9p-40 \text{ substitute for } Q_d \text{ and } Q_s$$

$$120 = 12p \text{ rearrange}$$

$$\underline{p^* = 10 \text{ birr/kg}}$$

To get the equilibrium quantity (Q*), substitute this price into either of the functions.

$$Qd = 80 - 3 (10)$$

$$Q^* = \underline{50 \text{ kg}}.$$

Therefore, the market clears when the price is Br.10/kg and both the quantity demanded and supplied are 50 kilograms.

Graphically:
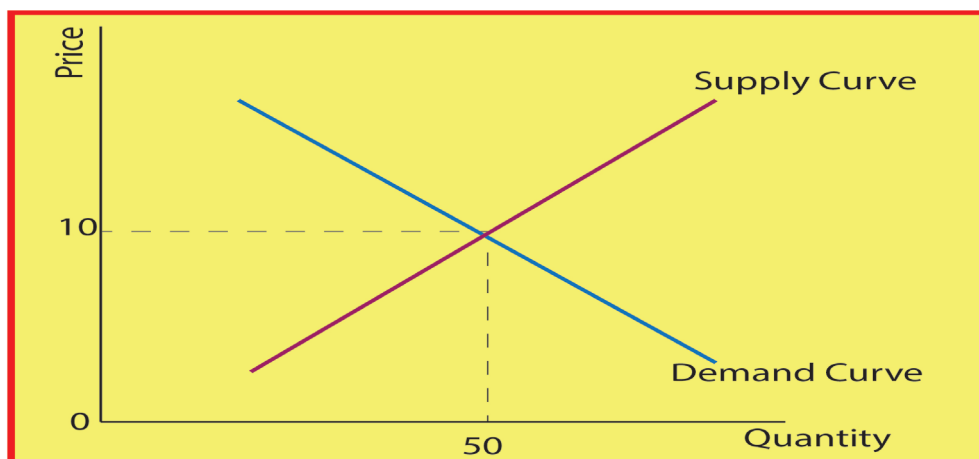
Figure 2.12 Market equilibrium price and quantity

For prices greater than 10, supply is greater than demand, which leads to excess supply (surplus), while prices less than 10 lead to excess demand (shortage).

2.3.3 Effects of change in demand and supply on equilibrium quantity and price

We know that demand might change because of fluctuations in consumer tastes or incomes, changes in consumer expectations, or variations in the prices of related goods. Supply might change in response to changes in resource prices, technology, etc.
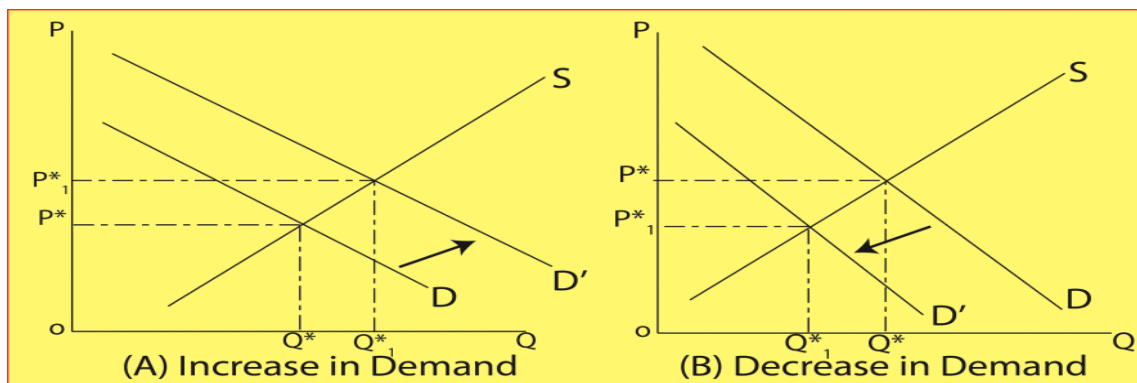
Figure 2.13: The Effect of a change in Demand on the Equilibrium

Changes in Demand: Suppose that supply is constant and increases in demand, leads to a rise in both the equilibrium price and quantity; and also if there is demand fall it leads to decrease in both the equilibrium price and quantity demanded. Look at figures 2. 13 (A) and (B) respectively.

Change in Supply: Let's suppose demand is constant but supply increases (decreases). This will affect the equilibrium by lowering (rising) the new market- clearing price and raising (lowering) the new equilibrium quantity. Look at the following figure 2.14:
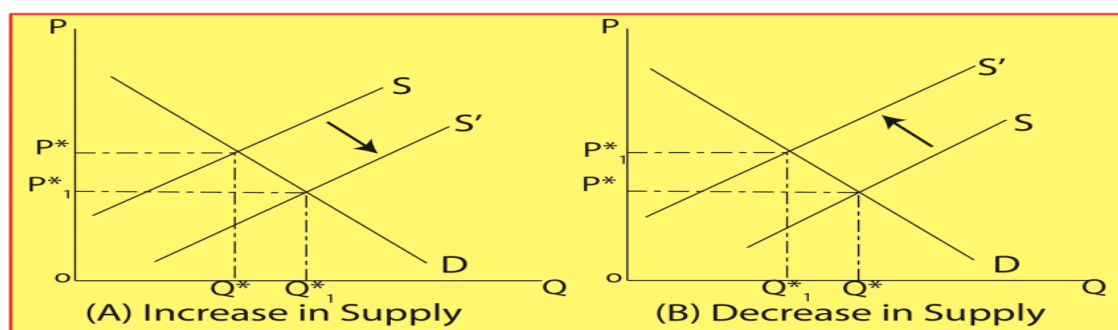
Figure 2.14: The Effect of a change in Supply on the Equilibrium

Table 2.7 Factors Shifting Demand Curve (assume Supply remains constant)				
Factors Changing Demand	Effect on Demand	Direction of Shift in Demand Curve	Effect on Equilibrium Price	Effect on Equilibrium Quantity
Increase in income	Increase	Rightward	Increase	Increase
Decrease in income	Decrease	Leftward	Decrease	Decrease
Increase in price of Substitute	Increase	Rightward	Increase	Increase
Decrease in price of substitute	Decrease	Rightward	Decrease	Decrease
Increase in price of complement	Decrease	Leftward	Decrease	Decrease
Decrease in price of complement	Increase	Rightward	Increase	Increase
Increase in taste and preference for good	Increase	Rightward	Increase	Increase
Decrease in taste and preference for good	Decrease	Leftward	Decrease	Decrease
Increase in number of consumers	Increase	Rightward	Increase	Increase
Decrease in number of consumers	Decrease	Leftward	Decrease	Decrease

Let's see the summary of changes in demand, and changes in supply with the help of tables.

Table 2.8 Factors that shift the Supply Curve (assume demand remains constant)				
Factors Changing Supply	Effect on supply	Direction of Shift in Supply Curve	Effect on Equilibrium Price	Effect on Equilibrium Quantity
Increase in resource price	Decrease	Leftward	Increase	Decrease
Decrease in resource price	Increase	Rightward	Decrease	Increase
Improved technology	Increase	Rightward	Decrease	Increase
Decline in technology	Decrease	Leftward	Increase	Decrease
Expect a price increase	Decrease	Leftward	Increase	Decrease
Expect a price decrease	Increase	Rightward	Decrease	Increase
Increase in number of suppliers	Increase	Rightward	Decrease	Increase
Decrease in number of suppliers	Decrease	Leftward	Increase	Decrease

Self-test exercise 2.3

What is market equilibrium?

Dear distance learner, we hope you did it. Good!

When the quantity demanded in the market exceeds the quantity supplied in the same market, we say there is shortage (excess demand), and when the opposite happens we say there is surplus (excess supply).

Activity 2.3

1. Explain what you mean by surplus and shortage.
2. When demand remains unchanged, what is the effect of a change in supply on price?

2.4 Elasticities of Demand and Supply

Overview:

Dear distance learner, we have discussed in the previous sections how different factors affects demand and supply. In this section you will learn how we measure the change of demand and supply as the result of change in factors affect demand and supply.

Learning Outcomes

At the end of this section, you will be able to:

♦ Define elasticity.
♦ Explain the types of elasticity.
♦ Describe elasticity of demand
♦ Discuss elasticity of supply.
♦ Interpret price elasticity of demand value.
♦ Analyse determinants of price elasticity of supply.

Key Concepts: Elasticity, Price elasticity, Income elasticity, Cross elasticity

Start Up Activity

Dear distance learner, what is elasticity?

Elasticity is a measure of the sensitivity of one variable to another. It tells us the percentage change in one variable in response to a one percent change in another variable.

2.4.1 The Elasticity of Demand

Elasticity of demand is the measure of the responsiveness of demand for a commodity to changes in any of its determinants, such as the price of the commodity, price of related goods, and consumers' income. Accordingly, there are three basic elasticities:

    I. Price elasticity of demand,

    II. Cross-price elasticity of demand &

    III. Income elasticity of demand

I.   **Price elasticity of demand**

Price elasticity of demand is a measure of the degree of responsiveness (or sensitiveness) of consumers to changes in the price of the commodity itself. It may be defined as the ratio of the percentage change in quantity demanded to the percentage change in price. In other words, the price elasticity of demand (E_P^D) is the percentage change in the quantity demanded divided by the percentage change in price. Economists measure the degree of elasticity or inelasticity by the elasticity coefficient (E_P^D), which is given as follows:

$$\text{Price elasticity } (E_P^D) = \frac{\text{Proportinate change in the quantity demanded}}{\text{proportinate change in price}}$$

$$= \frac{\text{Percentage change in the quantity demanded}}{\text{percentage change in price}}$$

Price elasticity of demand is of two types: point elasticity and arc elasticity of demand. Point elasticity of demand: measures elasticity at a (given) point or for a very small change in price. Symbolically, we could write:

$$\text{Price elasticity } (E_P^D) = \frac{\Delta Q/Q}{\Delta P/P} \quad \text{or} \quad E_P^D = \frac{\Delta Q}{\Delta P}\left(\frac{P}{Q}\right)$$

Whereas, arc elasticity refers to price elasticity over a distance on the demand curve. In other words, arc elasticity measures the average responsiveness of consumer demand to changes in price over a range of extended prices. Symbolically, we could write:

$$\text{Arc elasticity of demand} = E_P^D = \frac{\%\,\Delta\, quantity\, demanded}{\%\,\Delta\, price} = \frac{\Delta Q}{\Delta P}\left(\frac{P_1 + P_2}{Q_1 + Q_2}\right)$$

From the down sloping demand curve, we know that price and quantity demanded are inversely related. Thus, the price elasticity coefficient of demand, Ed, will always be a negative number. Therefore, we usually ignore the minus sign and simply present the absolute value of the elasticity coefficient to avoid any ambiguity that might otherwise arise.

Interpreting Price Elasticity of Demand Values

a) **Price Elastic Demand:** demand is said to be relatively elastic if a specific percentage change in price results in a larger percentage change in quantity demanded. Then, E_P^D will be greater than 1.

b) **Price Inelastic Demand:** If a given percentage change in price is accompanied by a relatively smaller change in the quantity of the good or service, then demand is said to be relatively inelastic.

For example, if a 10% increase in a product's price is accompanied by only a 2% decrease in the quantity demanded, the price elasticity of demand will be $E_P^D = 0.02/0.1 = 0.2 < 1$

c) **Unitary Elastic:** When a percentage change in price and the accompanying percentage change in quantity demand are equal, the case separating elastic and inelastic demands is said to be unitary elastic. For example, if a 6% change in price results in a 6% change in quantity demanded, then $E_P^D = \dfrac{6\%}{6\%} = 1.$

d) **Perfectly Inelastic:** this is a situation in which the quantity demanded of a certain product is invariable relative to the change in the price. The elasticity coefficient is equal to zero ($E_P^D = 0$).This shows that a change in the price of a good or service does not bring about in any change in the quantity demanded i.e. $(\Delta Q = 0)$.

e) **Perfectly Elastic:** denotes that a 1% change in price results in an infinite change in quantity demanded. In this regard, the consumer can buy all possible quantities at the given price and nothing else at other prices.

Table 2.9 Summary of Price Elasticity of Demand

Elasticity	Description	Implication
$/E_P^D/ > 1$	Elastic	$\% \Delta Q > \% \Delta P$
$/E_P^D/ = 1$	Unitary elastic	$\% \Delta Q = \% \Delta P$
$0 </E_P^D/ < 1$	Inelastic	$\% \Delta Q < \% \Delta P$

Example**:** Given table 2.10 demand schedule

Points	A	B	C	D	E
Price (Birr)	0	2	4	6	8
Quantity	800	600	400	200	0

Find the price elasticity of demand between two points (B and C).

Solution: Using demand arc elasticity.

$$\Rightarrow \text{Price elasticity } (E_p^D) = (\frac{600-400}{2-4})(\frac{2+4}{600+400}) = /-0.6/ = 0.6$$

Self-Test Exercise 2.4

From table 2.10 (demand schedule), find the price elasticity of demand between two points (C and E).

Dear distance learner, we hope you did it. Good!

$$\Rightarrow \text{Price elasticity } (E_p^D) = (\frac{400-0}{4-8})(\frac{4+8}{400+0}) = /-3/ = 3$$

The price elasticity of demand depends on the following factors:

- Nature of the commodity: The demand for necessities is inelastic because the demand does not change much with a change in price. But the demand for luxuries is elastic in nature.

- Availability of close substitutes: The commodity that has the greatest number of substitutes has relatively elastic demand. A commodity with fewer substitutes has relatively inelastic demand.

- People with high incomes are less affected by price changes than people with low incomes.

- Proportion of income spent on the commodity: When a small part of income is spent on the commodity, the price change does not affect the demand. Therefore, the demand is inelastic in nature.

- Urgency of demand / postponement of purchase: The demand for certain commodities is highly inelastic because you cannot postpone their purchase. For example, medicines for any sickness should be purchased and consumed immediately.

- Durability of a commodity: If the commodity is durable, then it will be used for a long period of time. Therefore, the elasticity of demand is high. Price changes highly influence the demand for durables in the market.

- Product purchase frequency or recurrence of demand: Demand for frequently purchased goods is more elastic than demand for rarely purchased goods.

- Time: In the short run, demand will be less elastic, but in the long run, demand for commodities will be more elastic.

II.   Cross Elasticity of Demand

The quantity demanded of a particular commodity varies according to the price of other commodities. Cross elasticity measures the responsiveness of the quantity demanded of a commodity due to changes in the price of another commodity. For example, the demand for tea increases when the price of coffee goes up. Here, the cross elasticity of demand for tea is high. If two goods are substitutes, then they will have a positive cross elasticity of demand. In other words, if two goods are complementary to each other, then negative cross elasticity may arise.

The responsiveness of the quantity of one commodity demanded to a change in the price of another good is calculated with the following formula. The cross elasticity of demand is defined as the proportionate change in quantity demanded of X resulting from a proportionate change in the price of Y.

$$\text{Cross elasticity}\,(E_{XY}^{D}) = \frac{\text{Proportinate change in demanded for commodity X}}{\text{proportinate change in Price of commodity Y}}$$

$$= \frac{\text{Percentage change in demanded for commodity X}}{\text{percentage change in Price of commodity Y}}$$

$$E_{XY}^{D} = \frac{\Delta Q_X}{\Delta P_Y}\left(\frac{P_Y}{Q_X}\right)$$

This coefficient tells us whether the two goods (say X and Y) are substitutes, complements, or independent (unrelated).

