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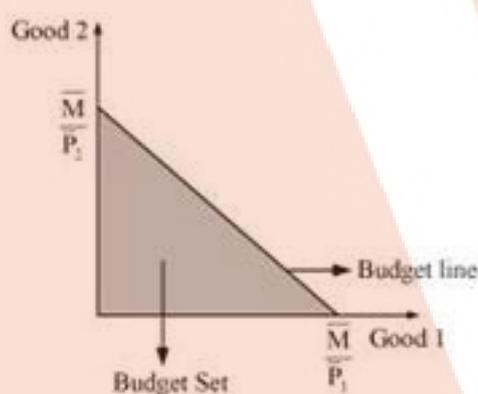
NCERT Solutions

Chapter-02 (Microeconomics)

Theory of Consumer Behaviour

1. What do you mean by the budget set of a consumer?

Ans: The collection of all the bundles that the consumer can buy with their income at the prevailing market prices is called budget set of a consumer.



Quantity of good 1 is measured along the horizontal axis and Quantity of good 2 is measured along the vertical axis. The budget set consists of all points on or below the straight line i.e. the budget line.

2. What is budgetline?

Ans: A budget line represents the different combinations of two goods that are affordable and are available to a consumer; while being aware of his/her income-level and market prices of both the goods.

Let x_1 be the amount of good 1.

x_2 be the amount of good 2. P_1

be the price of good 1.

P_2 be the price of good 2.

$P_1 x_1$ = Total money spent on good 1.

$P_1x_1 =$ Total money spent on good 2.

Then, the budget line will be:

$$P_1x_1 + P_2x_2 = M$$

All the consumption bundles on the budget line cost the consumer exactly the equivalent of his/her income.

3. Explain why the budget line is downward sloping.

Ans: The budget line is downward sloping because a consumer can increase the consumption of good 1 only by decreasing the consumption of good 2. The consumer has limited income which can be spent to buy good 1 and good 2.

The slope of the budget line is $-\frac{P_1}{P_2} = \frac{\Delta x_2}{\Delta x_1}$, which implies the rate of exchange or the rate at which good 2 can be substituted for good 1.

4. A consumer wants to consume two goods. The prices of the two goods are Rs. 4 and Rs. 5 respectively. The consumer's income is Rs 20.

(i) Write down the equation of the budget line.

(ii) How much of good 1 can the consumer consume if she spends her entire income on that good?

(iii) How much of good 2 can she consume if she spends her entire income on that good?

(iv) What is the slope of the budget line?

Ans:

(i) $P_1 = \text{Rs } 4$

$P_2 = \text{Rs } 5$

$M = \text{Rs } 20$

Equation of the budget line $P_1x_1 + P_2x_2 = M$

$$4x_1 + 5x_2 = 20$$

(ii) If Rs 20 is entirely spent on good 1, then the amount of good 2 demanded will be zero i.e., $x_2 = 0$ as the consumer has no income left to spend on good 2.

$$4x_1 + 5(0) = 20$$

$$4x_1 = 20$$

$$x_1 = \frac{20}{4}$$

$$x_1 = 5$$

Amount of good 1 consumed = 5 units

(iii) If Rs 20 is entirely spent on good 2, then $x_1 = 0$, as the consumer has no income left to spend on good 1.

$$4(0) + 5x_2 = 20$$

$$5x_2 = 20$$

$$x_2 = \frac{20}{5}$$

$$x_2 = 4$$

Amount of good 2 consumed = 4 units

(iv) Slope of the budget line = $\frac{-P_1}{P_2}$

$$= \frac{-\text{Price of good 1}}{\text{Price of good 2}} = -\frac{4}{5}$$

$$= -0.8$$

Questions 5, 6 and 7 are related to question 4.

