

## 2. Theory of Consumer Behaviour

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

A budget set of a consumer is a bundle of two or more goods in certain quantities and combinations that is desirable and affordable for the consumer based on their price range. A budget set is also called an opportunity set.

### 2. What is budget line?

A budget line is a graphical representation of a consumer's constraints when buying a combination of two or more products with a given budget. A budget line will shift whenever there is a change in the prices, preferences or income. It is also called a consumption possibility line. Here, it is assumed that the customer spends the entire income on the bundle of products.

### 3. Explain why the budget line is downward sloping.

With a limited income, the customer can increase the consumption of one good only by decreasing the consumption of the other good. This is why a budget line is downward sloping.

**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?**

Let us assume that the consumer wants to buy X amount of Good 1 and Y amount of Good 2. As given, Good 1 is priced at Rs.4 and Good 2 is priced at Rs.5. The income of the consumer is Rs.20.

i) The budget line can be represented using the equation  $4X + 5Y = 20$

ii) If the consumer spends the entire income on good 1, the value of Y will be zero.

$$\text{Hence, } 4X + 5(0) = 20$$

$$X = 20/4 = 5$$

Therefore, 5 units of Good 1 can be bought.

iii) If the consumer spends the entire income on good 2, the value of X will be zero.

$$\text{Hence, } 4(0) + 5Y = 20$$

$$Y = 20/5 = 4$$

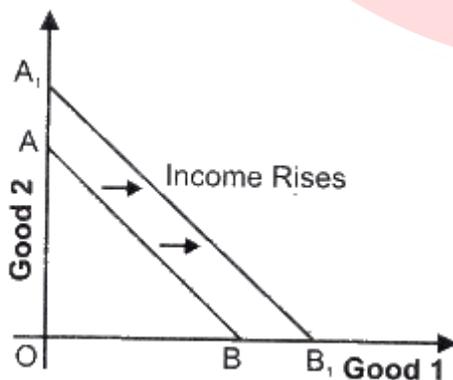
Therefore, 4 units of Good 2 can be bought.

iv) The slope of the budget line can be determined by the units of good 1 that the consumer is willing to give up to gain equivalent amounts of good 2.

$$P_1/P_2 = -4/5 = 0.8$$

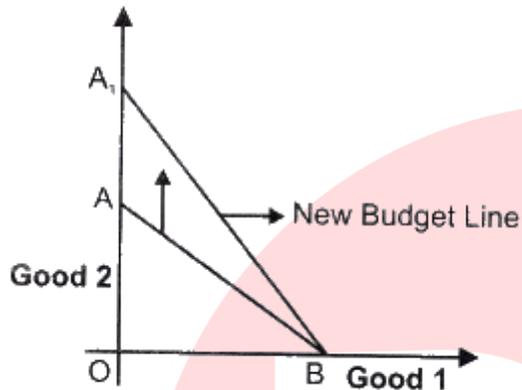
### 5. How does the budget line change if the consumer's income increases to Rs 40 but the prices remain unchanged?

When there is an increase in income, consumers can afford more amounts of both good 1 and good 2. Therefore, there will be a shift in the budget line towards the right direction.



**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?**

If the price of good 2 decreases, the consumer will be able to consume more amounts of good 2. Therefore, there will be a shift upwards along the vertical axis.



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

If both the prices as well as the income double, there will be no change in the budget set.

**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?**

According to the given information,

$$\text{Budget line} = M = P_1x_1 + P_2x_2$$

Therefore the budget equation is

$$M = 6(6) + 8(8)$$

Therefore, the Income (M) can be determined by solving the equation.

$$M = 36 + 64 = 100$$

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.**

i) The bundles that are available to the consumer are (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) (0, 4) (1, 3) (2, 2) (3, 1) and (4, 0) are all bundles that costs the customer exactly Rs.40

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

Monotonic preference is the assumption that a rational consumer will always prefer 'more' compared to 'less' of a given product. This means that a consumer will always be more satisfied by bundles which offer more amounts of products.

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

The bundle (10, 8) contains more quantities of both products. Therefore, if a consumer has monotonic preferences, they would prefer the bundle (10, 8) over the bundle (8, 6). So, the consumer cannot be indifferent between the two bundles.

**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)?**

If the consumer's preferences are monotonic, the bundles can be ranked as follows:

Rank 1 – (10, 10)

Rank 2 – (10, 9)

Rank 3 – (9, 9)

Bundle (10, 10) will always have a higher preference for the monotonic consumer.

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

No, the preferences of the friend are not monotonic. If the friend had a monotonic preference, they would not be indifferent to the bundles (5, 6) and (6, 6). Since the bundle (6, 6) has more quantities of both goods, they would naturally prefer it over the other bundle.