Substitute goods: If the cross elasticity of demand is positive, that is, the quantity demanded of X moves in the same direction as a change in the price of Y then X and Y are substitute goods. Example: Coca-Cola (X) and Pepsi (Y). An increase in the price of Pepsi (Y) causes consumers to buy more Coca-Cola (X). In general, the larger the positive cross elasticity coefficient, the greater the substitutability between the two products, cetris paribus.

Complementary goods: *We know that X and Y "go together" when cross elasticity is negative.* An increase in the price of one decreases the demand for the other. So, the two are complementary goods. The larger the negative cross elasticity coefficient, the greater the complementarity between the two goods.

Independent goods: A zero cross elasticity suggests that the two products are unrelated or they are independent goods.

III.   Income Elasticity of Demand

Income (I) Elasticity of Demand measures the percentage change in the amount of a commodity purchased per unit time resulting from a given percentage change in a consumer's income. That is,

$$\text{Income elasticity}\,(E_{I}^{D}) = \frac{\text{Proportinate change in the quantity demanded}}{\text{proportinate change in Income (I)}}$$

$$= \frac{\text{Percentage change in the quantity demanded}}{\text{percentage change in Income (I)}}$$

$$\text{Income elasticity } (E_I^D) = \frac{\Delta Q / Q}{\Delta I / I} \qquad \text{OR} \qquad E_I^D = \frac{\Delta Q}{\Delta I}\left(\frac{I}{Q}\right)$$

It is measured by dividing the percentage change in quantity demanded by the percentage change in income. If the demand for a commodity increases by 10% when income increases by 5%, then the income elasticity of that commodity is said to be positive and relatively high. If the demand for food were unchanged when income increased, the income elasticity would be zero. A fall in demand for a commodity when income rises results in a negative income elasticity of demand. The income (Y) elasticity is defined as the proportionate change in the quasntity (Q) demanded resulting from a proportionate change in income. The following are the various types of income elasticity:

- **Negative Income Elasticity:** The increase in the income of consumers leads to less purchase of those goods ($E_I^D < 0$). This implies the commodity is inferior good.

- **Income Elasticity is greater than one:** The change in income increases the demand for that commodity more than the change in income ($E_I^D > 1$). This implies the commodity is normal good.

- **Income Elasticity is less than one:** The change in income increases the demand for the commodity, but at a lesser percentage than the change in income ($E_I^D < 1$).

  Example: Based on table 2.11 below, answer the following question:

Table 2.11 Income schedule

Income (I) Birr per year	12,000	16,000	20,000	24,000	28,000
Quantity (Q) unit per year	10	15	18	20	19

Determine income elasticity (E_I^D) at Birr16, 000 level of income.

Solution

Recall that, $\text{Income elasticity } (E_I^D) = \frac{\Delta Q}{\Delta I}\left(\frac{I}{Q}\right)$

$\text{Income elasticity } (E_I^D) = \frac{15 - 10}{16000 - 12000}\left(\frac{16000}{15}\right) = \frac{4}{3} > 1$; The change in income increases the demand for that commodity more than the change in income. This implies the commodity is luxury good.

Self-Test Exercise 2.5

From table 2.11, compute the income elasticity of demand at an income level of Birr 20,000.

Dear distance learner, we hope you did it. Good!

$\Rightarrow$ Income elasticity$(E_I^D) = (\dfrac{20000\text{-}18000}{18\text{-}15})(\dfrac{18}{20000}) = 0.6$

2.4.2 Elasticity of supply

Price elasticity of supply measures the degree of responsiveness or reaction of producers to price changes. The greater the reaction is the greater the elasticity. The lesser the reaction is the smaller the elasticity. If the price of coffee rises, for example, producers may be tempted to sell more in the market and keep less in stock.

Formally, the price elasticity of supply (E_P^S) is the percentage change in quantity supplied divided by the percentage change in price of the commodity. That is,

Price elasticity $(E_P^S) = \dfrac{\text{Proportinate change in the quantity Supplied}}{\text{proportinate change in price}}$

$= \dfrac{\text{Percentage change in the quantity supplied}}{\text{percentage change in price}}$

$$E_P^S = \dfrac{\%\Delta Q_s \; of \; product \; X}{\%\Delta \; price \; of \; X} \; ,$$

$$E_P^S = \dfrac{\Delta Q_s}{\Delta P_x} . \dfrac{P_x}{Q_s}$$ - Point elasticity of supply

Whereas, $$E_P^S = \dfrac{\Delta Q_s}{\Delta P_x} . (\dfrac{P_1 + p_2}{Q_1 + Q_2})$$ - Arc elasticity of supply

The coefficient of E_P^S is defined as E_P^D except that we substitute "percentage change in quantity supplied" for "percentage change in quantity demanded."

The interpretations we used for price elasticity of demand also work for price elasticity of supply.

That is, if

- $E_P^S > 1$, supply is elastic;

- $E_P^S < 1$, then supply is inelastic; and

- $E_P^S = 1$, then supply is unitary elastic.

As the law of supply states, price and quantity supplied of a product are directly related. Hence, price elasticity of supply is positive.

Example: Given table 2.12 Supply schedule.

Price in Birr	60	80	100	120
Quantity supplied	14	16	18	20

Elasticity of supply when price is Birr 80 is:

Recall, $E_P^S = \dfrac{\Delta Q_s}{\Delta P_x} \cdot \dfrac{P_x}{Q_s}$ - Point elasticity of supply

$$\Rightarrow E_P^S = \frac{\Delta Q_s}{\Delta P_x} \cdot \frac{P_x}{Q_s} = (\frac{16-14}{80-60})(\frac{80}{16}) = 0.50$$

Determinants of the price elasticity of supply: There are factors which determine the price elasticity of supply. The main factors are:

- **Expectation of future prices:** If producers expect a rise in the price of a commodity in the future, they will likely hoard the commodity to take advantage of the rise in future prices. The supply will, therefore, be less elastic. On the other hand, if they expect a fall in future prices, they will release the goods from their stocks. The supply will be more elastic.

- **Production period:** The amount of time available to producers for responding to changes in product price is the main determinant of price elasticity of supply. Generally, supply is relatively elastic to price changes in the long-run and relatively inelastic in the short-run. The reason why supply is elastic for a longer period is that suppliers might produce good substitutes. In other words, time for adjustment is important because most production activities cannot be changed in scale overnight.

- **Factor substitution:** If there are greater substitutes for factors of production, supply is more elastic. Whenever there is a slight change in the price of a factor input, it can be substituted for others, making supply quite elastic. With no substitutes, supply becomes inelastic.

- **Number of sellers:** The market's supply will be more elastic when there are large numbers of firms serving the market. With a smaller number of firms/sellers, supply becomes inelastic.

Self-Test Exercise 2.6

Explain the meaning and types of elasticity

Dear distance learner, we hope you did it. Good!

Elasticity of demand is the measure of responsiveness of demand for a commodity to the changes in any of its determinants, such as price of the commodity, price of related goods, and consumers' income. Accordingly, there are three basic elasticities. These are Price elasticity of demand, Cross-price elasticity of demand and Income elasticity of demand.

Unit Summary

Demand for a commodity refers to the amount that will be purchased at a particular price during a particular period of time. The demand curve shows how the quantity of a good demanded depends on the price. According to the law of demand, as the price of a good falls, the quantity demanded also rises. Therefore, the demand curve slopes downward.

In addition to price, other determinants of the quantity demanded included the income of the consumer, the prices of substitutes and complements, consumer tastes and preferences, consumer expectation, the number of consumers in the market, etc. If one of these other determinants changes, it leads to demand curve shifts. Individual demand for a commodity is the amount purchased by a single consumer at a given price during a particular period of time; while market demand is the horizontal summation of individual demand.

In a market, while buyers of a product constitute the demand side of the market, sellers of that product make up the supply side of the market. Supply may be defined as a schedule, equation or a curve that shows the various amounts of a product that a producer (firm) is willing and able to produce and make available for sale in the market over a specific time period, at given prices, ceteris paribus. Holding other factors constant, the quantity supplied of a good or service is the amount offered for sale at a given price.

The supply curve shows how the quantity of a good supplied depends on the price. According to the law of supply, as the price of a good rises, the quantity supplied also rises. Therefore, the supply curve slopes upward. In addition to price, other determinants of the quantity supplied include input prices, technology, and expectations. If one of these other determinants changes, it causes the supply curve to shift.

The intersection of the supply and demand curves determines the market equilibrium. At the equilibrium price, the quantity demanded equals the quantity supplied. The behavior of buyers and sellers naturally drives markets toward equilibrium. When the market price is above the equilibrium price, there is a surplus of the good, which causes the market price to fall. When the market price is below the equilibrium price, there is a shortage, which causes the market price to rise.

Elasticity of demand refers to the degree of responsiveness of the quantity demanded of a commodity to changes in any of its determinants. Price elasticity of demand is the ratio of a percentage change in a commodity's quantity demanded to a given percentage change in its price.

The numerical value of the price elasticity of demand ranges from zero to infinity.

Price elasticity of supply measures the degree of responsiveness/ reaction of producers to price changes. The greater the reaction is the greater he elasticity; and the lesser the reaction, the smaller the elasticity. Like the elasticity of demand, the numerical value of the price elasticity of supply ranges from zero to infinity.

Check List

Dear distance learner, we hope you enjoyed working on this section. Now it is time to check your understanding about evolution of money. Read each question and put a tick (√) mark in the 'yes' or 'no' box, which helps you decide on your level of understanding of the points presented so far.

Objectives	Yes	No
Can you explain the theory of demand?		
Can you distinguish between individual and market demand?		
Can you describe the theory of supply?		
Can you identify factors that affect demand and supply?		
Can you distinguish between individual and market supply		
Can you demonstrate market equilibrium both graphically and mathematically?		
Can you evaluate the effect of changes in demand and supply on equilibrium price and quantity?.		
Can you define elasticity?		
Can you calculate and interpret the different types of elasticity?		

Dear distance learner, did you mark any box under the 'No' column? If so, please look at the corresponding item to the left and go back to your text and read about it.

Unit Review Exercise

Part I: Write 'True' if the statement is correct or 'False' if the statement is incorrect.

1. The law of demand states that the inverse relationship between price of the commodity and quantity demanded.
2. If the cross elasticity of demand between two goods is 0 the two goods are unrelated.
3. The market demand curve is flatter than the individual demand curves.
4. At equilibrium, the market demand and supply curves intersect each other.
5. Market is a place, condition, or mechanism that brings together both buyers and sellers in order to exchange their goods and services.
6. If income elasticity of demand is negative, the commodity is luxury good.
7. Supply is the amount of a product which a producer is willing and provides to sell.
8. An increase in market demand and a decrease in market supply lead to raising the equilibrium price.
9. Change in technology the main factor affect supply.
10. The value of the cross elasticity of demand between coca-cola and Pepsi-cola is positive.

Part II: Multiple-choice items.

Direction: Read the following questions and choose the correct answer from the given alternatives.

1. Which one is the correct definition of demand, ceteris paribus?

    A . It is a willingness and ability to buy goods and services.
    B . It is an individual's willingness to buy goods and services.
    C . It is the amount of a product which a producer is willing to sell.
    D . All

2. Which of the following statements about the demand curve is true?

    A . The slope of the demand curve is upward from left to right
    B . The slope of the demand curve is downward from left to right
    C . The slope of the demand curve is parallel to the X-axis
    D . The slope of the demand curve is parallel to the Y-axis

3. Which of the following statements is true?

    A . In the case of necessity goods, the fall in prices does not lead to an increase in demand
    B . In the case of luxury goods, the rise in prices lead to an increase in demand.
    C . In the case of luxury goods, the fall in prices does not lead to an increase in demand
    D . None of the above

4. Which of the following statements about demand is correct?

    A . The main factor that affects the demand for a product or a service is its price
    B . The main factor that affects the demand for a product or a service is the change in income levels of the consumer

C. The main factor that affects the demand for a product or a service is the taste of a consumer

D. All of the above

5. Which of the following statements is correct?

A. Goods that can be used alternatively to each other are known as substitute goods
B. Goods that can be used alternatively to each other are known as luxury goods
C. Goods that can be used alternatively to each other are known as complementary goods
D. All of the above

6. When the price of coffee rises, the demand for tea,

A. Decrease
B. Increase
C. Stays the same
D. None of the above

7. Which one of the following factors determines demand?

A. Price of the product itself.
B. Consumer's income.
C. Size of population.
D. All of the above

Part III: Write detail answers to the following.

1. What does the law of supply state?
2. What is the difference between the causes behind movement along the demand curve and the shift of the demand curve?
3. If the demand and supply functions of a good are given as $Q = 250-3P$ and $Q = 2P – 50$, respectively; determine

   A. Equilibrium price.
   B. Equilibrium quantity.
   C. From the above information, would there be a shortage or surplus if the government decided the market price to be 75 units?

Answers to Activities

<div style="text-align:center">Activity 2.1</div>

1. Demand means the ability and willingness to buy a specific quantity of a commodity at the prevailing price in a given period of time. Thus, Demand = Willingness to buy + Ability to pay

2. There are various factors affecting the demand for a commodity, some of these are;

   - Price of the good
   - Price of related goods
   - Consumer's Income
   - Taste and habits
   - Population: if the size of the population is more, demand for goods will be more.
   - Season**:** The demand for a commodity is also affected by season.
   - Consumer's future price expectation

3. Demand could be expressed in the form of functions, schedules, or curves. Demand schedule can be constructed for any commodity if the list of prices and quantities purchased at those prices are known. A demand curve is a curve which represents the relation between the quantity of the good chosen by a consumer and the price of the good.

4. What is the difference between changes in quantity demanded and changes in demand?

   Change in quantity demanded: Other things being equal, it designates the movement form one point to another point – from one price quantity combination to another – on a fixed demand schedule or demand curve.

   Change in Demand: A change in one or more of the determinants of demand (other than own price) will change the demand data (the demand schedule). A change in the demand schedule, or graphically, a *shift* in the location of the demand curve is called a change in demand.

5. What meant by individual demand and market demand?

   Individual Demand: Individual demand may be defined as the quantity of a commodity that a person is willing and able to buy at given prices over a specified period of time.

   Market Demand: Market demand refers to the total quantity that all the users of a commodity are willing and able to buy at given prices over a specific period of time.

<div style="text-align:center">Activity 2.2</div>

1. Supply is the total amount of a given product or service a producer (firm) is willing and able to produce and make available for sale in the market over specific time period, at given prices, ceteris paribus.

2. Supply affected by several factors such as price, demand, technology, etc.

1. When the quantity demanded in the market exceeds the quantity supplied in the same market, we say there is shortage (excess demand), and when the opposite happens we say there is surplus (excess supply).
2. When demand remains constant and increases in supply, leads to decreases in the equilibrium price; and also if there is supply fall it leads to increase the equilibrium price.

Answers to Review Exercises

Part I

1. True	2. True	3. true	4. true	5. true
6. false	7. true	8. true	9. true	10. false

Part II

1. **A**	2. **B**	3. **A**	4. **D**
5. **A**	6. **B**	7. **D**	

Part III

1. The Law of supply expresses the direct relationship between the prices of a commodity and its quantity supplied. Price and supply are positively related. Hence, the slope of supply curve is positive.

