

# Weighted Averages and Missing Data Values

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

A *weighted average* multiplies each value by its weight (or count), adds the products, then divides by the total weight. To find a *missing value* when the mean is known, multiply the mean by the number of values to get the total, then subtract the values you know.

▶ **Example:** A student scores 80 on 2 tests and 95 on 3 tests. Find the weighted average. **Work:**  $\frac{80(2) + 95(3)}{2 + 3} = \frac{160 + 285}{5} = \frac{445}{5}$ .

★ **Answer:** 89

$$\frac{\sum(\text{value} \times \text{weight})}{\sum \text{weight}}$$

Multiply, add, then divide.

## ◆ Practice Problems

Find each average or missing value.

1. Mean of 4, 6, 8

\_\_\_\_\_

2. Mean of 10, 20, 30, 40

\_\_\_\_\_

3.  $\frac{90(1) + 80(1)}{2}$

\_\_\_\_\_

4.  $\frac{70(2) + 100(3)}{5}$

\_\_\_\_\_

5. Mean of 3 tests is 80; two are 75, 85. Find the third

\_\_\_\_\_

6. Mean of 5, 5, 5, 5

\_\_\_\_\_

7.  $\frac{60(1) + 90(2)}{3}$

\_\_\_\_\_

8. Mean of 2, 4, 6, 8, 10

\_\_\_\_\_

9. Mean of 4 values is 10; three are 8, 10, 12. Find the missing value

\_\_\_\_\_

10.  $\frac{100(3) + 50(1)}{4}$

\_\_\_\_\_

11. Mean of 12, 18

\_\_\_\_\_

12. Mean of two is 20; one is 15. Find the other

\_\_\_\_\_

13.  $\frac{80(2) + 90(2)}{4}$

\_\_\_\_\_

14. Mean of 3, 7, 11

\_\_\_\_\_

## ◆ Word Problems

15. Grades: 85 on 2 tests and 95 on 2 tests. Find the weighted average.

\_\_\_\_\_

16. A class of 10 averages 70; a class of 20 averages 85. Find the combined average.

\_\_\_\_\_

17. Five quiz scores average 8; four of them are 7, 9, 8, 10. Find the fifth.

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18. Homework counts 40% and the exam 60%. Homework = 90, exam = 80. Find the final grade.

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## Answer Keys

- |                                    |                                       |                                     |
|------------------------------------|---------------------------------------|-------------------------------------|
| 1. <input type="text" value="6"/>  | 7. <input type="text" value="80"/>    | 13. <input type="text" value="85"/> |
| 2. <input type="text" value="25"/> | 8. <input type="text" value="6"/>     | 14. <input type="text" value="7"/>  |
| 3. <input type="text" value="85"/> | 9. <input type="text" value="10"/>    | 15. <input type="text" value="90"/> |
| 4. <input type="text" value="88"/> | 10. <input type="text" value="87.5"/> | 16. <input type="text" value="80"/> |
| 5. <input type="text" value="80"/> | 11. <input type="text" value="15"/>   | 17. <input type="text" value="6"/>  |
| 6. <input type="text" value="5"/>  | 12. <input type="text" value="25"/>   | 18. <input type="text" value="84"/> |

### Step-by-Step Explanations

1. Start by naming the process: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{4 + 6 + 8}{3} = \frac{18}{3} = 6$ . So the final answer is 6.
2. A good way to think about this is: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{100}{4} = 25$ . So the final answer is 25.
3. Step by step: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{90 + 80}{2} = 85$ . So the final answer is 85.
4. Take it one move at a time: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{140 + 300}{5} = \frac{440}{5} = 88$ . So the final answer is 88.
5. Start by naming the process: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is Total =  $80 \times 3 = 240$ . The two known scores sum to 160, so the third =  $240 - 160 = 80$ . So the final answer is 80.
6. A good way to think about this is: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is All values are 5: mean 5. So the final answer is 5.
7. Step by step: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{60 + 180}{3} = \frac{240}{3} = 80$ . So the final answer is 80.
8. Take it one move at a time: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{30}{5} = 6$ . So the final answer is 6.
9. Start by naming the process: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is Total =  $10 \times 4 = 40$ . Subtract 30: missing = 10. So the final answer is 10.
10. A good way to think about this is: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{300 + 50}{4} = \frac{350}{4} = 87.5$ . So the final answer is 87.5.
11. Step by step: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{12 + 18}{2} = 15$ . So the final answer is 15.
12. Take it one move at a time: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is Total =  $20 \times 2 = 40$ . Subtract 15: other = 25. So the final answer is 25.
13. Start by naming the process: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{160 + 180}{4} = \frac{340}{4} = 85$ . So the final answer is 85.
14. A good way to think about this is: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{3 + 7 + 11}{3} = \frac{21}{3} = 7$ . So the final answer is 7.
15. Step by step: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{85(2) + 95(2)}{4} = \frac{170 + 190}{4} = 90$ . So the final answer is 90.
16. Take it one move at a time: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $\frac{10(70) + 20(85)}{30} = \frac{2400}{30} = 80$ . So the final answer is 80.
17. Start by naming the process: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is Total =  $8 \times 5 = 40$ . Subtract 34: fifth = 6. So the final answer is 6.
18. A good way to think about this is: For an average, add the values and divide by how many values there are; for a missing value, work backward from the total. The setup/work is  $0.4(90) + 0.6(80) = 36 + 48 = 84$ . So the final answer is 84.



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