5. How does the budget line change if the consumer's income increases to Rs. 40 but the prices remain unchanged?

Ans: $M_2 = \text{Rs. } 40$

$$P_1 = \text{Rs. } 4$$

$$P_2 = \text{Rs. } 5$$

Initial equation of the budget line:

$$4x_1 + 5x_2 = 20$$

New equation of the budget line:

$$4x_1 + 5x_2 = 40$$

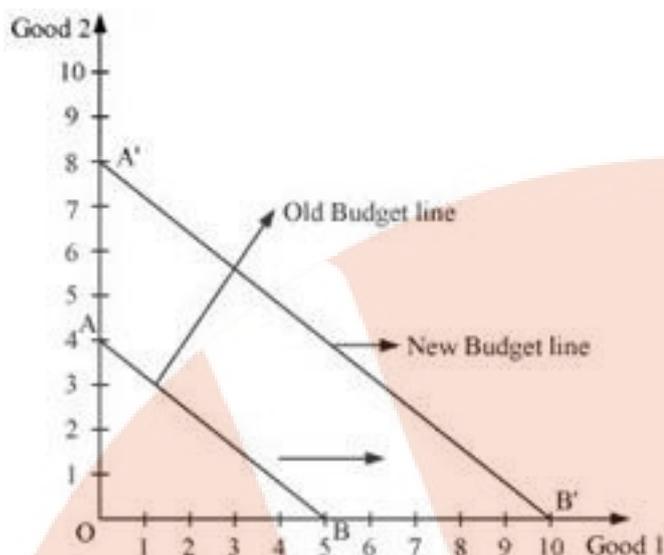
As M has increased, the consumer cannot purchase more of both the goods and the increase in the income causes a parallel outward shift of budget line from AB to $A'B'$.

Horizontal intercept will be $= M/P_1 = 40/4 = 10$

Vertical intercept will be $= \frac{M}{P_2} = \frac{40}{5} = 8$

The slope of the new budget line will be the same as that of the old budget line.

$$\frac{-P_1}{P_2} = \frac{4}{5}$$



6. How does the budget line change if the price of good 2 decreases by a rupee but the price of good 1 and the consumer's income remain unchanged?

Ans: $P_1 = \text{Rs. } 4$

$P_2 = \text{Rs. } 5$

$P_2^1 = \text{Rs. } 4$

$M = \text{Rs. } 20$

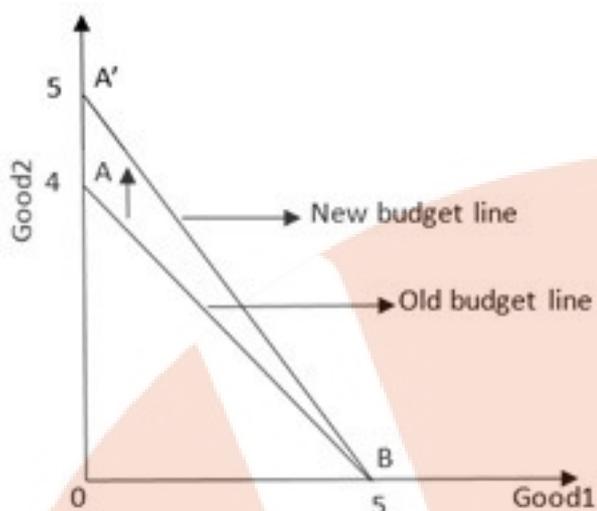
Since the income and the price of good 1 remain unchanged, the decrease in the price of good 2

will increase the vertical intercept of the budget line. The new budget line will also pivot outwards around the same horizontal intercept.

Horizontal intercept will be $= M/P_1 = 20/4 = 5$

Vertical intercept will be $= M/P_2 = 20/4 = 5$

Slope $= \frac{-P_1}{P_2} = \frac{4}{4} = -1$



The slope of the new budget line will be more and the new budget line will be steeper than the original one.

7. What happens to the budget set if both the prices as well as the income double?

Ans: If the prices and the income are doubled, then the budget line will remain unchanged.

$$M_1 = \text{Rs. } 20, M_2 = \text{Rs. } 40$$

$$P_1 = \text{Rs. } 4, P_2 = \text{Rs. } 8$$

$$P_1 = \text{Rs. } 5, P_2 = \text{Rs. } 10$$

$$\text{Horizontal intercept} = \frac{M_2}{P_1} = \frac{40}{8} = 5$$

$$\text{Vertical intercept} = \frac{M_2}{P_2} = \frac{40}{10} = 4$$

$$\text{Slope} = \frac{-P_1}{P_2} = \frac{-8}{10} = -0.8$$

Hence, the vertical intercept, the horizontal intercept and the slope of the budget line will remain the same. The new budget line will be the same as the old budget line but associated with higher income and higher prices of both the goods.

