Simple Interest

Name: _____	Date: _____	Score: _____ / 17

Simple interest is the friendliest kind of interest because it only grows on the *original* amount—no compounding, no surprises! The formula $I = P \times r \times t$ shows exactly how principal, rate, and time team up: plug in the numbers, multiply, and you are done. This makes it easy to figure out how much you would earn in a savings account or owe on a loan over a set period. Understand this formula now and you will have a solid foundation for the more advanced interest topics ahead!

Key Concepts & Quick Review

Simple Interest Formula: $I = P \cdot r \cdot t$ (P = principal, r = annual rate as decimal, t = time in years).

Total amount: $A = P + I = P(1 + rt)$. **Find P:** $P = \dfrac{I}{rt}$. **Find r:** $r = \dfrac{I}{Pt}$. **Find t:** $t = \dfrac{I}{Pr}$.

Examples

① Find the simple interest and total amount for $P = \$1{,}500$, $r = 4\%$, $t = 3$ years.

Think It Through: $I = 1{,}500 \times 0.04 \times 3 = \$180$. Total: $A = 1{,}500 + 180 = \$1{,}680$.

Answer: $I = \$180$; $A = \$1{,}680$

② A student borrows money at 6% simple interest per year. After 2.5 years the interest owed is $\$270$. What was the original amount borrowed? What is the total amount owed?

Think It Through: $P = \dfrac{I}{rt} = \dfrac{270}{0.06 \times 2.5} = \dfrac{270}{0.15} = \$1{,}800$. Total owed: $A = 1{,}800 + 270 = \$2{,}070$.

Answer: *Principal:* $\$1{,}800$; *total owed:* $\$2{,}070$

Practice Problems

Use $I = Prt$ to find the missing value.

1. Use $I = Prt$ to find the interest for principal \$500, rate 3%, and time 2 years. _____
2. Use $I = Prt$ to find the interest for principal \$800, rate 5%, and time 3 years. _____
3. Use $I = Prt$ to find the interest for principal \$1,200, rate 4%, and time 5 years. _____
4. Use $I = Prt$ to find the interest for principal \$600, rate 2%, and time 4 years. _____
5. Use $I = Prt$ to find the interest for principal \$2,000, rate 6%, and time 1.5 years. _____
6. Use $I = Prt$ to find the interest for principal \$450, rate 8%, and time 2 years. _____
7. The interest is \$90, the rate is 3%, and the time is 2 years. Find the principal. _____
8. The interest is \$160, the rate is 4%, and the time is 2 years. Find the principal. _____

9. The interest is \$120, the rate is 5%, and the time is 3 years. Find the principal. _____

10. The interest is \$75, the principal is \$500, and the time is 3 years. Find the rate. _____

11. The interest is \$200, the principal is \$1,000, and the time is 4 years. Find the rate. _____

12. The interest is \$54, the principal is \$600, and the time is 3 years. Find the rate. _____

13. The interest is \$100, the principal is \$500, and the rate is 5%. Find the time in years. _____

14. The interest is \$180, the principal is \$900, and the rate is 4%. Find the time in years. _____

15. A loan has principal \$3,000, rate 7%, and time 3 years. Find the total amount after simple interest. _____

Study Tips

- Always convert the rate to a **decimal** before substituting: $5\% = 0.05$. Forgetting this step is the most common error.
- Time t must be in **years**. If given months, divide by 12 first: 18 months $= 1.5$ years.
- I is the **interest only**. The **total amount** $A = P + I$. Be sure the problem is asking for I or A — they are different.

Word Problems

16. Maya deposits $\$2{,}400$ into a savings account that earns 3.5% simple interest per year. How much interest will she earn in 4 years? What will her total balance be? If she wants a total balance of $\$3{,}000$, how many years will she need to leave the money in the account? _____

17. Jordan borrows $\$3{,}600$ at a simple interest rate of 8% per year for 18 months. Find the total interest and the total amount owed. If he can only afford to repay $\$150$ per month, how many months will it take to pay off the full amount owed? _____

Answer Keys

1) \$30.00
2) \$120.00
3) \$240.00
4) \$48.00
5) \$180.00
6) \$72.00
7) \$1,500.00
8) \$2,000.00
9) \$800.00
10) 5%
11) 5%
12) 3%
13) 4 yr
14) 5 yr
15) \$3,630.00
16) Interest \$336; amount \$2,736; about 7.14 years
17) 1.5 yr; interest \$432; total \$4,032; 27 months

Step-by-Step Explanations

Strategy: For Graphing Proportional Relationships, use a point on the line to find $k = \frac{y}{x}$, then connect the graph back to $y = kx$. Keep the graph point and the equation connected so k has a visual meaning.

Practice 1: The point $(2, 6)$ lies on a proportional graph. Find the constant of proportionality k. **Answer:** 3
In the first example, use the marked point as a clean ratio, $k = y/x$, before thinking about the whole line.

Practice 15: In the proportional relationship $y = kx$, use $k = \frac{3}{5}$ and $x = 15$ to find y. **Answer:** 9
Toward the end, substitute into $y = kx$; the graph idea and the equation idea are the same multiplier.

Word-problem notes:

16. Answer: $k = \$12.50$/hr; $y = 12.5x$; $10\,hr$: \$125; $40\,hr$: \$500.
Since the graph passes through the origin, the relationship is proportional. Use the point $(4, 50)$ to find the constant of proportionality: $k = \frac{50}{4} = 12.5$. So the driver earns \$12.50 per hour, and the equation is $y = 12.5x$. For 10 hours, $y = 12.5 \times 10 = 125$. For 40 hours, $y = 12.5 \times 40 = 500$. Once you know k, the equation makes any future amount easy to find.

17. Answer: A: $k = 15\,mph$; B: $k = 13\,mph$; after $5\,hr$: $75 - 65 = 10\,mi$ apart.
Find each speed by dividing y by x. For Cyclist A, $k = \frac{30}{2} = 15\,mi$ per hour, so the equation is $y = 15x$. For Cyclist B, $k = \frac{39}{3} = 13\,mi$ per hour, so the equation is $y = 13x$. After 5 hours, Cyclist A travels $15 \times 5 = 75\,mi$ and Cyclist B travels $13 \times 5 = 65\,mi$. Because they started together and rode in the same direction, the distance between them is the difference: $75 - 65 = 10\,mi$.

18. Answer: ℓ_1: $k = 1$, $y = x$, \$1/lb; ℓ_2: $k = 0.5$, $y = 0.5x$, \$0.50/lb; ℓ_1 fruit is more expensive (steeper line).
Use $k = \frac{y}{x}$ on each marked point. For ℓ_1, $k = \frac{3}{3} = 1$, so $y = x$. For ℓ_2, $k = \frac{2}{4} = 0.5$, so $y = 0.5x$. The steeper line (ℓ_1, with the larger k) represents the more expensive fruit at \$1 per pound, while ℓ_2 costs \$0.50 per pound.

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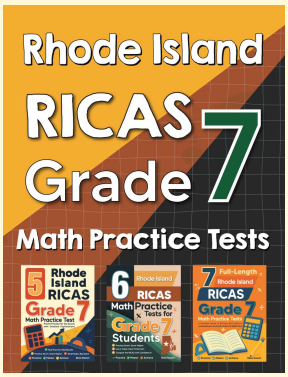

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