Mathematics — Ganita Manjari

Chapter 10 Test 7

How Quantities Combine: Understanding Data

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

General Instructions

1. All 13 questions are compulsory. Calculators are not allowed.
2. Select one correct option in Section A. Show working in Sections B–D.
3. Use given data. Assume additive volumes and no loss unless stated.

SECTION A

(5 questions × 1 mark = 5 marks)

1. Values 6 and 12 have weights 3 and 2. Find the weighted total.

(A) 18 (B) 30
(C) 42 (D) 60

2. Find the sum of the means of 10, 30 with weights 1: 3 and 3: 1.

(A) 20 (B) 30
(C) 40 (D) 60

3. In a 10%–30% blend, adding more 10% solution moves concentration towards:

(A) 10% (B) 30%
(C) 40% (D) 0%

4. All energy-use categories double. What changes in the 100% stacked bar?

(A) Every share doubles. (B) The bar becomes twice as long.
(C) Every share halves. (D) No percentage share changes.

5. Which operation on all positive weights can change a weighted mean?

(A) Multiply by 4. (B) Divide by 2.
(C) Add 1. (D) Multiply by 0.5.

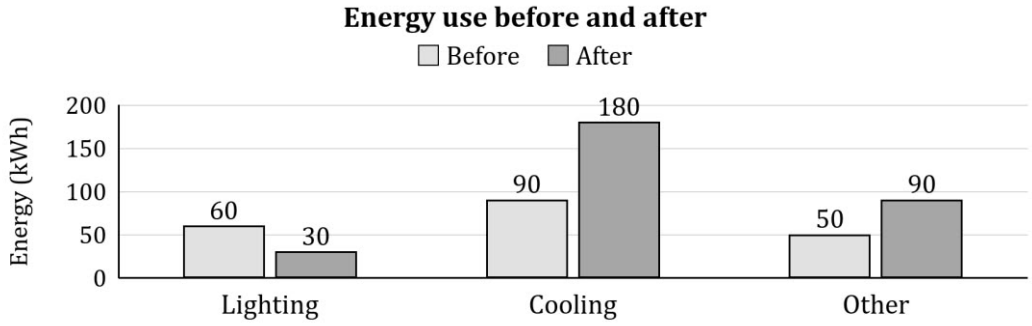
SECTION B

(4 questions × 2 marks = 8 marks)

6. Values a, b have positive weights u, v. Prove that multiplying both weights by the same positive number k leaves their weighted mean unchanged.

7. Find the weighted mean of 40 and 80 with weights 1 and 3. Add 1 to each weight and recalculate. Is the mean unchanged?

8. Using the data in figure, find lighting's percentage share before and after the change. By how many percentage points did it change?



9. Scores 50 and 90 have weights 3 and 2. Double only the first weight. Find the old and new means, and state the direction of change.

SECTION C

(3 questions × 3 marks = 9 marks)

10. Values x, y have weighted mean M with unchanged positive weights u, v. Each value is transformed to twice itself plus 3. Prove the new mean is $2M + 3$; evaluate it for $M = 12$.

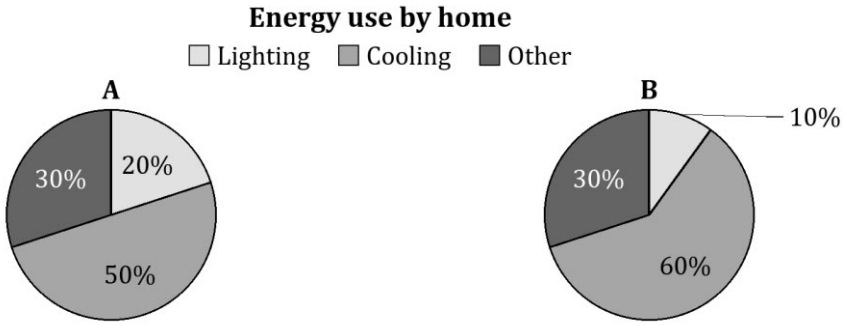
11. Distinct values a, b have positive weights u, v. Show that adding 1 to both weights preserves the mean exactly when $u = v$.

12. Energy plans A and B score (80,40,60) and (60,70,70) for efficiency, cost and reliability. Use weights 2: 1: 1. Compare their overall scores. Do equal scores mean identical performance?

SECTION D

(1 application question × 3 marks = 3 marks)

13. The energy shares in figure are for homes A and B, using 200 kWh and 300 kWh respectively.



(i) Find A's cooling use.
(ii) Find B's lighting use.
(iii) Find the combined cooling percentage.