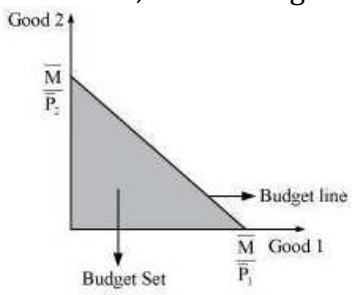
## Chapter-02 (Microeconomics)

## Theory of Consumer Behaviour

**Ans1:** It refers to the set of consumption bundles that are available to or affordable by the consumer; while being aware of his/her income-level and the existing market prices.




**Ans2:** 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 1.

$p_1x_1$ = Total money spent on good 1.

$p_2x_2$ = 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.

**Ans3:** The budget line is a negatively downward sloping line. The slope of a budget line measures the amount of good 2 that must be sacrificed in order to get an additional unit of good 1, as the consumer's income (M) is fixed. The budget line is downward sloping because, in order to increase the consumption of one good, the consumption of the other good must be reduced, with constant M.

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.

**Ans4:**

**(i)** $P_1$ = Rs 4

$P_2$ = Rs 5

M = Rs 20

Equation of the budget line = $P_1x_1 + P_2 + x_2$ =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

**Ans5:** $M_2$ = Rs. 40

$P_1$ = Rs. 4

$P_2$ = Rs. 5

Initial equation of the budget line:

$4x_1 + 5x_2 = 20$

New equation of the budget line:

$4x_1 + 5x_2 = 40$

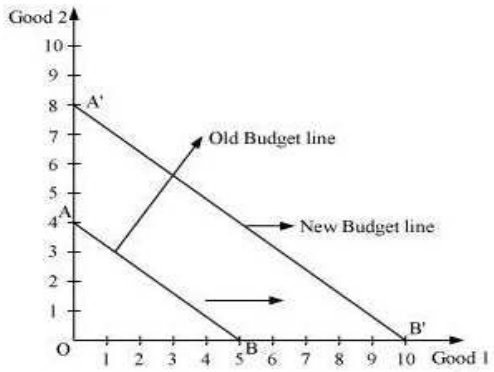
As M has increased, the consumer can now purchase more of both the goods and the budget line will shift parallelly outwards to A'B' from AB.

Horizontal intercept will be= $\frac{M}{P_2} = \frac{40}{4}$ =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.

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




**Ans6:** $P_1$ = Rs. 4

$P_2$ = Rs. 5

$P_2^1$ = Rs. 4

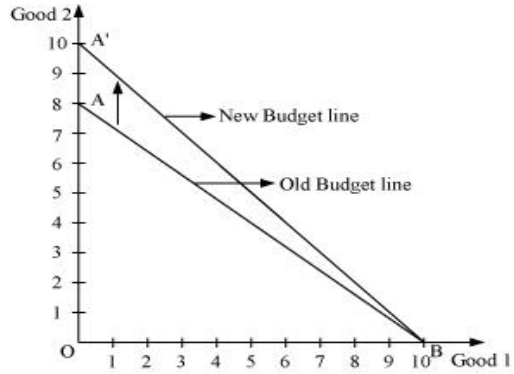
M = Rs. 20

Since the income and the price of good 1 are 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= $\frac{M}{P_1} = \frac{40}{4}$

Vertical intercept will be= $\frac{M}{P_1} = \frac{40}{4}$

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.

**Ans7:** If the prices and the income are doubled, then the budget line will remain unchanged.

$M_1$ = Rs. 20, $M_2$ = Rs. 40

$P_1$ = Rs. 4, $P_1$ = Rs. 8

$P_2$ = Rs 5, $P_2$ = Rs. 10

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

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

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.

**Ans8:** $P_1$ = Rs. 6

$P_2$ = Rs. 8

$x_1$ = 6

$x_2$ = 8

Budget line = M = $P_1x_1 + P_2x_2$

M = $6\times6+8\times8$

M = 36 + 64

M = 100

Thus, the consumer's income is Rs 100.

