📘 Class 9 Maths – Ganita Manjari

📊 Chapter 10: How Quantities Combine: Understanding Data

✏️ Exercise Set 10.1 – Questions & Solutions

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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 × 30) + (76 × 25)] ÷ (30 + 25)

= (2160 + 1900) ÷ 55

= 4060 ÷ 55

= **73.82 approximately**

✅ **Answer: 73.82 approximately**

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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)] ÷ 3

Taking LCM = 300:

1/10 = 30/300

9/50 = 54/300

3/60 = 15/300

Therefore,

= [(30 + 54 + 15)/300] ÷ 3

= 99/900

= **11/100**

✅ **Answer: 11/100**

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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 × 12) + (5 × 10) + (17 × 11)] ÷ (9 + 5 + 17)

= (108 + 50 + 187) ÷ 31

= 345 ÷ 31

= **11.13 varna approximately**

✅ **Answer: 11.13 varna approximately**

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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 × 31) + (10 × 30) + (8.7 × 31)] ÷ (31 + 30 + 31)

= (108.5 + 300 + 269.7) ÷ 92

= 678.2 ÷ 92

= **7.37 mm approximately**

✅ **Answer:**

[(3.5 × 31) + (10 × 30) + (8.7 × 31)] ÷ 92

= **7.37 mm per day approximately**

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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% of 100 mL = 5 mL

10% of 200 mL = 20 mL

15% of 300 mL = 45 mL

Total spice mix:

5 + 20 + 45 = **70 mL**

Total volume:

100 + 200 + 300 = **600 mL**

Concentration

= (70/600) × 100

= **11.67% 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% of 300 mL = 15 mL

10% of 200 mL = 20 mL

15% of 100 mL = 15 mL

Total spice mix:

15 + 20 + 15 = **50 mL**

Total volume:

300 + 200 + 100 = **600 mL**

Concentration

= (50/600) × 100

= **8.33% 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