

Case Study 1

A group of young entrepreneurs started an organic juice shop called "PureSip." To maintain the unique taste of their signature "Tropical Blast," they mix orange juice and pineapple juice in a strict ratio of 5 : 3. Last month, the shop produced 160 liters of this signature blend to meet the high demand. As the business grew, the owners decided to track their performance using various mathematical tools. They found that 25% of their total customers preferred the Tropical Blast over other drinks.

Due to a sudden increase in the cost of organic oranges, the price of a small bottle was increased from 80 rupees to 100 rupees. To keep customers loyal, the shop offered a "membership discount" where members pay a different rate. The owners also borrowed a sum of 50,000 rupees from a local bank at a simple interest rate to purchase a new high-speed blender. The manager now needs to calculate the exact quantities of juice used, the percentage of price increase, and the interest accrued over time to ensure the startup remains profitable. This detailed analysis of quantities helps them decide whether to expand their menu or focus on cost-cutting measures.

Questions

1. In the 160 liters of "Tropical Blast" produced last month, what was the actual quantity of orange juice used?
 - (a) 60 liters
 - (b) 100 liters
 - (c) 80 liters
 - (d) 120 liters

Answer: (b) 100 liters

Solution: The ratio of orange juice to pineapple juice is 5 : 3. Total parts = 5 + 3 = 8. Quantity of orange juice = $\frac{5}{8} \times 160 = 5 \times 20 = 100$ liters.

2. If 25% of the total customers preferred Tropical Blast and the shop had 1,200 customers in total, how many customers chose this signature blend?
 - (a) 250
 - (b) 350
 - (c) 300
 - (d) 400

Answer: (c) 300

Solution: Number of customers = 25% of 1,200 = $\frac{25}{100} \times 1200 = 25 \times 12 = 300$.

3. The price of a small bottle was increased from 80 rupees to 100 rupees. What is the percentage increase in the price?
 - (a) 20%
 - (b) 25%
 - (c) 15%
 - (d) 30%

Answer: (b) 25%

Solution: Amount of increase = $100 - 80 = 20$ rupees. Percentage increase = $\frac{\text{Increase}}{\text{Original Price}} \times 100 = \frac{20}{80} \times 100 = \frac{1}{4} \times 100 = 25\%$.

4. If the shop owners borrowed 50,000 rupees at a simple interest rate of 8% per annum, how much interest will they owe after 3 years?

- (a) 12,000 rupees
- (b) 15,000 rupees
- (c) 4,000 rupees
- (d) 10,000 rupees

Answer: (a) 12,000 rupees

Solution: Simple Interest (S.I.) = $\frac{P \times R \times T}{100}$. S.I. = $\frac{50000 \times 8 \times 3}{100} = 500 \times 24 = 12,000$ rupees.

5. To maintain the 5 : 3 ratio, if the shop has 45 liters of pineapple juice available, how many liters of orange juice do they need to mix with it?

- (a) 75 liters
- (b) 65 liters
- (c) 80 liters
- (d) 55 liters

Answer: (a) 75 liters

Solution: Let the orange juice be x . The proportion is $\frac{5}{3} = \frac{x}{45}$. Solving for x : $x = \frac{5 \times 45}{3} = 5 \times 15 = 75$ liters.