

# Finding the Whole Given a Part and Percent

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 17

Sometimes you know the *part* and the *percent*, but the whole amount is a mystery—this topic teaches you to work backward and find it! Think of situations like discovering the original price before a discount, or figuring out the total number of students when you only know a percentage. The trick: convert the percent to a decimal and divide the part by that decimal. It is like being a math detective—you have the clue and the percentage, and you are uncovering the full story!

### Key Concepts & Quick Review

**Formula:**  $\text{Whole} = \frac{\text{Part}}{\text{Percent (decimal)}}$     **Example:** 18 is 30% of what number?  $W = \frac{18}{0.30} = 60$ .

**Proportion method:**  $\frac{\text{Part}}{W} = \frac{n}{100}$ , then cross-multiply and divide. Always identify which quantity is the *part* and which is the *whole*.

### Examples

① (a) 45 is 60% of what number? (b) 7 is 3.5% of what number?

**Think It Through:** (a)  $W = \frac{45}{0.60} = 75$ . (b)  $W = \frac{7}{0.035} = 200$ .

**Answer:** (a) 75; (b) 200

② A store is having a 25% off sale. A customer pays \$54 for a jacket. What was the original price of the jacket before the discount?

**Think It Through:** The customer pays 75% of the original price (since 25% is off).  $W = \frac{54}{0.75} = \$72$ . The original price was \$72.

**Answer:** Original price: \$72

### Practice Problems

Find the whole number given the part and the percent.

- |                     |       |                     |       |
|---------------------|-------|---------------------|-------|
| 1. 9 is 30% of $W$  | _____ | 4. 21 is 70% of $W$ | _____ |
| 2. 15 is 50% of $W$ | _____ | 5. 6 is 25% of $W$  | _____ |
| 3. 12 is 40% of $W$ | _____ | 6. 16 is 80% of $W$ | _____ |



- |                      |       |                      |       |
|----------------------|-------|----------------------|-------|
| 7. 5 is 20% of $W$   | _____ | 12. 90 is 75% of $W$ | _____ |
| 8. 33 is 55% of $W$  | _____ | 13. 2 is 0.5% of $W$ | _____ |
| 9. 48 is 60% of $W$  | _____ | 14. 18 is 45% of $W$ | _____ |
| 10. 13 is 65% of $W$ | _____ | 15. 36 is 90% of $W$ | _____ |
| 11. 7 is 35% of $W$  | _____ |                      |       |

**Study Tips**

- 👉 The whole is always found by **dividing** the part by the decimal form of the percent. If you multiply instead, you get the part — not the whole.
- 👉 When the percent is  $> 100\%$ , the whole will be **smaller** than the part. This is a useful reasonableness check.
- 👉 Label the unknown as  $W$  and write the equation  $\text{Part} = \% \times W$  first — then divide both sides by the percent to solve.

**Word Problems**

16. A library survey found that 84 students said they prefer reading fiction. This represents 35% of all students surveyed. How many students were surveyed in total? How many students do *not* prefer fiction? \_\_\_\_\_
17. After a 20% raise, an employee earns \$54,000 per year. What was the employee's salary before the raise? How many dollars was the raise worth? If a second employee received a 15% raise to reach \$46,000, what was *their* original salary? \_\_\_\_\_



## Answer Keys

- |                                                                                              |                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1) 30<br/>2) 30<br/>3) 30<br/>4) 30<br/>5) 24<br/>6) 20<br/>7) 25<br/>8) 60<br/>9) 80</p> | <p>10) 20<br/>11) 20<br/>12) 120<br/>13) 400<br/>14) 40<br/>15) 40<br/>16) 240 students total; 156 non-fiction students<br/>17) Original: \$45,000; raise: \$9,000. Second employee: <math>\approx</math> \$40,000.</p> |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Step-by-Step Explanations

**Strategy:** For Writing and Solving Proportions, set equal ratios in the same order on both sides, then cross-multiply or use a scale factor. A proportion often becomes clearer when the two ratios are written with matching labels above them.

**Practice 1:**  $\frac{x}{6} = \frac{4}{3}$  **Answer:** 8

For the first worked item, multiply both sides by 6 so the unknown is left by itself.

**Practice 15:**  $\frac{4}{x} = \frac{16}{24}$  **Answer:** 6

Near the end of this topic, cross-multiply carefully: 4 must match 16 and  $x$  must match 24.

**Word-problem notes:**

**16. Answer:**  $\frac{3}{4} : 15 = 12 : x$ ;  $x = 240$  *mi*.

Set up a proportion with matching units: gallons over miles equals gallons over miles. That gives  $\frac{3}{4} : 15 = 12 : x$ . Cross-multiply:  $(\frac{3}{4})x = 15 \times 12 = 180$ . Now divide by  $\frac{3}{4}$ , which means multiply by  $\frac{4}{3}$ :  $x = 180 \times \frac{4}{3} = 240$ . So the car can travel 240 *mi* on 12 *gal*.

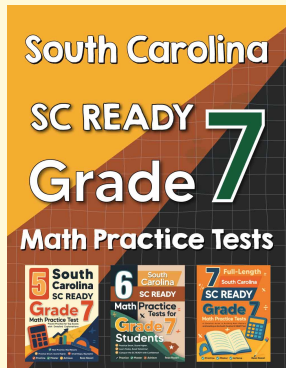
**17. Answer:** 180 *ft*: 12 hours; in 10 hours: 150 feet.

Keep the rate consistent by matching feet over hours. For 180 feet, write  $\frac{45}{3} = \frac{180}{x}$ . Cross-multiply to get  $45x = 540$ , so  $x = 12$  hours. For a 10-hour day, use  $\frac{45}{3} = \frac{y}{10}$ . Cross-multiplying gives  $3y = 450$ , so  $y = 150$  feet. The same constant rate lets us set up both proportions.



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