

# Solving Equations with the Distributive Property

Name: \_\_\_\_\_

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Score: \_\_\_\_\_ / 17

When parentheses pop up in an equation, the first move is to **distribute**—multiply the outside term by everything inside to clear those brackets away. Once the parentheses are gone, you will see a familiar one- or two-step equation waiting for you. The biggest thing to watch for is a negative sign outside the parentheses—distribute it carefully and the rest falls into place. This skill turns scary-looking equations into problems you already know how to solve!

## Key Concepts & Quick Review

**Strategy:** (1) Distribute. (2) Combine like terms. (3) Add/subtract. (4) Multiply/divide.

**Example:**  $3(2x - 5) = 21$

Step 1:  $6x - 15 = 21$ . Step 2:  $6x = 36$ . Step 3:  $x = 6$ .

Check:  $3(2x - 5) = 3(7) = 21$  ✓.



Send the outside factor to every term inside the parentheses.

## Examples

① Solve:  $-2(3x + 4) = 16$ .

**Think It Through:** Start by distributing the  $-2$  to both terms inside the parentheses. That gives  $-6x - 8 = 16$ . Now solve the two-step equation: add 8 to both sides to get  $-6x = 24$ , then divide by  $-6$  to find  $x = -4$ . Distributing correctly is the key first step in this kind of problem.

**Answer:**  $x = -4$

② Five friends split the total cost of a birthday party evenly. Each person's share covers a \$6 decoration fee plus their portion of the food cost  $f$ . The total bill was \$90. Write and solve an equation to find each person's food share.

**Think It Through:** Each friend pays a decoration fee plus a food share, and there are 5 friends, so the total bill is  $5(f + 6) = 90$ . Distribute the 5 to get  $5f + 30 = 90$ . Subtract 30 from both sides:  $5f = 60$ . Divide by 5:  $f = 12$ . So each person's food share is \$12.

**Answer:**  $f = 12$ ; each person's food share is \$12

## Practice Problems

Distribute, simplify, and solve each equation.



1.  $2(x + 3) = 14$  \_\_\_\_\_

2.  $4(n - 1) = 20$  \_\_\_\_\_

3.  $3(2y + 5) = 21$  \_\_\_\_\_

4.  $-2(m + 4) = 10$  \_\_\_\_\_

5.  $5(k - 3) = 0$  \_\_\_\_\_

6.  $-3(2x - 1) = 15$  \_\_\_\_\_

7.  $6(a + 2) = 36$  \_\_\_\_\_

8.  $2(3n + 7) = -4$  \_\_\_\_\_

9.  $-(x - 8) = 12$  \_\_\_\_\_

10.  $4(2t - 3) = 20$  \_\_\_\_\_

11.  $-5(y + 2) = -30$  \_\_\_\_\_

12.  $3(4 - x) = 6$  \_\_\_\_\_

13.  $7(2p + 1) = 35$  \_\_\_\_\_

14.  $-4(3 - 2k) = 20$  \_\_\_\_\_

15.  $2(5m - 4) + 6 = 20$  \_\_\_\_\_

### Study Tips

-  **Distribute before anything else** — never try to divide both sides by the factor while there are still parentheses with two terms inside.
-  A negative factor flips **every** sign inside:  $-3(x - 4) = -3x + 12$ . Write each term explicitly.
-  When variables appear on **both sides**, collect them on one side by adding or subtracting the variable term first.

### Word Problems

**16.** A roller-skating rink charges \$5 for skate rental and then a flat hourly rate  $h$  for rink time. Four friends each paid for their own rentals and the same rink time, and together they spent \$76. Write and solve an equation of the form  $4(h + 5) = 76$  to find the hourly rate. How much would it cost for *six* friends to skate for the same amount of time? \_\_\_\_\_

**17.** Two garden plots are being fenced. Plot A is a square with side length  $(2x + 3)$  feet, and Plot B is a rectangle with dimensions  $(x + 5)$  feet by 4 feet. If both plots require the same total length of fencing (same perimeter), write and solve an equation to find  $x$ . Then find the actual perimeter of each plot. \_\_\_\_\_



## Answer Keys

- |   |  |
|---|--|
| <p>1) 4<br/>2) 6<br/>3) 1<br/>4) -9<br/>5) 3<br/>6) -2<br/>7) 4<br/>8) -3<br/>9) -4</p> | <p>10) 4<br/>11) 4<br/>12) 2<br/>13) 2<br/>14) 4<br/>15) 2<br/>16) 14 per hour; \$114 for 6 friends<br/>17) <math>x = 1</math>; perimeter 20 ft each</p> |
|---|--|

### Step-by-Step Explanations

**Strategy:** For Simple Interest, use  $I = Prt$  and make sure the rate is a decimal and the time is measured in years. Once  $P$ ,  $r$ , and  $t$  are labeled, the interest calculation is direct.

**Practice 1:** Use  $I = Prt$  to find the interest for principal \$500, rate 3%, and time 2 years. **Answer:** \$30.00  
At the beginning of the practice, plug the principal, rate, and time directly into  $I = Prt$ .

**Practice 15:** A loan has principal \$3,000, rate 7%, and time 3 years. Find the total amount after simple interest. **Answer:** \$3,630.00

For the second model problem, add the interest back to the principal only after the interest is found.

**Word-problem notes:**

**16. Answer:**  $I = \$336$ ;  $A = \$2,736$ ; to reach \$3,000:  $t \approx 7.14$  years.

Use the simple interest formula  $I = Prt$ . Here,  $P = 2400$ ,  $r = 0.035$ , and  $t = 4$ , so  $I = 2400 \times 0.035 \times 4 = 336$  dollars. Add the interest to the principal to get the total balance:  $2400 + 336 = 2736$  dollars. For a balance of 3000, Maya needs  $3000 - 2400 = 600$  dollars of interest. Set  $600 = 2400 \times 0.035 \times t$ , which gives  $t = \frac{600}{84} \approx 7.14$  years (about 7 years and 2 months). Since 7 full years only yields \$588 in interest (total \$2,988), she must wait past the 7-year mark.

**17. Answer:**  $t = 1.5$  yr;  $I = \$432$ ; total = \$4,032; months to repay:  $\lceil 4032/150 \rceil = 27$  months.

First convert 18 months into years because the interest rate is yearly: 18 months = 1.5 years. Now use  $I = Prt$ :  $I = 3600 \times 0.08 \times 1.5 = 432$  dollars. The total amount owed is  $3600 + 432 = 4032$  dollars. If Jordan pays \$150 each month, divide the total by the monthly payment:  $4032 \div 150 = 26.88$ . Since he cannot make only part of a final payment month, round up to 27 months.



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