2. **Change in quantity demanded:** Other things being equal, it designates the movement from one point to another point from one price quantity combination to another on a fixed demand schedule or demand curve. The cause of such a change is an increase or decrease in the price of the product being considered. Downward movement along the demand curve is called extension of demand, while the upward movement as contraction of demand.

   A change in the demand schedule, or graphically, a *shift* in the location of the demand curve is called a change in demand. An increase in demand causes the demand curve to shift upward to the right; whereas, a decrease in demand causes the demand curve to shift down ward to the left. In other words, while an increase in demand is explained by an outward shift of the demand curve, a decrease in demand is explained by an inward shift of the demand curve.

3. If the demand and supply functions of a good are given as Q = 250-3P and Q = 2P - 50, respectively;

   A) Equilibrium price.
   $\Rightarrow$ At equilibrium   250-3P = 2P - 50,
   $\Rightarrow$ 5P=300
   $\Rightarrow$ P=300/5
   $\Rightarrow$ P=60

B) Equilibrium quantity.

$\Rightarrow Q = 250-3(60)$

$\Rightarrow Q = 250-180$

$\Rightarrow Q = 70$

When market price be 75:

Q=250-3P   (Demand)

Q=250-3(75)

Q = 250- 225

Q=25

Q = 2P + 50 (Supply)

Q = 2(75) + 50

Q = 150 + 50

Q=200

Thus, Demand < Supply, the market will face surplus.

Unit 3

Theories of Production and Cost

Unit Introduction

In the previous unit, we have discussed the theory of demand and supply. In this unit, we move to the theory of production and cost, which emphasizes the behavior of firms in the production of goods and services. Firms incur costs when they buy inputs to produce the goods and services that they plan to sell. In this unit, we examine the link between a firm's production process and its total cost.

Unit Outcomes

After completing this unit, you will be able to:

- State production and production functions in the short and long run.
- Derive and draw the various average and marginal functions from the total functions.
- Calculate the average and marginal cost and productivity values.
- Draw and explain the relationship between different types of cost curves.
- Show the relationship between production and cost curves.
- Discuss the stages of production.
- Analyze the concept of returns to scale in production.

The Required Study Time: 9 hours

Unit Learning Strategies

Dear distance learner, remember each unit has a self-study format. The following learning strategies will help you study this unit.

- Reading the topics
- Doing various activities
- Completing written exercises
- Activities based on the learner's experience
- Extra-curricular learning
- Scenario-based activity
- Auto tutorial instruction

3.1 Theory of Production

⊕ Overview:

Dear Distance learners, as we have discussed the behaviour of the consumers in the previous unit, in this unit we shall examine the behaviour of a producer. Production is the process by which inputs are transformed into 'output'. Production is carried out by producers or firms.

🎯 Learning Outcomes

At the end of this section, you will be able to:

- Define the function of production.
- Describe short run and long run production functions.
- Calculate the average and marginal products.
- State the law of diminishing marginal productivity and its implications.
- Explain the concept of returns to scale.
- Clarify the stages of production,
- Mention the properties of isoquants.
- Analyse technology change and the position of production curves.

Key Concepts: Production, production function, isoquant, returns to scale

❓ Start Up Activity:

Dear distance learner, how do you define 'production'? What are needed to undertake production?

Introduction

📖 Production is a scientific process that involves the transformation of raw materials (inputs) into desired products or services (outputs) by adding economic value. Production of goods and services involves transforming resources such as labor power, raw materials, services, and machines into finished products.
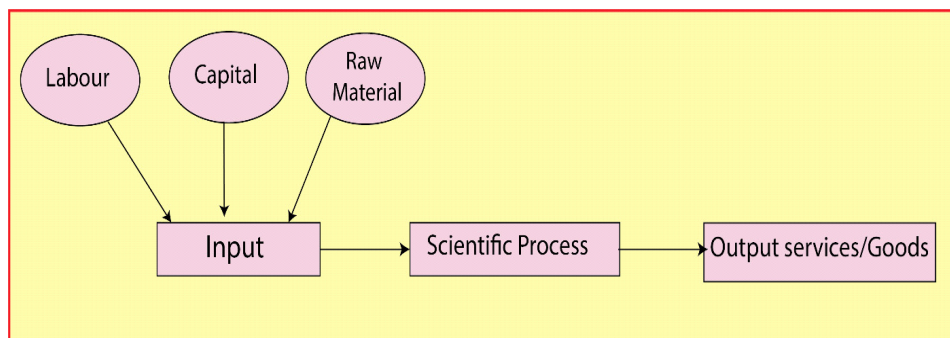

Figure 3.1 Production

3.1.1 Short Run Production Function

As you may recall from your grade 9th economics class, the term short-run refers to the period of time over which at least one factor of production is fixed. In the real world, land and capital (such as plants and equipment) are usually treated as fixed factors. The long run is the period of time (planning horizon) which is sufficient when all quantities of inputs are variable. Here we are considering a simple production process with only two factors. We treat capital as the fixed factor, and labor as the variable factor.

Production with one variable input: Production with one variable input (while the others are fixed) is obviously a short run phenomenon. So, let's now consider a farmer producing wheat. To the farmer, the only variable input is assumed to be labor, and all other inputs, like land, capital, and technology, are fixed inputs.

That is to say: $$Q = F(L, \ \bar{L}_a, \ \bar{K}, \ \bar{T} \ )$$

Where, Q=Quantity (output), L = Labor, L_a = Land, K = Capital, T = Technology, and the bar implies constant. So the short run production function tells us only the effect of a change in the farmer's labor on the production of wheat, while keeping the size of land, capital, and technology constant.

The following are the three basic concepts of the production function:

- Total physical product (total product) **(TP)**
- Average physical product (Average product) **(AP)**
- Marginal physical product (marginal product) **(MP)**

Total product (TP): refers to the total output produced by a given amount of a variable input, keeping the quantity of other (fixed) inputs constant. It is the overall amount of output produced by the factors of production employed over a given period.

Average Product (AP): To calculate the average product (AP), the total product is divided by the number of units of that input. Suppose in the production of wheat, the AP of a farmer is obtained by dividing the total output by the number of workers employed.

This can be put in the form of: $$AP_L = \frac{\text{Total product}}{\text{Number of workers}} = \frac{TP}{L}$$

Where AP_L denotes Average Product of Labor, TP denotes Total Product, and L denotes Labor. An average product measures the output per worker, which is an indication of the productivity of the input.

Marginal Product (MP): The marginal product (MP) is the extra or additional output obtained with one extra unit of the variable input while all other variables remain constant. In other words, the MP is the percentage change in total output resulting from a percentage change in variable input, all other things being equal.

$$MP_L = \frac{\text{Change in total product}}{\text{Change in number of workers}} = \frac{\Delta TP}{\Delta L}$$

Mathematically,

As a result, the marginal product (MP) is equal to the slope of the total product (TP). Generally, we can say that the three, i.e. total product (TP), marginal product (MP), and average product (AP), are interrelated.

The Law of Diminishing Marginal Productivity: In any production function with a fixed level of some of the inputs, it is impossible to expand the level of production indefinitely. Initially, as more of the variable inputs are employed together with the fixed ones, the output level increases dramatically to a certain extent, i.e. the marginal contribution of one more variable input (say, labor) increases sharply. But as the number of labor employed increases with a fixed capital, the production capacity goes to exhaustion and eventually the total output declines, i.e. the additional contribution of extra laborers employed becomes a loss or negative. Therefore, according to the law of diminishing returns, increasing the amount of the variable factor (labor) with the fixed factor (capital) will lead to an eventual decline in the marginal contribution of the additional labor to the total output. This is also accompanied by an eventual decline in total output.

Stages of production: Assume capital is fixed. The production function shows different levels of output that the firm can obtain by efficiently utilizing different units of labor. In the short run production function above, the quantity of capital is fixed. Thus, output can change only when the amount of labor used for production changes. Hence, total production (TP) or total quantity (Q**)** is a function of labor (L). Now let us take a hypothetical example (table 3.1**)** that explains how a farmer can produce wheat on fixed land (one hectare of land) by changing only the amount of labor.

Table 3.1 short run productions and stages production

Fixed input (a hectare of land)	Variable input (labor)	Total Product (TP) (In quintals)	Average product	Marginal Product	Stages of production
1 hectare	0	0	---	---	Stage I
»	1	5	5	5	
»	2	11	6	5.5	
»	3	19	8	6.33	
»	4	30	11	7.5	
»	5	40	10	8	
»	6	48	8	8	
»	7	54	6	7.71	Stage II
»	8	57	3	7.12	
»	9	59	2	6.56	
»	10	60	1	6	
»	11	60	0	5.4	
»	12	58	-2	4.80	Stage III
»	13	55	-3	4.23	
»	14	51	-4	3.64	
»	15	45	-6	3	

Stages of Production: as table 3.1 shows, the total product goes through three different stages.

- Stage I (increasing returns stage): this stage includes the range of variable inputs at which the MPL continues to rise, i.e., up to the point of MP_L.

- Stage II (the diminishing returns stage): this stage includes the value over which MP_L is positive but decreasing.

- Stage III (negative returns stage): defined as a range of negative MPL or decreasing TP.

- In this stage of production, since MP_L is negative, additional units of variable inputs (L) actually cause a decrease in TP.

From table 3.1, we can sketch the graph to show the relationships between the variables, and also to explain the law of diminishing marginal returns.
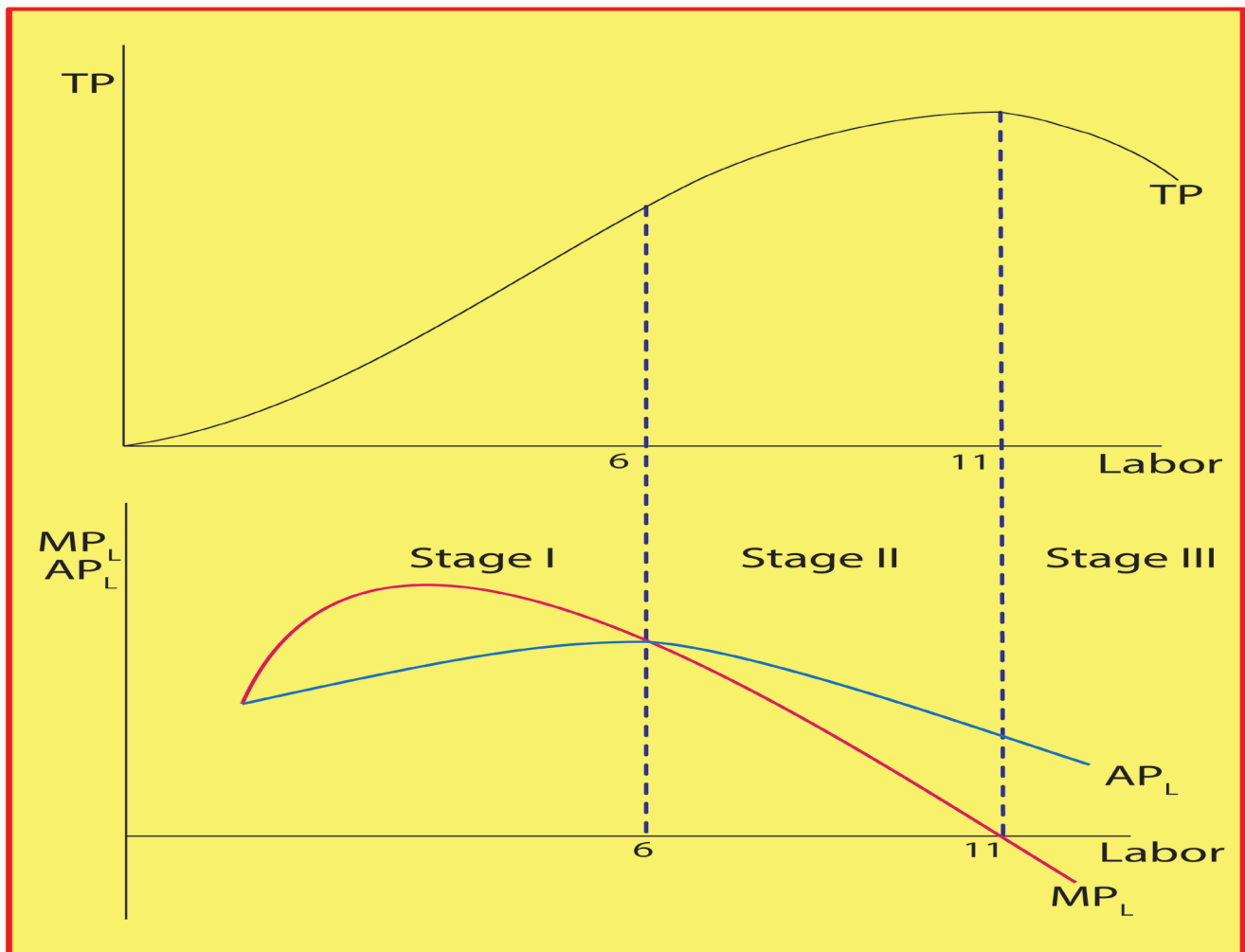
Figure 3.2 Production curves and stages of production

As you can see from the above graph, as we add more units of labor on the fixed inputs, our total product first increases. It then reaches its maximum and starts to fall. The same is true for MP_L and AP_L. TP and MPL are related in the following ways:

- MP_L increases when TP increases at an increasing rate.
- It starts to fall but then remain positive when TP increases at a decreasing rate.
- MP_L reaches zero when TP is maximum and

When TP is falling, MPL becomes negative. AP_L also increases first, reaches its maximum, and starts to fall, but it remains positive whenever TP is positive.

The Relationship between MP_L and AP_L: As you have seen from the above figure, the MP_L curve reaches its maximum before the AP_L curve. Also, as long as the AP_L is rising, the MP_L is above it; when the AP_L is falling, the MP_L is below it. When the AP_L is at its maximum, the MPL is equal to the AP_L. Thus,

- For the AP_L to rise the addition to TP (or MP_L) must be greater than the previous AP_L, i.e. AP_L rises when $MP_L > AP_L$.
- For the AP_L to fall, the addition to TP (or MP_L) must be less than the previous average, i.e. AP_L falls when $MP_L < AP_L$.

- For the AP_L to remain unchanged, the addition to total product (or MP_L) must be equal to the previous Average. i.e. AP_L is at its maximum if $AP_L = MP_L$.

3.1.2 The Long-Run Production Function

Assume production with two variable inputs. In our earlier discussion of the short run production function and stages of production, we assumed labor as a variable input and capital as a fixed input. Now we turn to the long–term analysis of production. Remember that, long run is a period of time (planning horizon) which is sufficient for the firm to change the quantity of all inputs.

In order to produce an output, a firm may require any number of different inputs. Assume, however, that a firm produces output using only two factors of production: labor and capital. With both factors variable, a firm can usually produce a given level of output by combining different amounts of labor and capital. The output from the various combinations of inputs can be shown by using isoquant.

Isoquant: An isoquant is a curve that shows all possible efficient combinations of inputs that can yield equal level of output. If both labor and capital are variable inputs, the production function will have the following form.

