

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 :** $P = \frac{I}{rt}$. **Find r :** $r = \frac{I}{Pt}$. **Find t :** $t = \frac{I}{Pr}$.

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:** $P = \frac{I}{rt} = \frac{270}{0.06 \times 2.5} = \frac{270}{0.15} = \$1,800$. 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: $18 \text{ months} = 1.5 \text{ years}$.
- ✎ 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

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

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: $k = \$12.50/\text{hr}$; $y = 12.5x$; 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: $k = 15 \text{ mph}$; B: $k = 13 \text{ mph}$; after 5 hr: $75 - 65 = 10 \text{ mi}$ apart.

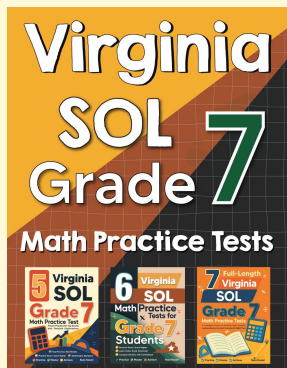
Find each speed by dividing y by x . For Cyclist A, $k = \frac{30}{2} = 15 \text{ mi}$ per hour, so the equation is $y = 15x$. For Cyclist B, $k = \frac{39}{3} = 13 \text{ mi}$ per hour, so the equation is $y = 13x$. After 5 hours, Cyclist A travels $15 \times 5 = 75 \text{ mi}$ and Cyclist B travels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

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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