8. Suppose a consumer can afford to buy 6 units of good 1 and 8 units of good 2 if she spends her entire income. The prices of the two goods are Rs 6 and Rs 8 respectively. How much is the consumer's income?

Ans: $P_1 = \text{Rs. } 6$

$P_2 = \text{Rs. } 8$

$x_1 = 6$

$x_2 = 8$

Budget line $= M = P_1x_1 + P_2x_2$

$M = 6 \times 6 + 8 \times 8$

$M = 36 + 64$

$M = 100$

Thus, the consumer's income is Rs 100.

9. Suppose a consumer wants to consume two goods which are available only in integer units. The two goods are equally priced at Rs 10 and the consumer's income is Rs 40.

(i) Write down all the bundles that are available to the consumer.

(ii) Among the bundles that are available to the consumer, identify those which cost her exactly Rs 40.

Ans:

(i) $P_1 = \text{Rs. } 10$

$P_2 = \text{Rs. } 10$

$M = \text{Rs. } 40$

Budget set $= P_1x_1 + P_2x_2 \leq M$

$$10x_1 + 10x_2 \leq 40$$

The bundles that are available to the consumer should cost less than or equal to Rs 40.



$$\text{Horizontal intercept} = \frac{M_2}{P_1} = \frac{40}{10} = 4$$

$$\text{Vertical intercept} = \frac{M_1}{P_2} = \frac{40}{10} = 4$$

$$\text{Slope} = \frac{-P_1}{P_2} = \frac{-10}{10} = -1$$

The bundles in the shaded region (ΔAOB) are all available to the consumer, including the bundles lying on the line AB.

(0, 0) (0, 1) (0, 2) (0, 3) (0, 4)

(1, 0) (1, 1) (1, 2) (1, 3) (2, 0)

(2, 1) (2, 2) (3, 0) (3, 1) (4, 0)

(ii) The coordinates that lie on the line AB cost exactly the same as the income of the consumer. The bundles are as follows:

(0, 4) (1, 3) (2, 2) (3, 1) (4, 0)

10. What do you mean by 'monotonic preferences'?

Ans: Monotonic preferences

meansthattheconsumerprefersaparticulاربundleovertheotherbundleifthe formerconsistsofatleastmoreofonegoodandnolessoftheothergood. A rational consumer will always prefer more of a commodity as it offers him a higher level of satisfaction.

Example: If bundle A(4,6) and bundle B(4,2) are available to the consumer, then he/she will prefer bundle A over bundle B as bundle A consists of more units of good 2 than bundle B.

11. If a consumer has monotonic preferences, can she be indifferent between the bundles (10,8) and (8,6)?

Ans: According to monotonic preferences a consumer cannot be indifferent towards these two bundles as bundle 1 consists of more of both goods as compared to bundle 2. A consumer will prefer bundle 1 over bundle 2 as it contains 10 units of good 1 and 8 units of good 2 as compared to 8 units and 6 units of good 1 and good 2 respectively in bundle 2.

12. Suppose a consumer's preferences are monotonic. What can you say about her preference ranking over the bundles (10,10), (10,9) and (9,9)?

Ans: If a consumer has monotonic preferences, then his/her preferences will be ranked as follows:

First preference: (10,10)

Second preference: (10,9)

Third preference: (9,9)

13. Suppose your friend is indifferent to the bundles (5,6) and (6,6). Are the preferences of your friend monotonic?

Ans: It is given that my friend is indifferent towards the bundles (5,6) and (6,6). This implies that his/her preferences are not monotonic. If he/she is indifferent towards both the bundles, then it means that he/she derives the same level of satisfaction and assigns them the same rank. However, the second bundle consists of more of both the goods. Thus, according to the

monotonic assumption, he/she must prefer the second bundle over the first.

