

Finding the Whole Given a Part and Percent

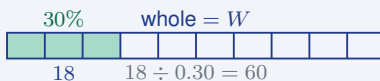
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Sometimes you know the *part* and the *percent*, but the whole amount is a mystery—this topic teaches you to work backward and find it! Think of situations like discovering the original price before a discount, or figuring out the total number of students 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
2) 30
3) 30
4) 30
5) 24
6) 20
7) 25
8) 60
9) 80</p> | <p>10) 20
11) 20
12) 120
13) 400
14) 40
15) 40
16) 240 students total; 156 non-fiction students
17) Original: \$45,000; raise: \$9,000. Second employee: \approx \$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*.

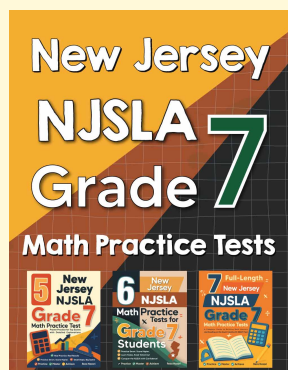
17. Answer: 180 *ft*: 12 hours; in 10 hours: 150 feet.

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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