$Q = f (L, K)$; given this production function, the equation of an isoquant, where output is held constant at $\overline{Q}$ is $\overline{Q} = f (L, K)$

Thus, isoquants show the flexibility that firms have when making production decision: they usually obtain a particular output (Q) by substituting one input for the other. The production isoquant may assume different shapes depending on the degree of substitutability of factors. However, most of the time, the smooth or convex isoquant is used in the traditional economic theory, and we shall consider it in this section.

An isoquant schedule: is a tabular representation of the various combinations of two variable inputs that give the same level of output. Suppose that a firm seeks to produce 100 units of output by using two variable inputs, L and K (say, labor and capital, respectively). It can do so by employing different combinations of L and K. The hypothetical table 3.2 shows the different combinations the firm could make to produce the given level of output.

Table 3.2: Factor Combinations to Produce a Given Level of Output (Isoquant Schedule)

Factor Combinations	labour (units)	Capital (units)	Output (units)
A	1	11	100
B	2	7	100
C	3	4	100
D	4	2	100
E	5	1	100

Table 3.2 shows that input combination A, consisting of 1 unit of labor (L) and 11 units of capital (K), produces 100 units of output. While combination B consists of 2 units of labor and 7 units of capital. Similarly, combination C consists of 3 units of labor and 4 units of capital, and so on. Figure 3.3 is constructed from Table 3.2 by joining the points of different

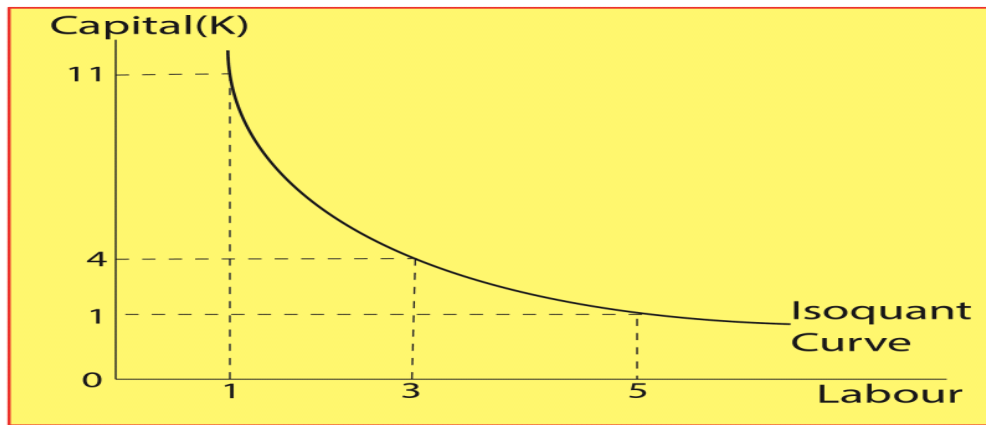combinations of labor and capital required to produce 100 units of output.

Figure 3.3- Isoquant Curve

An isoquant map is a graph combining several or a set of isoquants. An isoquant map is another way of describing a production function. The level of output increases as we move upward to the right, while it remains constant along an isoquant.
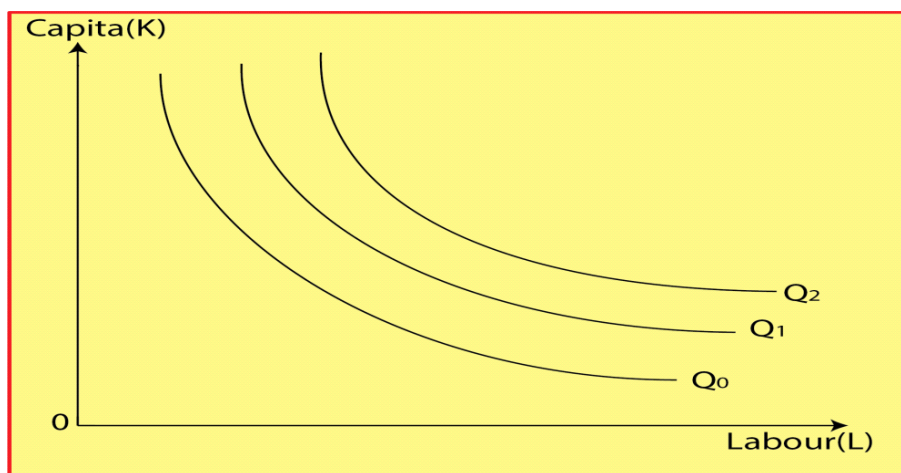
Figure 3.4 Isoquant map

Properties of isoquants

i. Isoquants are down ward sloping: implying that if more of one factor is used, less of the other factor is needed for producing the same level of output.

ii. The further an isoquant lays away from the origin, the greater the level of output it denotes.

iii. Isoquants do not cross each other.

iv. Isoquants are convex to the origin.

The slope of an isoquant/ marginal rate of technical substitution (MRTS): The slope of the isoquant ($\Delta K/\Delta L$) defines the degree of substitutability of the factors of production. This slope decreases (in absolute terms) as we move downwards along the isoquant. The slope of the isoquant is called the rate of technical substitution, or the marginal rate of technical substitution (MRTS) of factors. MRTS of labor for capital, denoted as $MRTS_{L,K}$ shows the amount by which the input of capital can be reduced when one extra unit of labor is used so that output remains constant.

The "steepness" of an isoquant determines the rate at which the firm can substitute between labor and capital in its production process. The $MRTS_{L,K}$ tells us the following:

- The rate at which the quantity of capital can be decreased for every one unit increase in the quantity of labor, holding the quantity of output constant, or
- The rate at which the quantity of capital must be increased for every one unit decrease in the quantity of labor, holding the quantity of output constant

As we move down along the isoquant, the slope of the isoquant increases (i.e., becomes less negative), which means that the $MRTS_{L,K}$ gets smaller and smaller. This property is known as diminishing marginal rate of technical substitution. When a production function exhibits diminishing marginal rate of technical substitution (i.e., when the $MRTS_{L,K}$ along an isoquant decreases as the quantity of labor L increases), the isoquants are convex to the origin (i.e., bowed in toward the origin).

Returns to Scale: In the previous section, we explored the extent to which inputs could be substituted for each other to produce a given level of output. In this section, we study how increases in all input quantities affect the quantity of output the firm can produce. When inputs have positive marginal products, a firm's total output must increase when the quantities of all inputs are increased simultaneously, that is, when a firm's scale of operations increases. Often, though, we might want to know by how much output will increase when all inputs are increased by a given percentage amount.

In the long run, where all inputs are variable, output can be increased by changing all factors by the same proportion. The concept of returns to scale tells us the percentage increase in output when a firm increases all of its input quantities by a given percentage amount. We have three cases of returns to scale: increasing, constant, and decreasing returns to scale.

- **Increase returns to scale:** this is the case where increasing all factors by the same proportion 'm' leads to an increase in output by more than 'm' scale.

- **Constant returns to scale**: if we increase input by some factor 'm' and output is increased by the same proportion as inputs 'm' then it is called constant returns to scale. In this case, the size of the firm's operation doesn't affect the productivity of its factors.

- **Decreasing returns to scale:** When scaling up all inputs by 'm' results in a scaling up of output by less than 'm', this is referred to as decreasing returns to scale. This is because difficulties in organizing and running a large scale operation may lead to decreased production of both labor and capital.

- **Technology Change and the Position of Production Curves:** Technological change (progress) makes factors of production more productive or the production system more efficient so that the firm will get higher output from the same combinations of labor and capital than before. Figure 3.5 shows *upward* movement of the total product curve indicating higher output level can be achieved from the same input
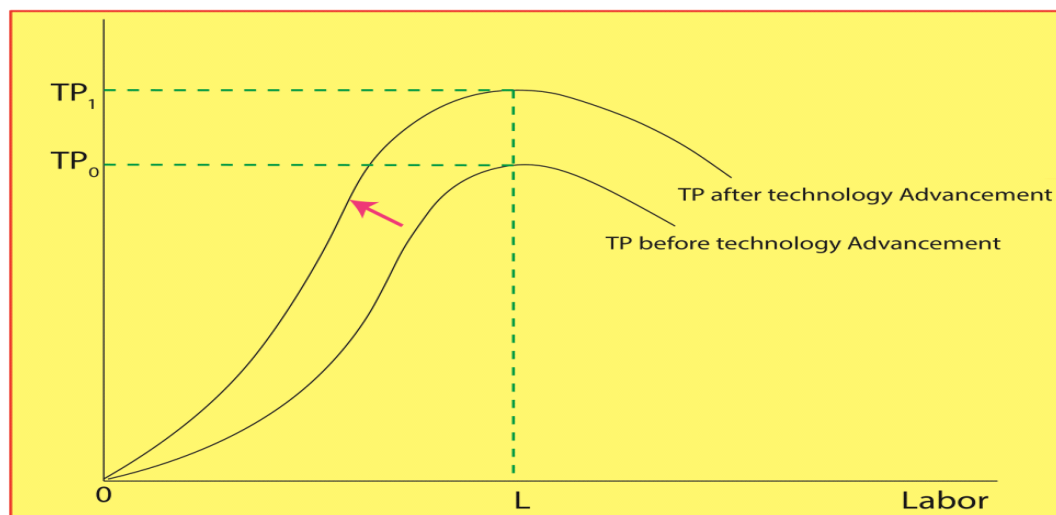
after technological advancement.

Figure 3.5 Technology change and the position of production curves

Technical progress and the production function: as knowledge of new and more efficient methods of production become available, technology changes. Furthermore new inventions may result in increase of the efficiency of all methods of production. These changes in technology constitute technical progress.

Graphically, the effect of technical progress is shown with an upward shift of the production function. This shift shows that the same output may be produced by less factor inputs, or more output may be produced with the same inputs.

Technical progress may also change the shape (as well as produce a shift) of the isquant. There are three types of technical progress, depending on its effect on the rate of substitution of the factors of production.

Capital side technical progress: a technical progress which increases the MP_K by more than the MP_L. For this kind of technical progress, along a line on which the capital labor ratio (K/L) is constant, the $MRTS_{L,K}$ decreases in absolute terms (the slope of an isoquant declines). The slope of the shifting isoquants becomes less steep along any given radius. This type of technical progress is also called capital saving or labor using technical progress.

Labor side technical progress: a technical progress which increases the MP_L by more than the MP_K. Along a line on which the K/L ratio is constant, the $MRTS_{L,K}$ increases(the slope of an isoquant increases in absolute value). It is also called labor saving or capital using technical progress.

Neutral technical progress: a technical progress that increases the MP_L and MP_K by the same percentage, so that the $MRTS_{L,K}$ (along any radius) remains constant.

Self-Test Exercise 3.1

What stages must a firm follow in its production process?

Dear distance learner, we hope you did it. Good!

Unit 3: Theory of Production and Cost

The second stage (stage II) is where a rational firm operates. Here each additional labor contributes positively to the production but less than the average. At this stage as the use of a variable input (labor) increases with other inputs (capital) being fixed, the resulting additions to output (MP_L) will eventually decrease.

Activity 3.1

1. Define the function of production.
2. Differentiate between short run and long run production functions.
3. Suppose that ABC company produce 500 units of outputs using 20 labors; and the 21st labor contribute 10 unit of output.
   a. Calculate the total product and average product of labor
   b. Calculate marginal product of labor of the last labor.
4. Explain the return to scale.
5. Explain the law of diminishing marginal productivity and its implications.
6. Explain technology change and the position of production curves.

3.2 Theory of Cost

Overview:

In order to produce output, the firm needs to employ inputs. The prices of inputs are called cost of production. In this section you will learn different types of short run and long run costs, cost curves and how they relate with production curves.

Learning Outcomes

At the end of this section, you will be able to:

♦ Define the cost of production.

♦ Explain the difference between short and long run costs.

♦ Give examples of short and long run costs in their locality

♦ Calculate total, average, and marginal costs.

♦ Describe the link between production and costs.

♦ Analyze the relationship between product curves and cost curves.

Key Concepts: Cost, average costs, cost curves

3.2.1 Short-Run Costs

(?) **Start Up Activity:**

Dear distance learner, how do the cost relates to the production?

📖 In the production process, the firm needs to employ inputs in order to produce outputs. Thus, the prices of inputs or the expenditures the firm incurs on these inputs are referred to as the "cost of production." In this section, you will study the types and behaviors of production costs and the relationship between production and costs (i.e. cost function both in the short run and long run).

Short-run costs are costs over a period during which some factors of production (usually capital equipment and management) are fixed. In short run based fixed and variable inputs, total cost (TC) is divided into two parts:

Total Fixed Cost (TFC): TFC is a cost that does not vary with the level of output (it does not change with change in quantity of output).Thus, it is independent of output. Fixed costs consists costs such as: salaries of administrative staff, expenses for building depreciation and repairs, etc.

Total variable cost (TVC): TVC is a cost that varies as output varies. These costs vary directly with changes in the volume of output, rising as more is produced and falling as less is produced. The variable costs include: the cost of raw materials, the cost of labor, etc.

Total Cost (TC): Total cost is the cost incurred on all types of inputs fixed, as well as variable inputs incurred in producing a given amount of output. Total cost of production is the sum of all fixed and variable costs   (TC = TFC+TVC).

Table 3.3 Total Fixed Cost, Total Variable Cost, and Total Cost

Output (Quantities)	TFC (in Birr)	TVC(in Birr)	TC(in Birr)
0	100	0	100
1	100	30	130
2	100	56	156
3	100	75	175
4	100	85	185
5	100	90	190
6	100	100	200
7	100	130	230

As the total fixed cost (TFC) does not depend on the level of output, it is represented by a horizontal line.
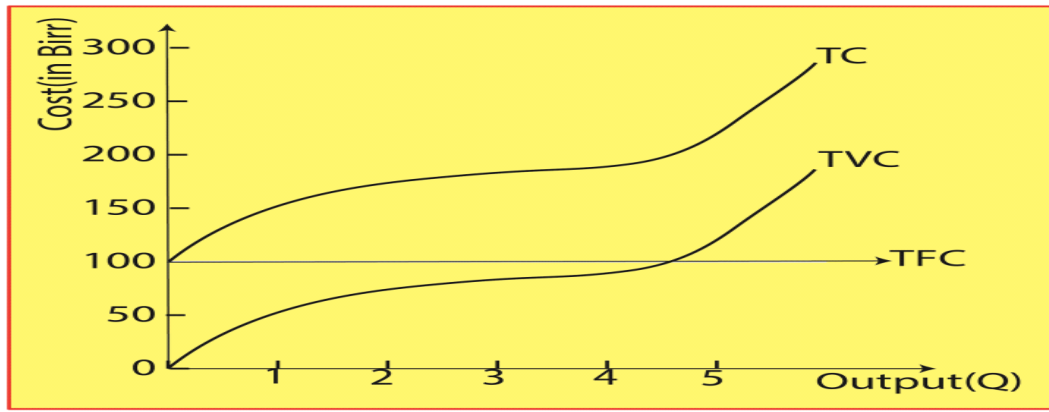
Figure 3.6 Total Fixed Cost, Total Variable Cost, and Total Cost curves

The total variable cost initially increases at a decreasing rate at the initial stage of production, as more of the variable factors are employed. When the productivity of the variable input falls, larger and larger units of the variable input will be needed to increase output by the same unit, and thus TVC and TC increase at increasing rates. By adding the TFC and TVC, we can obtain the TC of the firm. From the total-cost curves, we obtain average cost curves.

