

# 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.

- Use  $I = Prt$  to find the interest for principal \$500, rate 3%, and time 2 years. \_\_\_\_\_
- Use  $I = Prt$  to find the interest for principal \$800, rate 5%, and time 3 years. \_\_\_\_\_
- Use  $I = Prt$  to find the interest for principal \$1,200, rate 4%, and time 5 years. \_\_\_\_\_
- Use  $I = Prt$  to find the interest for principal \$600, rate 2%, and time 4 years. \_\_\_\_\_
- Use  $I = Prt$  to find the interest for principal \$2,000, rate 6%, and time 1.5 years. \_\_\_\_\_
- Use  $I = Prt$  to find the interest for principal \$450, rate 8%, and time 2 years. \_\_\_\_\_
- The interest is \$90, the rate is 3%, and the time is 2 years. Find the principal. \_\_\_\_\_
- 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:**  $\ell_1$ :  $k = 1$ ,  $y = x$ , \$1/lb;  $\ell_2$ :  $k = 0.5$ ,  $y = 0.5x$ , \$0.50/lb;  $\ell_1$  fruit is more expensive (steeper line). Use  $k = \frac{y}{x}$  on each marked point. For  $\ell_1$ ,  $k = \frac{3}{3} = 1$ , so  $y = x$ . For  $\ell_2$ ,  $k = \frac{2}{4} = 0.5$ , so  $y = 0.5x$ . The steeper line ( $\ell_1$ , with the larger  $k$ ) represents the more expensive fruit at \$1 per pound, while  $\ell_2$  costs \$0.50 per pound.



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