



Class 9 Maths – Ganita Manjari



Chapter 10: How Quantities Combine: Understanding Data



Exercise Set 10.3 – Questions & Solutions

1. 💰 Profit on Total Sales

Question:

A stationery shop owner made ₹8000 selling books, of which 30% is the profit amount, and ₹1000 selling book covers, of which 50% is the profit amount. What is the percentage of profit on the total sales?

Solution:

Profit on books:

$$= 30\% \text{ of ₹8000}$$

$$= (30/100) \times 8000$$

$$= \text{₹2400}$$

Profit on book covers:

$$= 50\% \text{ of ₹1000}$$

$$= (50/100) \times 1000$$

$$= \text{₹500}$$

Total profit:

$$= \text{₹2400} + \text{₹500}$$

$$= \text{₹2900}$$

Total sales:

$$= ₹8000 + ₹1000$$

$$= ₹9000$$

Percentage of profit:

$$= (2900/9000) \times 100$$

$$= 32.22\% \text{ approximately}$$

✓ Answer: 32.22% approximately

2. Average Daily Distance of the White Stork

Question:

A white stork's migration is tracked. The average daily distance travelled, calculated over 20 days, is 44.5 km. On the 21st day, it flew 55 km. What is the average daily distance travelled over these 21 days? Make a guess before you calculate.

Solution:

Average distance for first 20 days = **44.5 km**

Total distance travelled in 20 days:

$$= 44.5 \times 20$$

$$= 890 \text{ km}$$

Distance travelled on 21st day = **55 km**

Total distance in 21 days:

$$= 890 + 55$$

$$= 945 \text{ km}$$

Therefore,

Average daily distance

$$= 945 \div 21$$

$$= 45 \text{ km}$$

✓ Answer: 45 km

3. Salt and Sugar Concentrations

Question:

A 600 mL solution with 5% salt is mixed with a 300 mL solution with 8% sugar. What are the concentrations of salt and sugar in the mixture?

- (i) Salt: 5%, Sugar: 8%
- (ii) Salt: 13%, Sugar: 3%
- (iii) Salt: 6%, Sugar: 6%
- (iv) Salt: 5.55%, Sugar: 8.88%
- (v) Salt: 3.33%, Sugar: 2.67%
- (vi) Salt: 4.1%, Sugar: 7.08%

Solution:

Salt

Salt in 600 mL solution:

$$= 5\% \text{ of } 600$$

$$= (5/100) \times 600$$

$$= 30 \text{ mL}$$

$$\text{Total volume} = 600 + 300 = 900 \text{ mL}$$

Salt concentration:

$$= (30/900) \times 100$$

$$= 3.33\% \text{ approximately}$$

Sugar

Sugar in 300 mL solution:

$$= 8\% \text{ of } 300$$

$$= (8/100) \times 300$$

$$= \mathbf{24 \text{ mL}}$$

Sugar concentration:

$$= (24/900) \times 100$$

$$= \mathbf{2.67\% \text{ approximately}}$$

✅ **Answer: (v) Salt: 3.33%, Sugar: 2.67%**

4. 🌶️ Concentration of Spice in Pani

Question:

At a *panipuri* (*golgappa*) stall, the concentration of spice in the *pani* (spiced water) was 8%. Many customers complained that it was too spicy. What quantity of regular water should be mixed into the 10 litres of *pani* so that the spice level is reduced to $(3/4)$ of the original concentration?

Solution:

Original concentration = **8%**

Required concentration:

$$= (3/4) \times 8\%$$

$$= \mathbf{6\%}$$

Initial quantity of *pani* = **10 litres**

Amount of spice:

$$= 8\% \text{ of } 10$$

$$= \mathbf{0.8 \text{ litres}}$$

Let the quantity of regular water added be **x litres**.

Total mixture:

$$= 10 + x \text{ litres}$$

Required concentration = 6%.

Therefore,

$$0.8/(10 + x) = 6/100$$

$$0.8/(10 + x) = 0.06$$

$$0.8 = 0.06(10 + x)$$

$$0.8 = 0.6 + 0.06x$$

$$0.2 = 0.06x$$

$$x = 0.2/0.06$$

$$x = 10/3 \text{ litres}$$

$$x = 3 \frac{1}{3} \text{ litres}$$

✓ **Answer: 3 1/3 litres of regular water**

5. Physical Fitness Evaluation

Question:

A physical fitness evaluation is being undertaken. The final marks are calculated by combining the marks for strength, flexibility, and agility in the ratio 4 : 5 : 6. Rashi has scored 60, 65, and 70. Keerthi has scored 55, 65, and 75 respectively.