- **AFC (Average Fixed Cost):** AFC is the total fixed cost divided by the amount of output, i.e., $\text{AFC} = \frac{TFC}{Q}$. Since TFC is constant, an increase in output (Q) reduces the ratio and thus the AFC approaches the quantity (output) axis as output rises.

- **Average Variable Cost (AVC):** The average variable cost is the per-unit cost of the variable factors of production. It is obtained by dividing the total variable cost by the total units of output. $\text{AVC} = \frac{TVC}{Q}$

- **ATC (Average Total Cost):** ATC (Average Total Cost) is the per-unit cost of both fixed and variable factors of production. It is obtained by dividing the total cost by the total units of output.

$$\text{ATC} = \frac{TC}{Q} \quad \text{or} \quad \text{ATC} = \frac{TFC+TVC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q}$$

→ ATC=AFC+AVC

Marginal Cost (MC): Marginal Cost is the extra or additional total cost that results from producing one more unit of output; or it is the change in total cost resulting from a percentage change in output i.e.

$$MC = \frac{\Delta TC}{\Delta Q} \quad or \quad MC = \frac{\Delta TFC}{\Delta Q} + \frac{\Delta TVC}{\Delta Q} \quad or$$

$$MC = \frac{\Delta TVC}{\Delta Q}, \text{ when } \Delta TFC=0 \text{ (in the short run)}$$

Table 3.4 Average and Marginal costs

Output (Q)	TFC (in Birr)	AFC	TVC (in Birr)	AVC	TC(in Birr)	ATC	MC
0	100	-	0	-	100	-	-
1	100	100	30	30	130	130	30
2	100	50	56	28	156	78	26
3	100	30.33	75	25	175	58.33	19
4	100	25	85	21.25	185	46.25	10
5	100	20	90	18	190	38	5
6	100	16.67	100	16.67	200	33.33	10
7	100	14.28	130	18.57	230	32.86	30

The Relationship between Average and Marginal Cost Curves: Cost curves show how average and marginal costs vary with output level. Since the TFC is constant, it falls continuously as output increases. The AVC declines first, reaching a minimum level, then starts rising and shows a U- shaped structure. The MC also declines first, reaches its minimum, and then rises. The MC curve passes through the minimum point of both the AVC and ATC curves. Figure 3.7 shows the relationship between the ATC, AFC, AVC, and MC curves.
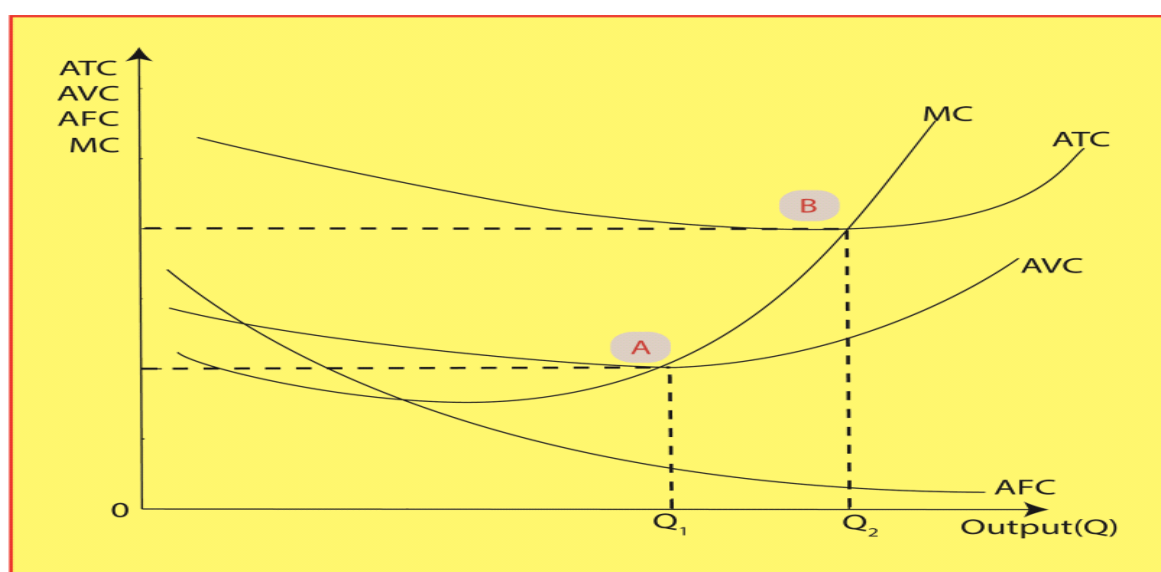
Figure 3.7 AC and MC curves

The behavior of the average variable cost is derived from the behavior of the total variable cost. The AVC curve slopes downward, up to output OQ_1 (the optimum capacity level of output), showing decreases in average variable cost, and it slopes upward beyond output OQ_1, indicating increases in average variable cost. In other words, the AVC curve is U-shaped. Point A is at where AC=MC and minimum point of ATC, corresponding to optimum capacity level of output, OQ_1.

The ATC curve can be obtained by adding the AFC and AVC curves. An ATC curve is the summation of the AFC and AVC curves. Therefore, at each level of output, the ATC curve lies above the AVC curve at a distance equal to the value of the AFC curve. The ATC curve

slopes downward up to output OQ2, shows a decrease, and slopes upward beyond output OQ2, indicating an increase in average total cost. Point B is the minimum point of ATC and the point where ATC=MC.

3.2.2 Long-run Costs

In the long run, the amounts of all the factors of production can be varied so that there are no fixed costs. The time period corresponding to the long run will be such a condition that the producers can make all the necessary changes to the size of the plant. For the analysis of the long-run cost of production, we use only three types of curves: the Long- Run Total Cost Curve (LTC), the Long-Run Average Cost Curve (LAC), and the Long- Run Marginal Cost Curve (LMC). Here also, LAC and LMC curves are U-shaped, but they are flatter than the short-run cost curves.

If we consider the case, the total cost first increases at a deceasing rate due to increasing returns to scale (which implies economies of scale). With an increasing rate attributed to decreasing returns to scale after the optimum size, the long-run total cost curve will look like the following. The LAC and LMC curves will be U-shaped.
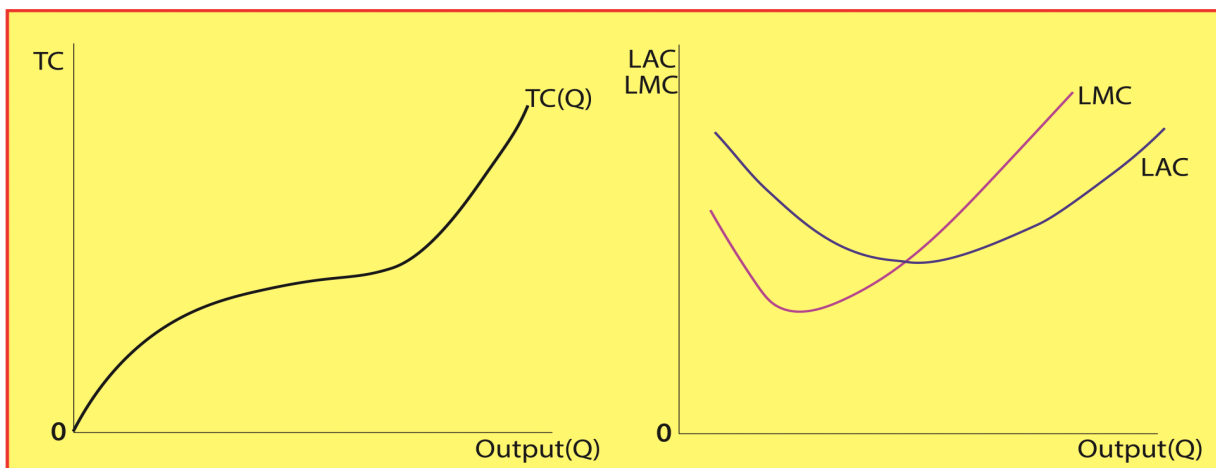
Figure 3.8 Long run total cost curve   Figure 3.9 Long run average cost and marginal cost curves

The range from the minimum point of LAC to the left is called the "economies of scale range," which means output can be doubled for less than a doubled cost. The range from the minimum of LAC to the right is called "diseconomies of scale," because a doubling of output requires more than a doubling of cost.

The Relationship between Product and Cost Curves: Cost and production curves are mirror images of each other, i.e. the relationship between cost and production is shown in figure 3.9.

➢ when AP(MP) rises, AC(MC) falls;
➢ when AP(MP) falls, AC(MC) rises; and
➢ When AP (MP) is maximum, AC (MC) is minimum.
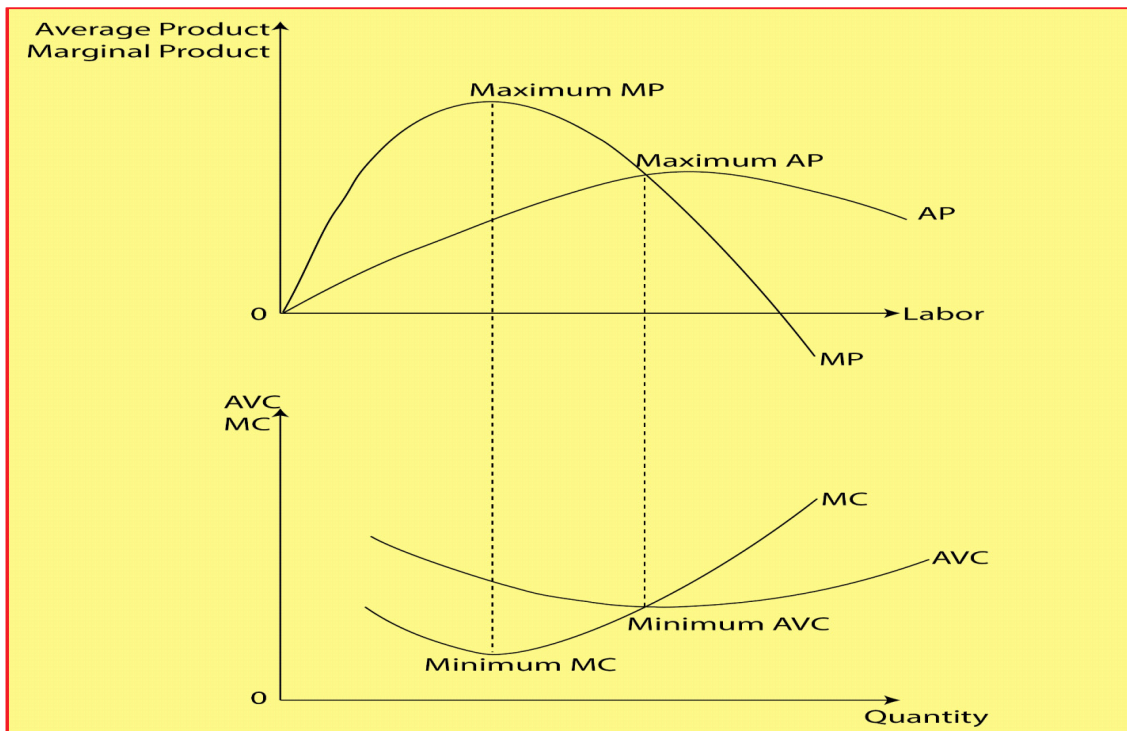
Figure 3.10 the relations hips between Production and Cost curves

👤 Self-Test Exercise 3.2

What is the difference between short run and long run costs?

Dear distance learner, we hope you did it. Good!

🔑 Short run costs vary in relation to the quantity of goods being produced; whereas, long run cost includes the variation of quantities used for all inputs necessary for production.

❓Activity 3.2

1. Define the cost of production.

2. Give practical examples for short and long run costs in their locality.

3. Explain the link between production and costs.

4. What is the relationship between product and cost curves?

Unit Summary

The production function shows the maximum quantity of a commodity that can be produced per unit of time, with given amounts of inputs, when the best production technique is used. A Total Product (TP) refers to the total amount of a commodity produced during some period of time by combining different factors of production. The average product (AP) of a variable factor refers to the output per unit of the variable factor. The marginal product (MP) of a variable factor may be defined as the change in total product resulting from the additional unit of a variable factor.

Returns to a factor mean a change in the physical output of a good when the quantity of one factor is increased while the quantity of other factors remains constant. The law of diminishing marginal returns states that in all production processes, adding more of one factor of production while holding one or more of the other inputs constant will at some point yield lower per unit returns.

Diminishing returns occur in the short run when one factor is fixed. Technological change shifts the production function upward. The cost of production depends on several factors, such as the quantity of production, the level of technology and input prices. In the short run, one or more of a firm's inputs are fixed. Thus, the total cost of production can be divided into fixed costs and variable costs. Fixed costs are constant regardless of the level of output. A firm cannot avoid fixed costs by producing zero levels of output. Variable costs, on the other hand, vary with the level of output directly. By dividing the total cost and total variable costs for the quantity of production, we obtain an average cost (AC) respectively.

In the short run, when not all inputs are variable, the AC and AVC curves assume a U- shape due to the law of variable proportions. Marginal costs of production are additional costs incurred to produce one more unit of a commodity. The MC curve has a U-shape due to the law of variable proportions. The short-run marginal and average variable cost curves are a mirror reflection of the marginal product and the average product of the variable input, respectively. In the long run, all the inputs to the production process are variable. As a result, the choice of inputs depends both on the relative costs of a factor of production and on the extent to which the firm can substitute among inputs in its production process.

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☑ Check List

Dear distance learner, we hope you enjoyed working on this section. Now it is time to check your understanding about evolution of money. Read each question and put a tick (√) mark in the 'yes' or 'no' box, which helps you decide on your level of understanding of the points presented so far.

Objectives	Yes	No
Can you state production and production functions in the short and long run?		
Can you derive and draw the various average and marginal functions from the total functions. ?		
Can you calculate the average and marginal cost and pro-ductivity values? ?		
Can you draw and explain the relationship between different types of cost curves?		
Can you show the relationship between production and cost curves?		
Can you discuss the stages of production?		
Can you analyze the concept of returns to scale in production?		

Dear distance learner, did you mark any box under the 'No' column? If so, please look at the corresponding item to the left and go back to your text and read about it.

⊕ Unit Review Exercise

Part I. Write 'True' if the statement is correct or 'False' if the statement is incorrect.

1. In production marginal product is always greater than the average product.
2. Production is the process of transforming inputs to outputs.
3. Fixed cost has direct relationship with output.
4. If there is production there must be cost of production.
5. In production short run is time period less than five years.

Part II: Multiple-choice items

Direction: Read the following questions and choose the correct answer from the given alternatives.

1. Total product is maximum when

   A . Average product increasing
   B . Marginal cost will be zero
   C . Marginal cost is negative
   D . All of the above

2. Average fixed cost curve

   A . Is decrease as production increase
   B . Constant as production increase
   C . U-shape as production increase
   D . Increase as production increase

3. If average total cost is Birr 80 as total output 10, total cost is

   A . 8   C . 80
   B . 10   D . 800

4. Advancement in technology

   A . shift the production function outward   C . Decrease cost of production
   B . Increase productityity   D . All of the above.

