

WORD PROBLEMS WITH AVERAGES

Mr. Merrick · September 23, 2025

Explainer

Reminder: The Arithmetic Mean (Average).

The *average* (or arithmetic mean) of several numbers is found by dividing the total of the numbers by how many numbers there are:

$$\text{Average} = \frac{\text{Sum of all values}}{\text{Number of values}}.$$

Examples:

- The average of 4, 7, 9 is $\frac{4+7+9}{3} = \frac{20}{3} \approx 6.7$.
- If the average of 5 numbers is 12, then their total sum is $5 \times 12 = 60$.

In word problems: Often you'll first find a *total* using $\text{average} \times \text{number of items}$, or set up an equation equating two totals. This is the key move throughout this set.

1. A school cafeteria prepared 120 sandwiches. The average cost of the vegetarian sandwiches was \$2.40, while the average cost of the non-vegetarian sandwiches was \$3.10. If the overall average cost of all sandwiches was \$2.75, how many vegetarian sandwiches were there?
2. A class of 25 students has an average height of 150 cm. After 5 new students joined, the class average increased to 152 cm. What was the average height of the new students?
3. On the first five tests, a student's average is 72. What score is needed on the sixth test to raise the overall average to 75?
4. The average of 12 numbers is 18. When one number is removed, the average of the remaining 11 numbers is 16. What number was removed?

5. The average of 6 test scores is 75. When the highest score is removed, the average of the remaining 5 scores drops to 72. When the lowest score is removed instead, the average of the remaining 5 scores rises to 78. What were the highest and lowest scores?

6. The average age of a group of 8 friends is 21 years. When two more friends join, the average becomes 22 years. What is the average age of the two new friends?

7. A chemist mixes 4 L of a 25% alcohol solution with some amount of a 40% alcohol solution to obtain a 32.5% alcohol solution. How many liters of the 40% solution should be added?

8. The average score of three students, Alan, Ben, and Chris, is 78. The average of Alan and Ben is 82. What is Chris's score?

9. A company has two departments. The average monthly salary in Department A is \$4800, while in Department B it is \$5200. If the overall average is \$5000 and there are 30 employees in Department A, how many employees are in Department B?