

Subject: Microeconomics (Class 11)

Max Marks: 30

Document: Detailed Solution Key (Advanced Worksheet)

Chapter: Consumer's Equilibrium

SECTION A: APPLICATION-BASED OBJECTIVES ANSWERS

Q1. Correct Option: (b) The same or lower satisfaction

Explanation: Monotonic preferences state that more of a good always provides higher satisfaction. If preferences are non-monotonic, a bundle containing larger quantities could hit a point of over-saturation, leading to unchanged or even lower total utility.

Q2. Correct Option: (b) Consume more of Good X

Explanation: MRS_{xy} represents the rate at which the consumer is internally willing to substitute Y for X, while P_x / P_y is the market rate. Since the willingness to substitute X is higher than what the market demands, the consumer will buy more of Good X to drive down its marginal utility until equality is achieved.

Q3. Correct Option: (c) Remain entirely unchanged

Explanation: The slope of the budget line is determined by the price ratio ($-P_x / P_y$), which remains identical if both prices double. The intercepts are calculated as M / P_x and M / P_y . If income (M) and prices both double, the ratios stay constant, keeping the line stationary.

Q4. Correct Option: (c) Exactly zero

Explanation: At the point of satiety, Total Utility (TU) peaks and levels out. Since Marginal Utility is the rate of change of Total Utility ($\Delta TU / \Delta Q$), it becomes exactly zero at this apex point.

SECTION B: CRITICAL & ANALYTIC SHORT ANSWER SOLUTIONS

Q5. Evaluation of Intersection vs Tangency in Equilibrium

Answer: The statement is **incorrect**. A consumer cannot achieve a stable maximum utility equilibrium where an indifference curve intersects the budget line.

If an IC intersects a budget line, it means there are segments of the budget line that lie above that specific IC. A rational consumer can move to those higher segments to reach a higher indifference curve (and thus greater satisfaction) with the same income. True equilibrium requires a condition of **tangency** ($MRS_{xy} = P_x / P_y$), where the budget line just touches the highest attainable IC.

Marking Scheme: 1 Mark for correcting the statement, 2 Marks for the logical microeconomic evaluation.

Q6. Outward Shift vs Outward Rotation

Answer:

- **Outward Shift:** Occurs when the consumer's nominal income (M) increases while market prices remain completely fixed. This allows the consumer to buy proportionally more of both goods, shifting the entire line parallelly to the right without changing its slope.
- **Outward Rotation:** Occurs when the price of only one commodity (e.g., Good X) falls, while income and the price of Good Y remain constant. The line pivots/rotates outwards on the horizontal axis because the maximum reachable units of X increase, while the vertical axis intercept stays fixed.

Marking Scheme: 1.5 Marks for explaining the shift with income variables, 1.5 Marks for explaining the rotation with single price variables.

Q7. Proof of Non-Intersecting Indifference Curves

Answer: Suppose two indifference curves, IC_1 and IC_2 , intersect at point A. Let point B lie on IC_1 and point C lie on IC_2 , where C clearly has more of both goods than B.

1. Since A and B are on IC_1 , total satisfaction $SA = SB$.
2. Since A and C are on IC_2 , total satisfaction $SA = SC$.
3. By the mathematical law of **transitivity**, this implies that satisfaction $SB = SC$.

However, this directly contradicts the axiom of **monotonic preferences**, which dictates that bundle C must be strictly preferred over B because it holds more quantities. Hence, ICs can never intersect.

Marking Scheme: 1 Mark for transitivity chain, 1 Mark for monotonic contradiction, 1 Mark for structural clarity.

SECTION C: CONCEPTUAL & DIAGRAMMATIC LONG ANSWER SOLUTIONS

Q8. Adjustment Mechanism when $MRS_{xy} < P_x / P_y$

Answer: When $MRS_{xy} < P_x / P_y$, the consumer's internal valuation of an extra unit of Good X is lower than the price the market demands to acquire it. In other words, the consumer values Good Y more than what it costs to get it relative to X.

Adjustment Process:

1. The consumer will systematically **decrease the consumption of Good X** and **increase the consumption of Good Y**.
2. As consumption of Good Y increases, its marginal utility (MU_y) falls. Concurrently, as consumption of Good X decreases, its marginal utility (MU_x) rises.
3. This dual change causes the internal substitution rate (MRS_{xy} , which is MU_x / MU_y) to increase. The adjustment continues until MRS_{xy} rises enough to equal the market price ratio (P_x / P_y), restoring optimal equilibrium.

Marking Scheme: 1 Mark for identifying asset movement (buying more Y, less X), 2 Marks for detailing the MU adjustment mechanics, 1 Mark for specifying final equilibrium restoration.

Q9. Algebraic Budget Line Derivation

Given Data: Budget (M) = ₹60, Price of Chocolate (P_x) = ₹10, Price of Juice (P_y) = ₹5.

Solutions:

1. Equation of the Budget Line:

The standard form is $P_x \cdot X + P_y \cdot Y = M$. Substituting the given values:

$$10X + 5Y = 60 \text{ (or simplified as } 2X + Y = 12\text{)}.$$

2. Slope of the Budget Line:

$\text{Slope} = -P_x / P_y = -10 / 5 = -2$. The absolute value of the slope is **2**.

3. Maximum Juice Box Consumption (Y -intercept):

If the consumer buys zero chocolate bars ($X = 0$), then:

$$5Y = 60 \implies Y = 60 / 5 = \mathbf{12} \text{ juice boxes}.$$

Marking Scheme: 1.5 Marks for equation derivation, 1 Mark for exact slope calculation, 1.5 Marks for correct zero-consumption intercept calculation.

SECTION D: CASE-BASED / HIGHER ORDER THINKING SOLUTIONS

Q10. Structural Economic Shift Evaluation

Answer:

1. Effect on Budget Line Slope and Position:

The initial price ratio was P_x / P_y . When the price of essential green food items (Good X) drops by 50%, P_x becomes $0.5P_x$. The absolute value of the slope (P_x / P_y) is halved, making the budget line **flatter**. On the horizontal axis, the maximum possible intercept shifts outwards significantly, showing expanded purchasing capabilities for Good X.

2. Final Equilibrium Layout and Justification:

The final equilibrium will settle on a **higher indifference curve**.

Justification: A 50% price drop in Good X coupled with a 20% increase in nominal stipend expands the consumer's total "real income" or budget envelope. The bundle options that were previously unaffordable are now accessible. Because the consumer maintains strict **monotonic preferences** ("more is better"), they will leverage this expanded budget set to choose a combination that sits on a higher, more satisfying indifference curve.

Marking Scheme: 2 Marks for identifying slope flattening and horizontal movement, 2 Marks for identifying higher IC positioning with solid monotonic justification.

~ End of Solution Key ~

Verified for MasterG.Net Class 11 Microeconomics Core Portfolios.