14. Suppose there are two consumers in the market for a good and their demand functions are as follows: $d_1(p) = 20 - p$ for any price less than or equal to 20, and $d_1(p) = 0$ at any price greater than 20. $d_2(p) = 30 - 2p$ for any price less than or equal to 15 and $d_2(p) = 0$ at any price greater than 15. Find out the market demand function.

Ans:
$$d_1(p) = 20 - p \begin{cases} p \leq 20 \\ p > 20 \end{cases}$$

$$d_2(p) = 30 - 2p \begin{cases} p \leq 15 \\ p > 15 \end{cases}$$

For price less than Rs 15 ($p \leq 15$)

$$\text{Market demand for a good} = d_1(p) + d_2(p)$$

$$= 20 - p + 30 - 2p$$

$$= 50 - 3p$$

For price more than Rs 15 but less than Rs 20 ($15 < p \leq 20$) Market

$$\text{demand} = d_1(p) + d_2(p)$$

$$= 20 - p + 0 \quad (\because \text{for } p > 15, d_2(p) = 0)$$

$$= 20 - p$$

For price more than 20 ($p > 20$)

$$\text{Market demand} = d_1(p) + d_2(p)$$

$$= 0 + 0 \quad (\because \text{for } p > 10, d_1(p) = 0, d_2(p) = 0)$$

$$= 0$$

Thus, market demand

$$= 50 - 3p \text{ if } p \leq 15$$

$$= 20 - p \text{ if } 15 < p \leq 20$$



= if $p > 20$

15. Suppose there are 20 consumers for a good and they have identical demand functions:

$d(p) = 10 - 3p$ for any price less than or equal to $\frac{10}{3}$ and $d_1(p) = 0$ at any price greater than $\frac{10}{3}$. What is the market demand function?

Ans: $d(p) = 10 - 3p$ if $p \leq \frac{10}{3}$

$d_1(p) = 0$ if $p > \frac{10}{3}$

Market demand = Summation of demand of all the consumers in the market

For $price \leq \frac{10}{3}$

Market demand = $20 \sum d(p)$ (Since consumers have identical demand curve)

$$= 20 \times (10 - 3p)$$

$$= 200 - 60p$$

For $price > \frac{10}{3}$

Market demand = $20 \times d_1(p)$

$$= 20 \times 0$$

$$= 0$$

$$\text{Market demand function} = 200 - 60p \begin{cases} \text{if } p \leq \frac{10}{3} \\ \text{if } p > \frac{10}{3} \end{cases}$$

= 0

16. Consider a market where there are just two consumers and suppose their demands for the good are given as follows:

P	d_1	d_2
1	9	24
2	8	20
3	7	18
4	6	16
5	5	14
6	4	12

Calculate the market demand for the good. Ans:

P	d_1	d_2	Market demand = $D = d_1 + d_2$
1	9	24	$9 + 24 = 33$
2	8	20	$8 + 20 = 28$
3	7	18	$7 + 18 = 25$
4	6	16	$6 + 16 = 22$
5	5	14	$5 + 14 = 19$
6	4	12	$4 + 12 = 16$

17. What do you mean by a normal good?

Ans: A good whose demand increases with the increase in the income of the consumers and demand decreases with the decrease in income of the consumers is known as normal good.

There is a direct relationship between income and demand.

18. What do you mean by an 'inferior good'? Give some examples.

Ans: Inferior good: Those goods that share an inverse relationship with their prices and with the income of a consumer are called inferior goods. That is,

If the price of a good (P_x) increases, then the demand for the good (D_x) decreases. As the income of the consumer increases the demand for inferior good decreases.

For Example food items like coarse cereals.

19. What do you mean by substitutes? Give examples of two goods which are substitutes of each other.

Ans: Those goods that can be consumed in place of other goods are called substitute goods.

Example: Tea and coffee are goods that can be substituted for each other. If the price of tea increases, then the demand for tea will decrease and people will substitute coffee for tea, which will increase the demand for coffee.