- (i) Find out whose total is more without calculating.
- (ii) What are their final marks?

Solution:

(i) Whose total is more?

Weights are:

- Strength = 4

- Flexibility = 5
- Agility = 6

Compare the differences:

Rashi vs Keerthi:

- Strength: Rashi has **5 more**
- Flexibility: Both have **65**
- Agility: Keerthi has **5 more**

Since agility has a **higher weight (6)** than strength (4), Keerthi's advantage in agility has a greater effect.

Therefore:

 **Keerthi's total is more.**

(ii) Final marks

Rashi

Weighted total:

$$= (60 \times 4) + (65 \times 5) + (70 \times 6)$$

$$= 240 + 325 + 420$$

$$= \mathbf{985}$$

Total weight:

$$= 4 + 5 + 6$$

$$= \mathbf{15}$$

Final marks:

$$= 985/15$$

$$= \mathbf{65.67 \text{ approximately}}$$

Keerthi

Weighted total:

$$= (55 \times 4) + (65 \times 5) + (75 \times 6)$$

$$= 220 + 325 + 450$$

$$= 995$$

Final marks:

$$= 995/15$$

$$= 66.33 \text{ approximately}$$

✓ Answer:

- Rashi = 65.67 approximately
 - Keerthi = 66.33 approximately
-

6. ★ Average Restaurant Rating

Question:

A restaurant collected ratings from 10 customers on a scale of 1 to 5. The resulting data is shown in the table below.

	5	4	3	2	1
	★	★	★	★	★
Food	5	3	2	0	0
Ambience	0	4	5	1	0
Service	1	2	2	4	1

What is the average rating if the metrics are combined with the weights **food : ambience : service = 6 : 5 : 4**?

Solution:

Food

Average rating:

$$= [(5 \times 5) + (4 \times 3) + (3 \times 2)] \div 10$$

$$= (25 + 12 + 6) \div 10$$

$$= \mathbf{4.3}$$

Ambience

Average rating:

$$= [(4 \times 4) + (3 \times 5) + (2 \times 1)] \div 10$$

$$= (16 + 15 + 2) \div 10$$

$$= \mathbf{3.3}$$

Service

Average rating:

$$= [(5 \times 1) + (4 \times 2) + (3 \times 2) + (2 \times 4) + (1 \times 1)] \div 10$$

$$= (5 + 8 + 6 + 8 + 1) \div 10$$

$$= \mathbf{2.8}$$

Now use weights **6 : 5 : 4**.

Combined rating:

$$= [(4.3 \times 6) + (3.3 \times 5) + (2.8 \times 4)] \div (6 + 5 + 4)$$

$$= (25.8 + 16.5 + 11.2) \div 15$$

$$= 53.5 \div 15$$

$$= \mathbf{3.57 \text{ approximately}}$$

✓ **Answer: 3.57 approximately**

7. Weight Data of Langurs

Question:

The following table shows the weight data of langurs in an animal facility. Without doing any computations, can you tell whether there are more male langurs or more female langurs? Or are they equal in number?

	Male langurs	Female langurs	All langurs
Average weight	16.5 kg	13.8 kg	14.925 kg
Number of langurs	x	y	60

(i) Which of the following expression(s) describes the given scenario?

(a)

$$(16.5x + 13.8y)/(x + y) = 14.925$$

(b)

$$(16.5x + 13.8y)/60 = 14.925$$

(c)

$$(16.5x + 13.8y)/2 = 14.925$$

(d)

$$(16.5x + 13.8y)/(16.5 + 13.8) = 14.925$$

Solution to (i):

Since:

$$x + y = 60,$$

the combined average can be written as:

$$(16.5x + 13.8y)/(x + y) = 14.925$$

or

$$(16.5x + 13.8y)/60 = 14.925$$

Therefore:

✓ Correct expressions: (a) and (b)

(ii) Find out how many male langurs are present.

We know:

$$x + y = 60$$

and

$$16.5x + 13.8y = 14.925 \times 60$$

$$= 895.5$$

Substitute $y = 60 - x$:

$$16.5x + 13.8(60 - x) = 895.5$$

$$16.5x + 828 - 13.8x = 895.5$$

$$2.7x = 67.5$$

$$x = \mathbf{25}$$

Therefore:

$$\text{Male langurs} = \mathbf{25}$$

Female langurs:

$$= 60 - 25$$

$$= \mathbf{35}$$

✓ Answer: 25 male langurs

(iii) A female langur weighing 15.2 kg is admitted to the facility. What is the average weight of the female langurs after this?