5. Which of the following is correct about total cost?

   A . Total cost is the sum of total fixed cost and total variable cost.
   B . Total cost is the product of total fixed cost and total variable cost.
   C . Total cost is equal to variable cost.
   D . All of the above

Part III: Write detailed answers to the following.

1. What is the shape of the total product curve? Why?

   a) What is the relationship between the AP & MP?

   b) What is the law of diminishing return? How is it reflected in the shape of TP curve? In the shape of MP curve? Its relationship to the stages of production?

2. What does an isoquant refer to? What are its characteristics?

3. Given the following TFC and TVC cost information, complete the following table.

Output	TFC	TVC	TC	AFC	AVC	ATC	MC
0	100	0					
1	100	7					
2	100	12					
3	100	15					
4	100	17					
5	100	18					
6	100	20					
7	100	25					
8	100	31					

4. If the marginal cost of production is greater than the average variable cost, do you know whether the average variable cost is increasing or decreasing? Explain.

⊙━┓ **Answer for Activities**

<div align="center">Activity 3.1</div>

1. The production function is a function that shows the highest output that a firm can produce for every specified combination of inputs. In particular, the production function tells us the quantity of output the firm can produce given the quantities of the inputs that it might employ.

2. The short-run refers to the period of time over which at least one factor of production is fixed. Whereas, the Long run is the period of time (planning horizon) which is sufficient in all quantities of inputs are variable (change).

3. Total production (TP)= 510 units and average product (AVP)=510/21=24.28 units.

4. The returns to scale is refers to the long run analysis of production. In the long run, where all inputs are variable output can be increased by changing all factors by the same proportion. The rate at which output increases as inputs are increased by the same proportion is called returns to scale.

5. The second stage (stage II) is where a rational firm operates. Here each additional labor contributes positively to the production but less than the average. At this stage as the use of a variable input (labor) increases with other inputs (capital) being fixed, the resulting additions to output (MP_L) will eventually decrease.

6. As knowledge of new and more efficient methods of production become available, technology changes. These changes in technology constitute technical progress. Graphically, the effect of technical progress is shown with an upward shift of the production function or a downward movement of the isoquant. This shift shows that the same output may be produced by less factor inputs, or more output may be produced with the same inputs.

<div align="center">Activity 3.2</div>

1. Cost of productions refers to all the costs that are involved when an industry produce a product. Production costs are comprised of various expenses, including the cost of materials, employee wages, factory maintenance, shipping costs and more.

2. Short run costs vary in relation to the quantity of goods being produced. Long run cost includes the variation of quantities used for all inputs necessary for production.

3. Cost and production curves are mirror images of each other. Because factors of production are used as input to produce goods and services. Thus, the prices of these factors of production are considered as cost of production.

4. Cost and production curves are **mirror images** of each other. Cost curves and production curves are related as follows:

    → when AP(MP) is ring AC(MC) is falling;
    → when AP(MP) is falling AC(MC) is rising; and
    → when AP(MP) is maximum AC(MC) is minimum.

Answer for Review Exercises

Part I

1. False	2. True		3. False	4. True	5. False
6. True	7. True		8. False	9. True	10. True

Part II

1. B	2. A	3. D	4. D	5. A

Part III

1. The shape of total product curve, first increases at increasing rate, then increase decreasing rate, and finally reaches to a maximum and starts to fall.

   a) Both AP &MP first increase and reaches maximum and then start to fall. MP curve reaches its maximum before the AP curve. Also, as long as the AP is rising, the MP is above it; when AP is falling, the MP_L is below it. When AP is at its maximum, the MP is equal to the AP.

   b) In any production function with fixed level of some of the inputs, it is impossible to expand the level of production indefinitely. Initially, as more of the variable inputs are employed together with the fixed ones, the output level increases dramatically to a certain extent, i.e. the marginal contribution of one more variable input (say labor) increases sharply. But as the number of labor employed increases with a fixed capital, the production capacity goes to exhaustion and eventually the total output declines, i.e. the additional contribution of extra labor employed becomes a loss or negative. Therefore, according to the law of diminishing returns, increasing the amount of the variable factor (labor) with fixed factor (capital) will lead to an eventual decline in the marginal contribution of the additional labor to the total output. This is also determining the shape of TP curve and stages of production.

2. An isoquant is a curve that shows all possible efficient combinations of inputs that can yield equal level of output. Isoquants are characterized by:

   i. Isoquants are down ward sloping

   ii. The further an isoquant lays away from the origin, the greater the level of output it denotes.

   iii. Isoquants do not cross each other.

   iv. Isoquants are convex to the origin.

3. Given the following TFC and TVC cost information, complete the following table.

Output	TFC	TVC	TC	AFC	AVC	ATC	MC
0	100	0	100	-	-	-	-
1	100	7	107	100	7	107	7
2	100	12	112	50	6	56	5
3	100	15	115	33.33	5	38.33	3
4	100	17	117	25	6.25	29.25	2
5	100	18	118	20	3.6	23.6	1
6	100	20	120	16.67	3.33	20	2
7	100	25	125	14.29	3.57	17.86	5
8	100	31	131	12.5	3.87	16.38	6

4. The MC curve passes through the minimum point of the AVC, and then as MC >AVC, average variable cost is increasing.

Market Structures

Unit Introduction

In the previous unit, we discussed the theory of production and cost. There, we studied concepts related to a firm's production function and cost curves. In this unit, we discuss the types and characteristics of firms under different market models.
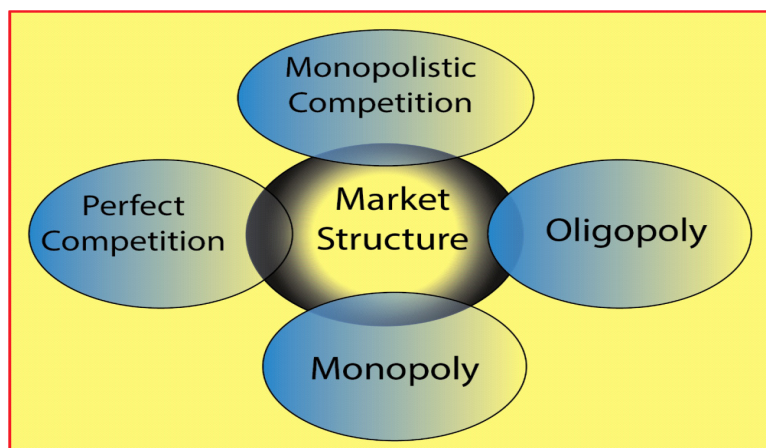

Figure 4.1 Market Structure

In economics, markets are characterized based on the competition levels and the nature of their markets, such as the nature of the products, the number of sellers, the number of buyers, etc. The market in which an individual firm operates or sells its product (good or service) to consumers can be categorized broadly into perfect (perfectly competitive) and imperfect markets. A perfect competitive market is a market with a large number of sellers and buyers; whereas a monopoly market (dominated by one firm), an oligopoly market (very few firms), and a monopolistic competition market (relatively large numbers of firms selling closely substitutable products) are the three common types of imperfect markets.

Unit Outcomes

After completing this unit, you will be able to:

- Explain the characteristics of the market structures.
- Analyze the nature of demand and revenue curves of a firm in each market.
- Make a list of the sources of monopoly.
- Calculate total, average, and marginal revenues.

The Required Study Time: 8 hours

Unit Learning Strategies

Dear distance learner, remember each unit has a self-study format. The following learning strategies will help you study this unit.

- Reading the topics
- Doing various activities
- Completing written exercises
- Activities based on the learner's experience
- Extra-curricular learning
- Scenario-based activity
- Auto tutorial instruction

4.1 Perfectly Competitive Markets

Overview:

Dear Distance learners, in this section you will learn the definition, the feature and characteristics of the special market called perfect competition market. You will also learn the type of demand curve, revenue and average revenue functions of a perfectly competitive market.

Learning Outcomes

At the end of this section, you will be able to:

- Define a market that is completely competitive.
- Review the characteristics of a perfectly competitive market.
- Explain the nature of demand and revenue curves in a perfectly competitive market.
- Calculate total, average, and marginal revenues.

Key Concepts: perfectly competitive, demand and revenue

Start Up Activity:

Dear distance learner, how do you define a perfectly competitive market?

In microeconomics, perfect competition describes a market in which a buyer or seller has no market power or where all buyers and sellers are price takers. It is this distinction that differentiates perfectly competitive markets from imperfectly competitive ones. In short, a perfectly competitive market is characterized by the fact that no single firm has any influence on the price of the product it sells. For instance, consider a farmers market where each seller sells the same type of products (such as maize). There is little differentiation between each of their products, and they each sell them at an equal price. At the same time, sellers and buyers free to participate in the market without any barrier.

4.1.1 The Characteristics of Perfect Competition

A perfectly competitive market has several distinguishing characteristics. The main features include:

The market has a large number of buyers and sellers: a perfect competitive market is composed of a large number of buyers and sellers of a commodity, so that the buying or selling decision of a single buyer or seller cannot affect the price of the commodity. That is, the actions of a single seller or buyer cannot influence the market price of the commodity, since the firm or buyer) is too small in relation to the market.

Homogeneity of products: products supplied by the different firms are the same or homogenous. For example, salt supplied by two sellers is identical to the extent that buyers are unable to differentiate which firm supplied which product. The assumption of a large number of sellers and product homogeneity together imply that an individual firm operating in a perfectly competitive market is a price taker.

For example, in the wheat market, there are thousands of farmers who sell wheat and millions of consumers who use wheat and wheat products. Because no single buyer or seller can influence the price of wheat, each takes the price as given.

Free entry and exit: in a perfectly competitive market, a new firm has the freedom to produce and supply a product. In other words, firms have freedom of movement or there is no barrier that restricts firms' entry into and/or exit out of a perfectly competitive market. If the firm believes that it is not worth staying in the business, it can go out of the market.

Perfect Information for Both Consumers and Producers: it is assumed that in a perfectly competitive market, both sellers and buyers have complete information and knowledge of the market. Every buyer and seller has full knowledge of the product quality and its nature, current and future prices, input prices, and other attributes that are certainly known.

Firms Aim to Maximize Profit: the objective of firms in perfect competition is profit maximization. Firms try to increase revenue and reduce (minimize) costs so as to increase profit.

4.1.2 Perfect competition demand and revenue functions

a. Demand

The assumption of a large number of sellers and product homogeneity together imply that an individual firm operating in a perfectly competitive market is a **_price taker_**.
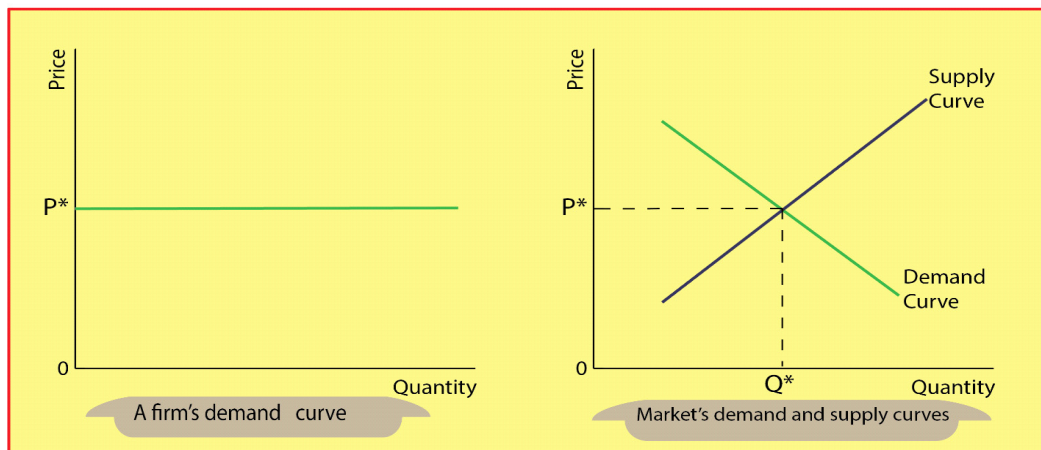
Figure 4.2: The demand curve faced by a firm in a perfectly competitive market

- Thus, a competitive firm faces a completely horizontal demand curve for its product, indicating that it can sell any amount of output only at the ongoing market price (P). That is, at the market price, the firm can supply whatever quantity it would like to sell. Therefore, once the price of the product is determined in the market, the producer takes the price (p* in Figure 4.2) as given. Hence, the demand curve that the firm faces in this market situation is a horizontal line drawn at the equilibrium price, p*.

b. Revenue Function

The revenues of a firm are the receipts that it obtains from selling its products. Revenues have three main categories: Total Revenue (TR), Average Revenue (AR), and Marginal Revenue (MR).

- Total Revenue (TR): total revenue is the total amount of money received by a company from the sale of a specific quantity of its product. It is obtained by multiplying the unit price of the commodity and the quantity of that product sold.

    TR=P x Q; where P = price of the product

    Q = quantity of the product sold.

- Average revenue (AR): is the revenue per unit of item sold. It is calculated by dividing the total revenue by the amount of the product sold, i.e.

    $$AR = \frac{TR}{Q} = \frac{P*Q}{Q} \Rightarrow AR = P$$

Note that average revenue (AR) and the price of the product (P) have the same meaning. Average revenue means the per unit revenue received by the seller from the sale of the commodity. On the other hand, price means the per unit payment made by the purchaser to purchase the commodity. Since the seller receives what the purchaser pays, the per unit revenue and per unit price are the same. That is why the AR curve and demand curve for a firm's product are also the same. Therefore, from the firm's viewpoint, the firm's demand curve is also the average revenue curve.

- **Marginal Revenue:** Marginal revenue is the change in total revenue resulting from one unit increase in sales. It is the additional amount of money or revenue the firm receives by selling one more unit of the product. It is calculated as the ratio of the change in total revenue to the change in the sale of the product, i.e. $MR = \dfrac{\Delta TR}{\Delta Q} = \dfrac{\Delta(P*Q)}{\Delta Q}$

Thus, in a perfectly competitive market, a firm's average revenue, marginal revenue, and price of the product are equal, i.e. AR = MR = P = $D_{firm.}$. Marginal revenue can also be estimated as the change in total revenue with the sale of 'n' units of a product instead of (n – 1) units. Thus, $MR = TR_n - TR_{n-1}$
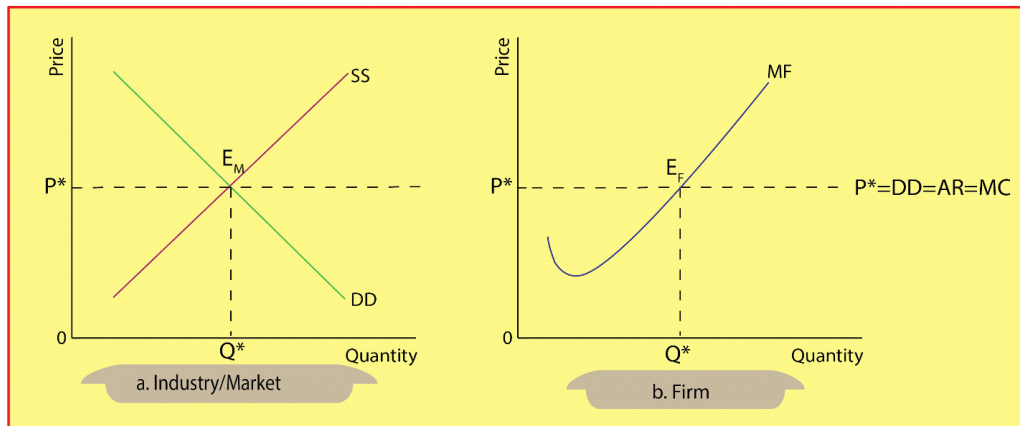

Figure 4.3: Determination of equilibrium price under perfect competition

In a perfect competition, a firm can sell any amount of output at a given market price. It means that a firm's additional revenue (MR) from the sale of every additional unit of the commodity is just equal to the market price (P) or average rate of the commodity (AR). Hence, average revenue and marginal revenue become equal and constant in the given situation. Consequently, the AR and MR curves are the same and would be horizontal or parallel to the X-axis.