**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.**

According to the question,

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

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

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

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

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

$$= 20 - p$$

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

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

$$= 0 + 0 \quad (\because \text{for } p > 20, d_1(p) = 0, d_2(p) = 0)$$

$$= 0$$

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

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

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

$$= 50 - 3p$$

Thus, market demand

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

$$= 0 \text{ if } p > 20$$

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

**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 and  $d_1(p) = 0$  at any price greater than.**

## What is the market demand function?

According to the question,

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

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

Market demand = Total sum of demand of all the consumers in the market

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

Market demand =  $20 \sum d(p)$  ( $\because$  As consumers have identical demand function)

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

$$= 200 - 60p$$

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

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

$$= 20 \times 0$$

$$= 0$$

$$\text{Market demand function} = \begin{cases} 200 - 60p & \text{If } p \leq \frac{10}{3} \\ 0 & \text{If } p > \frac{10}{3} \end{cases}$$

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

Calculate the market demand for the goods.

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

The market demand can be calculated as follows

$p$	$d_1$	$d_2$	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?

A normal good is a good for which the demand increases with an increase in the consumer's income or wages. For example, let's consider a fruit like an apple. When the consumer's income increases, the demand for apples also increases.

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

Inferior goods are goods for which the demand decreases with an increase in the consumer's income. For example, consider goods like cheap cigarettes, low-cost

furniture and inexpensive fast food items. There are always better alternatives to these products, which are priced higher. So, when the consumer's affordability increases, the need for inferior goods decreases.

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

Substitutes are goods of the same category which can be used interchangeably to some extent. For example, let us consider the products tea and coffee. Both of these products fall under the same classification of hot beverages, fulfil similar needs and are also similarly priced. Hence, a consumer will shift to coffee if the price of tea increases and vice versa.

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

Complements are goods which are usually consumed together and complement each other. An example would be tea and sugar or printers and cartridges. The prices of complementary goods also affect each other's demand. For example, if the price of sugar goes up, it is likely that the demand for tea will decrease significantly.

**21. Explain price elasticity of demand**

Price elasticity of demand measures how a change in price affects the demand for the product among its consumers. It is determined by dividing the percentage change in the quantity of a product demanded by the percentage change in the cost of the product. Here, elasticity refers to the responsiveness of the product's demand in relation to its price. The price elasticity of demand changes from one product to another.

It can be represented as:

$$\text{Price Elasticity of Demand (PED)} = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in } P}$$

Where

$\% \Delta \text{ in } Q_d$  = Percentage change in demand for a good

$\% \Delta \text{ in } P$  = Percentage change in price of good

Or

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

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

Where,

$\Delta Q = Q_2 - Q_1$ , the percentage change in the demand for a good

$\Delta P = P_2 - P_1$ , the percentage change in the price of good

$P$  = Initial price

$Q$  = Initial quantity

**22. Consider the demand for a good. At price Rs 4, the demand for the good is 25 units. Suppose the price of the good increases to Rs 5, and as a result, the demand for the good falls to 20 units. Calculate the price elasticity.**

According to the question

$P_1 = 4$	$Q_1 = 25$
$P_2 = 5$	$Q_2 = 20$

$\Delta P = P_2 - P_1$ $= 5 - 4$ $= 1$	$\Delta Q = Q_2 - Q_1$ $= 20 - 25$ $= -5$

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

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

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

$$e_d = -0.8$$

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

According to the question

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

$$P = 5/3$$

$$D(P) = 10 - 3 \times 5/3 = 5$$

$$\frac{\Delta D(p)}{\Delta p} = -3 \Rightarrow$$

Change in demand per unit change in price

Now,

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

$$= -3 \times \frac{5/3}{10 - 3 \times 5/3} = -3 \times \frac{5/3}{10 - 5} = -3 \times \frac{5/3}{5} = -1$$

At price  $p = \frac{5}{3}$

$$e_d = \frac{3 \times \frac{5}{3}}{10 - 3 \left( \frac{5}{3} \right)}$$

$$e_d \cdot p \frac{-5}{5} = -1$$

Therefore elasticity is perfectly elastic at  $\frac{5}{3}$

**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, then by what percentage will the demand for the good go down?**

According to question

$$e_d = -0.2$$

Change in price = 5%

$$e_d = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$$
$$-0.2 = \frac{\text{Percentage change in demand}}{5}$$

$$= 1$$

So, the percentage change in demand is 1.

**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 its price?**

According to the question

Price elasticity of demand = - 0.2

Percentage increase in price = 10%

$$e_d = \frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$$
$$0.2 = \frac{\text{Percentage change in demand}}{10}$$

-2 = Percentage change in demand

From the above results we can infer that when price increases and  $e_d < 1$ , the demand becomes inelastic and hence, the expenditure will increase.

**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?**

According to the question

Percentage decrease in price = 4%

Increase in expenditure = 2%

$$\Delta E = \Delta P \{q + (1 + e_d)\}$$

As 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.

Therefore, elasticity =  $\frac{\text{Percentage change in demand}}{\text{Percentage change in price}}$

As numerator is greater than denominator, which means it is more than 1. Therefore a small change can lead to bigger change in demand, therefore demand is elastic.