Original total weight of female langurs:

$$= 35 \times 13.8$$

$$= 483 \text{ kg}$$

After adding the new female langur:

New total weight:

$$= 483 + 15.2$$

$$= 498.2 \text{ kg}$$

New number of female langurs:

$$= 35 + 1$$

$$= 36$$

New average:

$$= 498.2/36$$

$$= 13.84 \text{ kg approximately}$$

✓ Answer: 13.84 kg approximately

(iv) Two male langurs weighing 16.9 kg and 16.1 kg are released from the facility. What is the average weight of the male langurs after this?

Original number of male langurs = 25

Original total weight:

$$= 25 \times 16.5$$

$$= 412.5 \text{ kg}$$

Weight of two released langurs:

$$= 16.9 + 16.1$$

$$= 33 \text{ kg}$$

Remaining total weight:

$$= 412.5 - 33$$

$$= 379.5 \text{ kg}$$

Remaining number:

$$= 25 - 2$$

$$= 23$$

New average:

$$= 379.5/23$$

$$= 16.5 \text{ kg}$$

✓ Answer: 16.5 kg

(v) Now, suppose one of the male langurs lost 1 kg of weight. What is the average weight of all the male langurs after this?

Before losing weight:

Total weight of male langurs = **412.5 kg**

After losing 1 kg:

New total weight:

$$= 412.5 - 1$$

$$= 411.5 \text{ kg}$$

Number of male langurs = **25**

New average:

$$= 411.5/25$$

$$= 16.46 \text{ kg}$$

✓ Answer: 16.46 kg

8. Salinity of Water Mixtures

Question:

Dorjee has collected 1 litre of water from the Dead Sea! Using the information in the table, answer the following questions. A calculator can be used if necessary.

Water Source	Salinity
Dead Sea	$\approx 34\%$
Other seas and oceans	$\approx 3.5\%$
Ground water	$\approx 0.01\%$
Purified drinking water	$\approx 0.001\%$

(i) What is the salinity of the mixture if he mixes 1 litre of water from the Dead Sea with 2 litres of purified drinking water?

Solution:

Salt in 1 litre Dead Sea water:

= 34% of 1 L

= **0.34 L**

Salt in 2 litres purified water:

= 0.001% of 2 L

= **0.00002 L**

Total salt:

= 0.34002 L

Total water:

= 1 + 2

= **3 L**

Salinity:

= $(0.34002/3) \times 100$

= **11.334% approximately**

✓ Answer: 11.334% approximately

(ii) Is it possible to mix water from the Dead Sea and purified drinking water to get a mixture with the salinity of groundwater? Why/Why not? What quantity of purified drinking water should Dorjee mix with 1 litre of water from the Dead Sea to get a mixture having the salinity of groundwater?

Solution:

Groundwater salinity = **0.01%**

Let the quantity of purified drinking water required be **x litres**.

Salt from 1 litre Dead Sea water:

$$= 0.34 \text{ L}$$

Salt from x litres purified water:

$$= 0.001\% \text{ of } x$$

$$= 0.00001x \text{ L}$$

Therefore:

$$0.34 + 0.00001x = 0.01(1 + x)$$

$$0.34 + 0.00001x = 0.01 + 0.01x$$

$$0.33 = 0.00999x$$

$$x \approx \mathbf{33.03 \text{ litres}}$$

Therefore, it is possible.

✓ Answer: Approximately 33.03 litres of purified drinking water

(iii) Is it possible to mix water from the Dead Sea and groundwater to get a mixture with the salinity of purified drinking water? Why/Why not? What quantity of groundwater should he mix with 1 litre of water from the Dead Sea to get a mixture having the salinity of purified drinking water?

Solution:

Dead Sea salinity = **34%**

Groundwater salinity = **0.01%**

Purified drinking water salinity = **0.001%**

A mixture of two substances must have a salinity **between the salinities of the two substances**.

The lowest salinity available here is groundwater at **0.01%**.

But the required salinity is **0.001%**, which is lower than 0.01%.

Therefore, it is **not possible** to obtain 0.001% salinity by mixing Dead Sea water with groundwater.

✓ **Answer: It is not possible. No finite quantity of groundwater can produce the required salinity.**



Quick Answer Key – Exercise Set 10.3

1. 32.22% approximately

2. 45 km

3. (v) Salt: 3.33%, Sugar: 2.67%

4. 3 1/3 litres of regular water

5.

- (i) Keerthi
- (ii) Rashi = 65.67, Keerthi = 66.33

6. 3.57 approximately

7.

- (i) **(a) and (b)**
- (ii) 25 male langurs
- (iii) 13.84 kg approximately

- (iv) 16.5 kg
- (v) 16.46 kg

8.

- (i) 11.334% approximately
- (ii) Approximately 33.03 L
- (iii) Not possible