Self-Test Exercise 4.1

A farmer usually sells 100 kg of coffee for Birr 200/kg. Calculate total revenue.

Dear distance learner, we hope you did it. Good!

Total revenue(TR)=P*Q

$\Rightarrow$ TR=Birr 200/kg *100kg=Birr 2000

Activity 4.1

1. Define a perfectly competitive market.
2. Explain the characteristics of the perfect competitive market.
3. Explain the nature of demand and revenue curves in a perfectly competitive market.

4.2 Pure Monopoly Market

Overview:

Dear Distance learners, in this section you will learn the definition, the feature and characteristics of the type of market called pure monopoly market. You will also learn the type of demand curve, revenue and average revenue functions of a pure monopoly market.

Learning Outcomes

At the end of this section, you will be able to:

- Define pure monopoly market
- Review the characteristics of the pure monopoly market
- Describe the reasons for the existence of pure monopoly
- Analyze the nature of demand and revenue curves of pure monopoly market

Key Concepts: Monopoly, Demand and Revenue

Start Up Activity:

Dear distance learner, what is a "pure monopoly market"?

The second market structure in which we analyze the interaction between producers and consumers is that of a pure monopoly. The term "monopoly" is derived from two Greek words, viz., "monos" and "polus." Monos" means" single," and "polus" means "a seller." A monopoly is a market structure in which there is only one supplier in a given market (industry). A monopoly market structure requires that there be a single producer of a particular commodity. For no other commodity to work as a substitute for this commodity, and for this situation to last, sufficient restrictions must be in place to prevent any other firm from entering the market and beginning to sell the commodity.

When there is only one firm in the market, the firm is the price maker, whereas, consumers are the price takers. For instance, ELPA is one of the firms producing and supplying electric power in Ethiopia can be considered an example of a monopoly firm, (however, ELPA is state owned firm).

4.2.1 The Characteristic Features of Pure Monopoly

A pure monopoly exists when a single firm is the only producer of a product for which there are no close substitutes. The main characteristics of this market structure include:

A single seller and many buyers: A pure or absolute monopoly is a one firm industry that sells the product to many buyers. As a result, the monopoly firm is the only producer of a specific product or the sole seller of the product, and has full control over the supply and price of the product. In this case, the firm and the industry are one and the same (i.e., the

firm = the industry).

No close substitutes: a product produced by a monopolist has a close substitute, meaning that consumers have no alternative choices to substitute one product for another. So, the monopoly firm would not face competition from new or existing products. For example, there is no close substitute for the electric services provided by ELPA.

Price maker: The individual firm exercises considerable control over price because it is responsible for, and therefore controls, the total quantity supplied. As a result, the monopolist becomes a price-maker and fixes its own price. By having a downward-sloped demand curve for its product, the monopolist can influence the market price by changing the supply of the product.

Price Discrimination: Under the conditions of a monopoly, price discrimination is possible. It implies that a monopolist can sell its product at different prices to different customers.

Restrictions on Entry: In a monopoly, new competitors cannot freely enter the market due to some strict barriers. These barriers may be due to legal restrictions like licencing or patent rights or restrictions created due to economies of scale. There are various reasons for the existence of monopolies that help the monopolists to maintain monopoly power. Some of these factors are the following.

- Absence of close substitutes. A firm enjoys a monopoly when it is the sole seller of its product and the product has no close substitutes.

- Economies of scale in production are another reason for the emergence of monopolies. A firm is said to have economies of scale if its long-term average cost is declining. Small firms do not have the capacity to do so. In such a situation, when the incumbent firm observes that new firms are entering the market, it will produce a large amount of output to minimize its unit cost of production and will charge a lower price than the new firms to deter entry.

- Ownership of strategic or key inputs. A company may own or control the entire supply of a raw material needed to manufacture a commodity. Such firms are not willing to sell the raw materials to another firm. For example: Ambo mineral water has monopolized the natural mineral water.

- Patent rights for products or production processes give legal monopoly rights to firms. Government policies such as those related to granting licences or imposing foreign trade restrictions (like quotas, etc.) result in limiting the number of sellers.

- A company may develop or invent a unique product or manufacturing technique and take steps to prevent competitors from copying it by obtaining patent or copy rights. MOHA and Coca Cola soft drink companies have maintained monopoly power over the supply of their products, partly due to exclusive knowledge of the ingredient chemicals required for the production of their products.

4.2.1 The Demand and Revenue Functions of the Monopoly Firm

a. Demand

In the previous section, we have seen that a perfectly competitive firm is small relative to the market in which it operates and, therefore, takes the price of its output as given by market conditions and faces a demand curve that is horizontal. However, as a monopoly is the sole producer in its market, it can alter the price of its goods by adjusting the quantity it supplies to the market.

Thus, a monopoly firm faces a downward-sloping market demand curve. As a result, the monopoly has to accept a lower price if it wants to sell more output. If the monopolist decides to raise the price of the product, it will reduce the quantity of supply
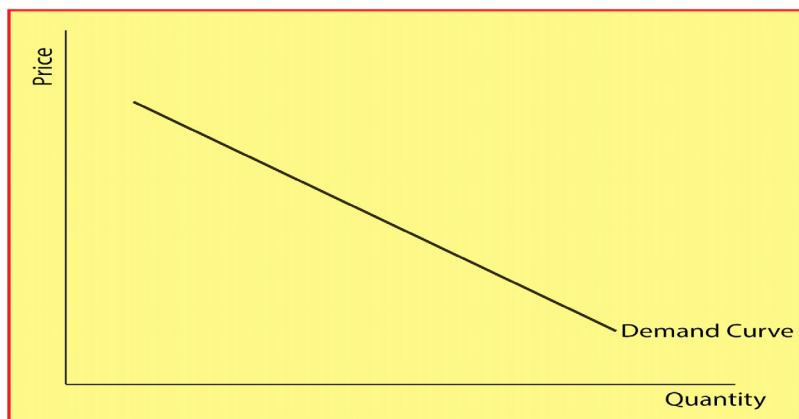

Figure 4.4 Monopolist's Demand Curve

Figure 4.4 shows the monopolist firm facing a downward-sloping demand curve, which implies that as the monopolist raises the price of its goods, consumers buy less of it. If the monopolist reduces its price, it will increase the quantity of output it sells. Where possible, a monopolist would prefer to charge a high price and sell a large quantity at that high price. The market demand curve makes that outcome impossible. In particular, the market demand curve describes the combinations of price and quantity that are available to a monopoly firm. The monopolist can choose any point on the downward-sloping demand curve, but it cannot choose a point off the demand curve.

Mathematically, assuming that the demand curve is linear, it can be written in the following form:

$$P = a - bQ$$

Where   P – is the market price

Q – is the quantity of sales (quantity demanded)

'a' and 'b' are any positive constants

b. Revenue Function

The revenues of a firm are the receipts that it obtains from selling its products. Revenues have three main categories: Total Revenue (TR), Average Revenue (AR), and Marginal Revenue (MR).

- Total Revenue (TR): Total revenue is the total amount of money a company receives from the sale of a given quantity of its product. It is obtained by multiplying the unit price of the commodity and the quantity of that product sold.

    TR=P x Q; where P = price of the product

    Q = quantity of the product sold.

    From demand function P = a – bQ

    Substituting (a – bQ) for P

    TR = (a - bQ) Q

    TR = aQ – b Q²

- Average revenue (AR): is the revenue per unit of item sold. It is calculated by dividing the total revenue by the amount of the product sold.

$$AR = \frac{TR}{Q} = \frac{P.Q}{Q} = \frac{aQ - bQ^2}{Q} = a - bQ$$

    =>AR = P

Note that average revenue (AR) and the price of the product (P) are the same, which means, average revenue per unit received by the seller from the sale of the commodity.

- Marginal Revenue: Marginal revenue is the change in total revenue resulting from one unit increase in sales. It is the additional amount of money or revenue the monopolist firm receives by selling one more unit of the product. It is calculated as the ratio of the change in total revenue to the change in the sale of the product.

$$MR = \frac{\Delta TR}{\Delta Q} = \frac{\Delta(P * Q)}{\Delta Q}$$

Marginal revenue can also be estimated as the change in total revenue with the sale of n units of a product instead of n – 1 units. As a result, MR = $TR_n - TR_{n-1}$. Using the following hypostatical table 4.1, we can show a monopoly's TR, AR, and MR curves with the help of the corresponding diagram figure.

Table 4.1: TR, AR, and MR under monopoly conditions

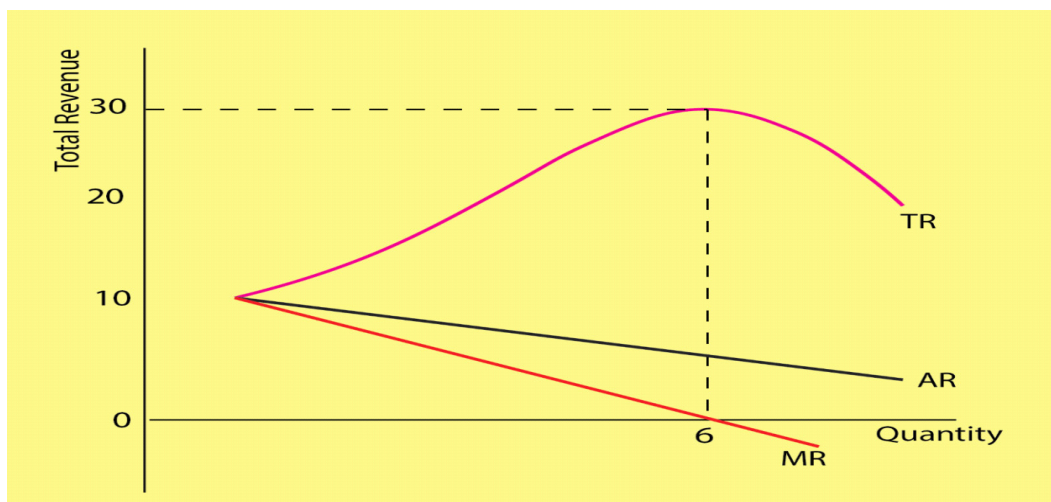| Quantity (Q)	Price (In Birr)	Total Revenue (PQ)	Average Revenue (PQ/Q)	Marginal Revenue $(\frac{\Delta(PQ)}{\Delta Q})$
0	11	0	-	0
1	10	10	10	10
2	9	18	9	8
3	8	24	8	6
4	7	28	7	4
5	6	30	6	2
6	5	30	5	0
7	4	28	4	-2
8	3	24	3	-4

Figure 4.5: TR, AR, MR Curves under Monopoly

As figure 4.5 shows, the total revenue curve of the monopolist firm has an inverse U-shape. The total revenue of a monopolist firm first increase with the quantity of sales, reaches its maximum, and finally decreases when the quantity of sales increases. A monopolist firm's AR and MR curves are both downward sloping (decreases with sales quantity).

Self-Test Exercise 3.2

List at least three reasons for the existence of a pure monopoly.

Dear distance learner, we hope you did it. Good!

There are various reasons for the existence of monopoly and help the monopolists to maintain monopoly power. Some of these factors are the following.

✓ Absence of close substitutes
✓ Economies of scale
   Ownership of strategic or key inputs
✓ Patent rights for the products or production processes give legal monopoly rights to firms.

- ✓ Government policies such as related to granting licences or imposing foreign trade restrictions (like quotas, etc.) result in limiting the number of sellers.
- ✓ Exclusive (special) knowledge of low cost production or technology

?Activity 4.2

1. Define a pure monopoly market.
2. Explain the characteristics of the pure monopoly market.

4.3 Monopolistically Competitive Market

Overview:

Dear Distance learners, in this section you will learn the definition, the feature and characteristics of the type of market called Monopolistically Competitive market. You will also learn the type of demand curve, revenue and average revenue functions of a Monopolistically Competitive market.

Learning Outcomes

At the end of this section, you will be able to:

- ◆ Define monopolistically competitive market
- ◆ Review the assumptions and characteristics of the monopolistically competitive market.
- ◆ Explain the nature of demand and revenue curves of monopolistically competitive market

Key Concepts: monopolistically competitive

?Start Up Activity:

Dear distance learner, suppose you walk into a stationary to buy a pen. On the stationer's shelve, you find different type of pens. When you pick out one and buy it, what kind of market are you participating in?

A monopolistic competition market refers to a market structure where there are relatively large numbers of sellers and buyers, and there is a free entry and exit of firms producing and selling differentiated (heterogeneous) products. A seller of a differentiated product has limited monopoly power over customers who prefer his/her product to others.

Monopolistic competition has some features of competition and some features of monopoly. The market is competitive due to the existence of a large number of firms, and

there is no barrier to entry or exit. Its monopoly features, however, result from differentiated products that are close substitute products. Thus, this market is more real market, and its actual market situations are somewhere in between a perfect competitive market and a monopoly market.

4.3.1 Monopolistically competitive market characteristics

Monopolistic competition describes a market with the following characteristics:

Product differentiation: each firm produces and supplies a product that is at least slightly different from those of other firms. The difference could be in style, brand name, quality, etc. Different firms produce products like pens, biscuits, soap, and include stores that sell different styles of clothing; restaurants that sell different kinds of food; and even products like beer that may be at least similar but different in terms of public perception because of advertising and brand names.

Many sellers and buyers: another feature of monopolistic competition is the presence of many sellers and buyers in the market. There are many sellers and buyers of the product, though relatively less than in the perfectly competitive market.

Free Entry and Exit of Firms: similar to the perfect competitive market, there is no barrier to new firms that are willing and able to produce and supply the product in the market if they find it profitable. Similarly, if any firm believes that it is not worth staying in the business, it is free to exit.

The existence of non-price competition: due to product differentiation, in addition to price competition, there is also **non-price competition**. Non-price competition is an essential part of monopolistic competition. Non-price competitions take the form of product quality, advertising, brand name, customer service, etc. For example, a firm spends money on advertisements to reach consumers about the relatively unique characteristics of its product, thereby getting new buyers and developing brand loyalty.