**Ans9:**

**(i)** $P_1$ = Rs. 10

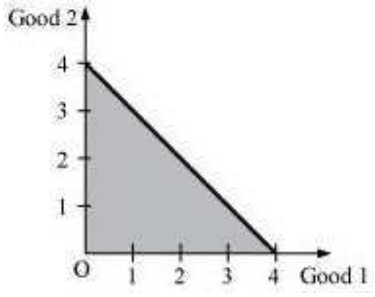
$P_2$ = Rs. 10

M = Rs. 40

Budget set = $P_1x_1 + P_2x_2 \le M$

$10x_1 + 10x_2 \le 40$

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




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

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

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

The bundles in the shaded region $(\Delta AOB)$ 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) (1, 4)
(2, 0) (2, 1) (2, 2) (2, 3) (2, 4)
(3, 0) (3, 1) (3, 2) (3, 3) (3, 4)
(4, 0) (4, 1) (4, 2) (4, 3) (4, 4)

**(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)

**Ans10:** It means that the consumer prefers a particular bundle over the other bundle if the former consists of at least more of one good and no less of the other good.
Example: If bundle A (3, 5) and bundle B (3, 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.

**Ans11:** No, he/she cannot be indifferent towards these two bundles as bundle I consists of more of both goods as compared to bundle II. He/she will prefer bundle I over bundle II 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 II.

**Ans12:**

Bundles $U_1$

(i) (10, 10) 3
(ii) (10, 9) 2
(iii) (9, 9) 1

As the consumer's preferences are monotonic, more is better and he/she will prefer bundle I over the rest of the bundles. This means that bundle I will be assigned a higher utility number i.e., three (rank = three) out of the available three bundles.

**Ans13:** 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 monotonicity assumption, he/she must prefer the second bundle over the first.

**Ans14:** $d_1(p) = 20 - p \begin{cases} p \le 20 \\ p > 20 \end{cases}$

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

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

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 $(15 < p \le 20)$
Market demand = $d_1(p)+d_2(p)$
= 20 – p + 0 $(\because$ for p>15, $d_2(p)=0)$
= 20 – p
For price more than 20 (p>20)
Market demand = $d_1(p)+d_2(p)$
= 0 + 0 $(\because$ for p>10, $d_1(p)=0,\ d_2(p)=0)$
= 0
Thus, market demand
= 50 – 3p if $p \le 15$
= 20 – p if $15 < p \le 20$
= 0 if p>20

**Ans15:** d(p) = 10 – 3p if $p \le \frac{10}{3}$

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

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

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

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

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

= 0

**Ans16:**

| 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 |

**Ans17:** Those goods that share a positive relationship with income but a negative relationship with price are called normal goods. In other words, if the income of a consumer increases, then the demand for a normal good also increases. However, the demand will fall with the rise in the price of that good.
That is,
If the price of a good $(P_x)$ increases, then the demand for the good $(D_x)$ decreases.
If a consumer's income (M) increases, then the demand for good $D_x$ increases.

**Ans18:** 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.
If a consumer's income (M) increases, then the demand for good $D_x$ increases.
Examples: Coarse cereals, birds, etc.

**Ans19:** Those goods that can be consumed in place of other goods are called substitute goods. Example: Tea and coffee are goods that can be substitutes 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.

**Ans20:** 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.

**Ans21:** 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,

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

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

P = initial price

Q = initial quantity

**Ans22:** $P_1 = 4$, $Q_1 = 25$

$P_2 = 5$, $Q_2 = 20$

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

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

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

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

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

$e_d$ = -0.8

**Ans23:** D(p) = 10 – 3p

$\frac{\Delta D(p)}{\Delta p}$ =-3 = Change in demand per unit change in price.

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

$\Phi - 3 \times \frac{p}{10-3p} \Phi \frac{-3p}{10-3p}$

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

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

$e_d \, \Phi \frac{-5}{5}$ =-1

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

**Ans24:** $e_d$ = -0.2 [Note that $e_d$ = -2. Hence we need not prefix ed to (-2)]

Percentage change in price = 5%

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

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

1.0 = percentage change in demand

= 1%

**Ans25:** 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

Thus, percentage decrease in demand is less than the percentage increase in price. This means that when price increases and

**Ans27:** Percentage decrease in price = 4%

Increase in expenditure = 2%

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

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.

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

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