Finding the Whole Given a Part and Percent

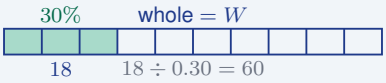
Name: _____	Date: _____	Score: _____ / 17

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

Proportion method: $\dfrac{\text{Part}}{W} = \dfrac{n}{100}$, 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) $W = \dfrac{45}{0.60} = 75$. (b) $W = \dfrac{7}{0.035} = 200$.

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). $W = \dfrac{54}{0.75} = \$72$. 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 _____
2. 15 is 50% of W _____
3. 12 is 40% of W _____
4. 21 is 70% of W _____
5. 6 is 25% of W _____
6. 16 is 80% of W _____

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7. 5 is 20% of W _____

8. 33 is 55% of W _____

9. 48 is 60% of W _____

10. 13 is 65% of W _____

11. 7 is 35% of W _____

12. 90 is 75% of W _____

13. 2 is 0.5% of W _____

14. 18 is 45% of W _____

15. 36 is 90% 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 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

1) 30
2) 30
3) 30
4) 30
5) 24
6) 20
7) 25
8) 60
9) 80
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: $\approx \$40{,}000$.

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: $\left(\frac{3}{4}\right) x = 15 \times 12 = 180$. 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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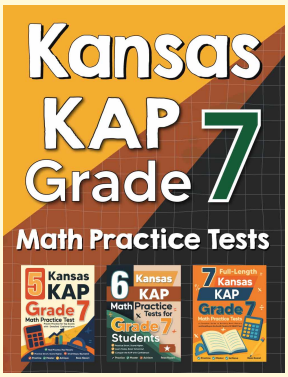

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