4.3.2 The Demand and Revenue Functions

a. Demand

As a result of product differentiation, characteristic of a monopolistic competition market, firms are price-makers, and each firm faces a downward-sloping demand curve. This implies that, unlike perfect competitive firms, a firm in a monopolistically competitive market has few rivals. A monopoly firm has no rivals. Thus, the demand curve of a firm under monopolistic competition is flatter than that of a monopoly firm, as shown in figure 4.6.
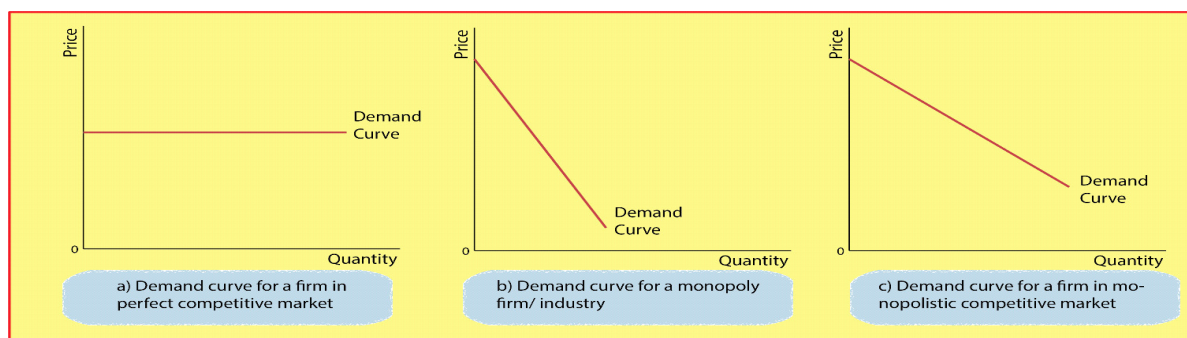
Figure 4.6 Compaction of demand curves under different markets

Figure 4.6 shows the demand curve faced by the monopolistic competitive firm is not horizontal as is the case with perfect competition. It is also not the market demand curve, as in the case of monopoly.

b. Revenue Function

In a perfect competitive market and a monopoly market, the revenues of a firm are the receipts that it obtains from selling its products. In the case of monopolistic competition, the firm expects an increase in demand if it lowers the price. The demand curve of a firm is also its AR curve. This firm, therefore, has a downward sloping AR curve. The marginal revenue is less than the average revenue, and also downward sloping.
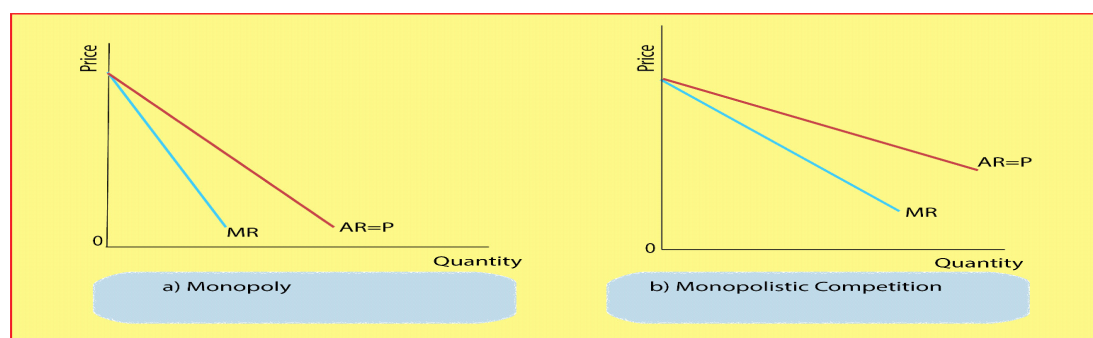

Figure 4.7: AR and MR Curves under Monopoly and Monopolistic Competition.

Self-Test Exercise 4.3

Review the assumptions and characteristics of the monopolistically competitive market Dear distance learner, we hope you did it. Good!

Monopolistic competition describes a market with the following characteristics.

➢ Product differentiation
➢ Many sellers and buyers
➢ Free Entry and Exit of Firms
➢ Existence of non-price competition

Activity 4.3

1. Define the term "monopolistically competitive market."
2. Describe the characteristics of monopolistically competitive market.

4.4 Oligopoly Market

🕸 Overview:

Dear Distance learners, in this section you will learn the definition, the feature and characteristics of the type of market called oligopoly market. You will also learn the type of demand curve, revenue and average revenue functions of an oligopoly market.

🎯 Learning Outcomes

At the end of this section, you will be able to:

- Define the oligopoly market.
- Review the characteristics of the oligopoly market.
- Explain the nature of demand and revenue functions of the oligopoly market.

Key Concepts: duopoly, oligopoly demand.

❓ Start Up Activity:

Dear distance learner, what is an oligopoly market?

📖 An oligopoly is a market organization in which there are few firms that produce identical or closely substituted products (idenstical or differentiated). An oligopoly is said to exist when there is more than one seller in the market, but their number is not so large as to make the contribution of each firm negligible. Firms are, therefore, situated mutually interdependently. That is, they behave as if one firm's actions are directly affected by those of rivals and by the actions of others. One example is the world market for crude oil. A few countries in the Middle East control much of the world's oil reserves. Cement and sugar factories are examples of oligopoly firms in Ethiopia.

4.3.1 Characteristics of the Oligopoly market

An oligopoly market describes a market with the following characteristics:

Few dominant firms: the number of firms is small enough that each firm recognizes the actions of other firms, implying that firms are mutually interdependent.

- Entry barrier: in an oligopoly market, the barrier to entry is difficult or impossible for new firms to enter the market. Barriers to entry may arise as a result of; scale of economics and large capital requirements compared to other markets, except monopoly.

- Patents or access to technology or raw materials may exclude potential competitors.

- Products may be homogenous or differentiated.

- There is interdependence among the firms. The decision of one firm affects all firms, and so all firms follow the other firms.

A duopoly is the simplest type of oligopoly. A duopoly is a special case of oligopoly in which there are only two firms in the industry, example: Ethio-Telecom and Safaricom Ethiopia.

4.4.2 The Demand and Revenue Functions

a. Demand

As a result of product differentiation, characteristic of an oligopoly market, firms are price-makers, and each firm faces a downward-sloping demand curve. Any change in price by one firm may result in price changes by rival firms. As a result, the demand curve faced by an oligopolist firm keeps on shifting.

b. Revenue Function

Like in all other markets, the revenues of a firm in an oligopoly are the receipts that it obtains from selling its products. The AR curve of a firm is also the same as its demand curve. Thus, the firm has a downward sloping AR curve. The marginal revenue curve is less than the average revenue curve.

Self-Test Exercise 4.4

Explain the nature of demand and revenue functions of the oligopoly market.
Dear distance learner, we hope you did it. Good!

As the result of product differentiation characteristic of oligopoly market, firms are price maker and each firm faces a downward-sloping demand curve. Like all other markets, the revenues of a firm in oligopoly are the receipts that it obtains from selling its products. AR curve of a firm is also the same as its demand curve. Thus, the firm has downward sloping AR curve.

Activity 4.4

1. Define oligopoly market.
2. What are the characteristics of the oligopoly market?

Unit Summary

The market in which an individual firm operates or sells its product (good or service) to consumers can be categorized broadly into perfect (perfectly competitive) and imperfect markets. The three main criteria are: the number of potential buyers (demanders) and sellers (suppliers); whether the good or service is homogeneous or heterogeneous; and whether there is free entry and free exit from the market. Based on these criteria, markets are classified into the following main categories:

Types of market	Main characteristics
1. Perfect Competition	• large number of buyers and sellers • homogeneous product • free entry/exit • full information transparency
2. Monopoly	• one dominant supplier • homogeneous product • restricted entry/exit
3. Monopolistic competition	• large number of buyers and sellers • heterogeneous product • free entry/exit
4. Oligopoly	• limited number of dominant suppliers • homogeneous/heterogeneous product • restricted entry/exit

Because a competitive firm is a price taker, its revenue is proportional to the amount of output it produces. The price of the good equals both the firm's average revenue and its marginal revenue. A monopoly arises when a single firm owns a key resource, when the government gives a firm the exclusive right to produce a good, or when a single firm can supply the entire market at a lower cost than many firms could. Because a monopoly is the sole producer in its market, it faces a downward-sloping demand curve for its product.

A monopolistically competitive market is characterized by three attributes: many firms, differentiated products, and free entry. The product differentiation inherent in monopolistic competition leads to the use of advertising and brand names. The latter two types of imperfect markets (oligopoly and monopolistic competition) are characterized by rivalry among individual firms.

☑ Check List

Dear distance learner, we hope you enjoyed working on this section. Now it is time to check your understanding about evolution of money. Read each question and put a tick (√) mark in the 'yes' or 'no' box, which helps you decide on your level of understanding of the points presented so far.

Objectives	Yes	No
Can you explain the characteristics of the market structures?		
Can you analyze the nature of demand and revenue curves of a firm in each market?		
Can you make a list of the sources of monopoly?		
Can you calculate total, average, and marginal revenues?		

Dear distance learner, did you mark any box under the 'No' column? If so, please look at the corresponding item to the left and go back to your text and read about it.

👤 Unit Review Exercise

Part I: Matching: Match the following items from column "B" to column "A"

Column A	Column B
1. Monopolistic competition market	A. Two dominant firms
2. Oligopoly market	B. Single firm
3. Monopoly market	C. Homogenous product
4. Perfect competition market	D. Heterogonous product
5. Duopoly market	E. Few firms

Part II: Write 'True' if the statement is correct or 'False' if the statement is incorrect.

1. Existence of blocked entry is the main characteristics of perfectly competitive market.
2. Demand curve of the pure monopoly market is horizontal.
3. Entry and exit are relatively difficult in oligopoly market than in momonopolistic competition market.
4. Perfectly competitive market is price maker.
5. Licensing is one factor for the existence of monopoly market.

Part III: Write detail answers to the following.

1. What are the distinguishing characteristics of a perfectly competitive and pure monopoly market structure?
2. List as many potential causes/sources of a monopoly as you can.
3. What factors determine the amount of monopoly power an individual firm is likely to have?
4. Describe the three attributes of monopolistic competition. How is monopolistic competition like a monopoly? How is it like a perfect competition?

🔑 Answers for Activities

Activity 4.1

1. Perfect competition describes a market in which no buyer or seller has market power or where all buyers and sellers are price takers. A perfectly competitive market is characterized by the fact that no single firm has influence on the price of the product it sells.
2. A perfectly competitive market has several distinguishing characteristics. The main features include:
   - Large number of buyers and sellers
   - Homogeneity of products
   - Free entry and exit

- Perfect Mobility of Factors of Production
- Perfect Information for Both Consumers and Producers
- Firms Aim to Maximize Profit
- Absence of Government Intervention

3. A competitive firm faces a completely horizontal demand curve for its product indicating that it can sell any amount of output only at the ongoing market price (P). In a perfectly competitive market, a firm's average revenue, marginal revenue and price of the product are equal, i.e. $AR = MR = P = D_{firm}$

Activity 4.2

1. Monopoly is a market structure in which there is only one supplier in the market (industry). A monopoly market structure requires that there is a single producer of a particular commodity; no other commodity works as a substitute for this commodity; and for this situation to persist over time, sufficient restrictions are required to be in place to prevent any other firm from entering the market and to start selling the commodity.

2. Pure monopoly exists when a single firm is the only producer of a product for which there are no close substitutes. The main characteristics of this market structure include:
   - Single seller and many buyers
   - No close substitutes:
   - Price maker
   - Price Discrimination
   - Restrictions on Entry

Activity 4.3

1. Monopolistic competition market refers a market structure where there are relatively large number of sellers and buyers, free entry and exit of firms, producing and selling differentiated (heterogeneous) product. A seller of a differentiated product has limited monopoly power over customers who prefer his/her product to others.

2. Monopolistic competition describes a market with the following characteristics.
   - Product differentiation
   - Many sellers and buyers
   - Free Entry and Exit of Firms
   - Existence of non-price competition

Activity 4.4

1. Oligopoly is a market organization in which there are few firms that produce identical or closely substituted products (identical or differentiated). Oligopoly is said to exist when there are more than one seller in the market, but their number is not so large so as to make the contribution of each firm negligible.

2. Oligopoly market describes a market with the following characteristics:
   - Few dominant firms
   - Entry barrier
   - Products may be homogenous or differentiated.

Answer for Review Exercises

Part I

1. False	2. False	3. True	4. True	5. True

Part II

1. A	2. A	3. B	4. A	5. B

Part III

A. Some the distinguishing characteristics of a perfectly competitive and pure monopoly markets are:

Perfectly competitive market	Pure monopoly market
• Large number of sellers in the market	Single firm (single seller) in the market
• Price taker	• Price maker
• Free entry and exit	• Restrictions on entry and exit
• Has close substitute	• No close substitute
• Horizontal demand curve	• Downward demand curve

B. There are various reasons for the existence of monopoly that help the monopolists to maintain monopoly power. These are:

✓ Absence of close substitutes

✓ Economies of scale

✓ Ownership of strategic or key inputs

✓ Patent rights for the products or production processes give legal monopoly rights to firms.

✓ Government policies such as related to granting licences or imposing foreign trade restrictions (like quotas, etc.) result in limiting the number of sellers.

C. Exclusive (special) knowledge of low cost production or technology.

• The factors that determine the amount of monopoly power of an individual firm:

• Number of sellers in the market.

• The degree of close substitute of the commodity.

• Product differentiation.

D. The nature of market (the degree im/possibility of entry).

i. The three attributes of monopolistic competition are:

ii. Product differentiation

iii. Many sellers and buyers

Free Entry and Exit of Firms.

Monopolistic competition has some features of competition and some features of monopoly. The market is competitive due to the existence of large number of firms and there is no barrier to entry or exit. Its monopoly features, results from differentiated products which give some power to be price maker.

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GLOSSARY

consumption—spending by households on goods and services, with the exception of purchases of new housing

cost—the value of everything a seller must give up to produce a good

cross-price elasticity of demand—a measure of how much the quantity demanded of one good responds to a change in the price of another good, computed as the percentage change in quantity demanded of the first good divided by the percentage change in the price

demand curve—a graph of the relationship between the price of a good and the quantity demanded

demand schedule—a table that shows the relationship between the price of a good and the quantity demanded

economics—the study of how society manages its scarce resources

elasticity—a measure of the responsiveness of quantity demanded or quantity supplied to one of its determinants

equilibrium—a situation in which supply and demand have been brought into balance

equilibrium price—the price that balances supply and demand

equilibrium quantity—the quantity supplied and the quantity demanded when the price has adjusted to balance supply and demand

income elasticity of demand—a measure of how much the quantity demanded of a good responds to a change in consumers' income, computed as the percentage change in quantity demanded divided by the percentage change in income

inferior good—a good for which, other things equal, an increase in income leads to a decrease in demand

law of demand—the claim that, other things equal, the quantity demanded of a good falls when the price of the good rises

law of supply—the claim that, other things equal, the quantity supplied of a good rises when the price of the good rises

market—a group of buyers and sellers of a particular good or service

price elasticity of demand—a measure of how much the quantity demanded of a good responds to a change in the price of that good, computed as the percentage change in quantity demanded divided by the percentage change in price

quantity demanded—the amount of a good that buyers are willing and able to purchase

quantity supplied—the amount of a good that sellers are willing and able to sell

shortage—a situation in which quantity demanded is greater than quantity supplied

substitutes—two goods for which an increase in the price of one leads to an increase in the demand for the other

supply curve—a graph of the relationship between the price of a good and the quantity supplied

supply schedule—a table that shows the relationship between the price of a good and the quantity supplied

surplus—a situation in which quantity supplied is greater than quantity demanded

ECONOMICS

GRADE 10

Distance Module I

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
MINISTRY OF EDUCATION