

Case Study 1

The "Sweet Delights" bakery is famous for its signature chocolate cake. To maintain the exact taste and texture that customers love, the head baker, Mr. Sharma, follows a strict ratio of ingredients. For every 500 grams of refined flour used, the bakery requires 300 grams of cocoa powder and 200 grams of granulated sugar. As the bakery expands its operations to cater to large corporate events, the staff must often scale these quantities up or down while keeping the proportions constant.

On a busy Monday morning, the bakery receives an order that requires a total mixture of 5 kilograms (5000 grams) of these three dry ingredients combined. Mr. Sharma explains to his apprentices that ratios are not just numbers but the secret to consistency. He also notes that the time taken to bake these cakes is inversely proportional to the number of industrial ovens used. If 2 ovens can bake the entire batch in 6 hours, adding more ovens will reduce the time, provided the temperature remains constant. The apprentices must now calculate the exact weight of each ingredient and manage the baking schedule efficiently to ensure all cakes are delivered fresh and on time for the event.

Multiple Choice Questions

1. What is the simplified ratio of refined flour to cocoa powder to granulated sugar as used in the signature recipe?
 - (a) 5 : 3 : 2
 - (b) 50 : 30 : 20
 - (c) 2 : 3 : 5
 - (d) 10 : 6 : 4

Answer: (a) 5 : 3 : 2

Solution: The given quantities are Flour = 500g, Cocoa = 300g, and Sugar = 200g. To simplify the ratio 500 : 300 : 200, we divide each term by the highest common factor, which is 100. Thus, $500/100 : 300/100 : 200/100 = 5 : 3 : 2$.

2. In the corporate order requiring 5000 grams of the total mixture, what is the specific weight of the cocoa powder needed?
 - (a) 1000 grams
 - (b) 1500 grams
 - (c) 2500 grams
 - (d) 1200 grams

Answer: (b) 1500 grams

Solution: The ratio is 5 : 3 : 2. Sum of ratio parts = $5 + 3 + 2 = 10$. The total mixture weight is 5000g. The share of cocoa powder = $(3/10) \times 5000 = 3 \times 500 = 1500$ grams.

3. If the bakery decides to use 750 grams of granulated sugar for a different batch, how much refined flour must be used to keep the proportion the same?
 - (a) 1500 grams
 - (b) 1250 grams
 - (c) 1875 grams
 - (d) 2000 grams

Answer: (c) 1875 grams

Solution: Let the flour needed be x . The ratio of flour to sugar is 5 : 2. Therefore, $x/750 = 5/2$. Solving for x : $x = (5 \times 750)/2 = 3750/2 = 1875$ grams.

4. The bakery finds that 2 ovens take 6 hours to bake the cakes. If they want to finish the baking in only 3 hours, how many ovens of the same capacity are required?

- (a) 3 ovens
- (b) 4 ovens
- (c) 5 ovens
- (d) 6 ovens

Answer: (b) 4 ovens

Solution: This is a case of inverse proportion. Let O_1, T_1 be the initial ovens and time, and O_2, T_2 be the new ones. $O_1 \times T_1 = O_2 \times T_2 \Rightarrow 2 \times 6 = O_2 \times 3 \Rightarrow 12 = 3 \times O_2 \Rightarrow O_2 = 12/3 = 4$ ovens.

5. If the cost of 500 grams of cocoa powder is Rs 450, how much will the bakery spend on cocoa powder for the 5000 gram total mixture mentioned in Question 2?

- (a) Rs 1350
- (b) Rs 900
- (c) Rs 1500
- (d) Rs 1800

Answer: (a) Rs 1350

Solution: From Question 2, we need 1500g of cocoa. This is a direct proportion. If 500g costs Rs 450, then 1g costs $450/500$. Therefore, 1500g costs $(450/500) \times 1500$. Simplifying: $450 \times 3 = 1350$. The bakery will spend Rs 1350.