



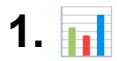
Class 9 Maths – Ganita Manjari



Chapter 10: How Quantities Combine: Understanding Data



Exercise Set 10.1 – Questions & Solutions



1. Combined Average

Question:

The average score of students on a test in Section A is 72 and that of students in Section B is 76. What is the combined average of both the sections given that Section A has 30 students and Section B has 25 students?

Solution:

Given:

- Average of Section A = 72
- Number of students in Section A = 30
- Average of Section B = 76
- Number of students in Section B = 25

Combined Average

$$= [(72 \times 30) + (76 \times 25)] \div (30 + 25)$$

$$= (2160 + 1900) \div 55$$

$$= 4060 \div 55$$

$$= 73.82 \text{ approximately}$$



Answer: 73.82 approximately

2. Nitrogen in Fertiliser Mixture

Question:

A farmer mixes three equal quantities of fertilisers. The first one contains $1/10$ nitrogen, the second contains $9/50$ nitrogen, and the third contains $3/60$ nitrogen. What is the fraction of nitrogen in the mixture?

Solution:

Since the three quantities are equal, the fraction of nitrogen in the mixture is the average of the three fractions.

Fraction of nitrogen

$$= [(1/10) + (9/50) + (3/60)] \div 3$$

Taking LCM = 300:

$$1/10 = 30/300$$

$$9/50 = 54/300$$

$$3/60 = 15/300$$

Therefore,

$$= [(30 + 54 + 15)/300] \div 3$$

$$= 99/900$$

$$= 11/100$$

✓ **Answer: 11/100**

3. Purity of Combined Gold

Question:

(Śridharācārya, *Pāṭīgaṇita*, c. 750 CE) In ancient India, Varna was the measure of gold purity. A purity of 16 varna meant pure gold; in general, a purity of k varna meant that the gold-alloy was $k/16$ gold and the rest impurities. (Now the term used is karat; 16 Varna = 24 karat.)

Suppose a goldsmith melts together three pieces of gold: 9 units at 12 varna, 5 units at 10 varna, and 17 units at 11 varna. Find the purity in varna of the combined gold.

Solution:

Using the weighted average:

Purity of combined gold

$$= [(9 \times 12) + (5 \times 10) + (17 \times 11)] \div (9 + 5 + 17)$$

$$= (108 + 50 + 187) \div 31$$

$$= 345 \div 31$$

$$= 11.13 \text{ varna approximately}$$

✓ **Answer: 11.13 varna approximately**

4. Combined Average Rainfall

Question:

The average rainfall per day in the months of May, June, and July in a certain location are 3.5 mm, 10 mm and 8.7 mm respectively. Write an expression that gives their combined average.

Solution:

May has 31 days, June has 30 days, and July has 31 days.

Therefore, the combined average is:

$$= [(3.5 \times 31) + (10 \times 30) + (8.7 \times 31)] \div (31 + 30 + 31)$$

$$= (108.5 + 300 + 269.7) \div 92$$

$$= 678.2 \div 92$$

$$= 7.37 \text{ mm approximately}$$

✓ **Answer:**

$$[(3.5 \times 31) + (10 \times 30) + (8.7 \times 31)] \div 92$$

$$= 7.37 \text{ mm per day approximately}$$

5. Concentration of Spice Mix

Question:

Calculate the concentration of spice mix in these two scenarios.

(i)

A 100 mL *kashayam/kadha* with 5% spice mix, a 200 mL one with 10% spice mix, and a 300 mL one with 15% spice mix are combined.

Solution:

Amount of spice mix:

$$5\% \text{ of } 100 \text{ mL} = 5 \text{ mL}$$

$$10\% \text{ of } 200 \text{ mL} = 20 \text{ mL}$$

$$15\% \text{ of } 300 \text{ mL} = 45 \text{ mL}$$

Total spice mix:

$$5 + 20 + 45 = \mathbf{70 \text{ mL}}$$

Total volume:

$$100 + 200 + 300 = \mathbf{600 \text{ mL}}$$

Concentration

$$= (70/600) \times 100$$

$$= \mathbf{11.67\% \text{ approximately}}$$

✓ **Answer: 11.67% approximately**

(ii)

A 300 mL *kashayam/kadha* with 5% spice mix, a 200 mL one with 10% spice mix, and a 100 mL one with 15% spice mix are mixed.

Solution:

Amount of spice mix:

$$5\% \text{ of } 300 \text{ mL} = 15 \text{ mL}$$

$$10\% \text{ of } 200 \text{ mL} = 20 \text{ mL}$$

$$15\% \text{ of } 100 \text{ mL} = 15 \text{ mL}$$

Total spice mix:

$$15 + 20 + 15 = \mathbf{50 \text{ mL}}$$

Total volume:

$$300 + 200 + 100 = \mathbf{600 \text{ mL}}$$

Concentration

$$= (50/600) \times 100$$

$$= \mathbf{8.33\% \text{ approximately}}$$

✓ **Answer: 8.33% approximately**

Quick Answer Key

1. 73.82 approximately
2. 11/100
3. 11.13 varna approximately
4. 7.37 mm per day approximately
5. (i) 11.67% approximately
5. (ii) 8.33% approximately