

Solving Equations with the Distributive Property

Name: _____

Date: _____

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: $3(2x - 5) = 3(12 - 5) = 3(7) = 21$ ✓.



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