The demand for a good move in the same direction as the price of its substitutes.

Price of tea (P_T) increases \rightarrow Demand for tea (D_T) decreases \rightarrow Demand for coffee (D_C) increases.

20. What do you mean by complements? Give examples of two goods which are complements of each other.

Ans: Those goods that are consumed together are called complementary goods. Example: Tea and sugar. If the price of sugar increases, then it will lead to a decrease in the demand for tea. If the price of tea increases, then it will reduce the demand for sugar.

The demand for a good move in the opposite direction of the price of its complementary goods. That is,

If the Price of tea (P_T) increases, then the demand for sugar (D_S) decreases.

If the Price of sugar (P_S) increases, then the demand for tea (D_T) decreases.

21. Explain price elasticity of demand.

Ans: Price elasticity of demand is the measure of the degree of responsiveness of the demand for a good to the changes in its price. It is defined as the percentage change in the demand for a good divided by the percentage change in its price.

$$e_d = \frac{\text{percentage change in the demand for a good}}{\text{percentage change in the price of a good}}$$

$$e_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Where,

$$\Delta Q = Q_2 - Q_1, \text{ change in demand}$$

$$\Delta P = P_2 - P_1, \text{ change in price}$$

P = initial price

Q = initial quantity

22. Consider the demand for a good. At price Rs4, the demand for the good is 25 units. Suppose price of the good increases to Rs5, and as a result, the demand for the good falls to 20 units. Calculate the price elasticity.

Ans: $P_1 = 4, Q_1 = 25$

$$P_2 = 5, Q_2 = 20$$

$$\Delta P = P_2 - P_1 = 5 - 4 = 1$$

$$\Delta Q = Q_2 - Q_1 = 20 - 25 = -5$$

$$e_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= \frac{-5}{1} \times \frac{4}{25}$$

$$= \frac{-4}{5}$$

$$e_d = -0.8$$

23. Consider the demand curve $D(p) = 10 - 3p$. What is the elasticity at price

$\frac{5}{3}$?

Ans: $D(p) = 10 - 3p$

$$b = \Delta Q / \Delta P = -3$$

$$p = 5/3 \quad \text{or} \quad D(5/3) = 10 - 3 \times 5/3$$

$$Q = 10 - 5 = 5$$

$$e_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= -3 \times (5/3) / 5$$

$$e_d = -1$$

i.e., the elasticity of demand at price = $\frac{5}{3}$ is unitary elastic.

24. Suppose the price elasticity of demand for a good is -0.2. If there is a 5% increase in the price of the good, by what percentage will the demand for the good go down?

Ans: $e_d = -0.2$ [Note that $e_d = -2$. Hence we need not prefix ed to (-2)]

Percentage change in price = 5%

$$e_d = \frac{\text{percentage change in demand}}{\text{percentage change in price}}$$

$$-0.2 = \frac{\text{percentage change in demand}}{5}$$

Percentage change in quantity demanded = -1% (decrease)

25. Suppose the price elasticity of demand for a good is -0.2. How will the expenditure on the good be affected if there is a 10% increase in the price of the good?

Ans: Since the price elasticity of demand E_p is -0.2, that is less than one or inelastic demand, then an increase in price of good will result in an increase in the expenditure. Because in case of inelastic demand, price and expenditure are positively related.

26. Suppose there was a 4 % decrease in the price of a good, and as a result, the expenditure on the good increased by 2%. What can you say about the elasticity of demand?

Ans: Decrease in price = 4%

Rise in expenditure = 2%

$$\Delta E = \Delta P [q + (1 + e_d)]$$

Since the price has decreased, the expenditure on the good will increase. This implies that the percentage of change in demand has increased more than the percentage decrease in price. There is an indirect relation between the price of the good and the expenditure on the good.

$$\text{Thus, elasticity} = \frac{\% \text{ change in demand}}{\% \text{ change in price}}$$

The numerator is more than the denominator. This means that elasticity is more than 1. Thus a small change in price has led to a bigger change in demand, and as a result, the demand is elastic.

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