The Distributive Property with Common Factors

Distributive property with common factors: Models and calculations

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QUICK REVIEW

Distribute $a(b+c) = ab + ac$; reverse by factoring a common factor. Since GCF$(18, 30) = 6$, $18 + 30 = 6(3 + 5) = 48$. For subtraction, $28 - 12 = 4(7 - 3) = 16$. A factored expression must reproduce both terms.

Worked example

Factor $24 + 40$ using the GCF, then evaluate.

1. The GCF is 8: $24/8 = 3$ and $40/8 = 5$.
2. Factor and compute: $8(3 + 5) = 8 \times 8 = 64$.
3. Expanding returns $8 \times 3 + 8 \times 5 = 24 + 40$.
Answer: $24 + 40 = 8(3 + 5) = 64$.

Practice Problems

Show your thinking.

1. Factor $18 + 42$ using the GCF.

2. Factor $35 - 15$, then compute.

3. Write $32 + 48$ as the area of one rectangle with a common side.

4. Explain why $9(3 + 5)$ equals $27 + 45$.

5. Complete $56 - 24 = 8(\square - \square)$.

6. Two groups collect 36 and 54 cans. Use a common factor to find the total.

7. Write $44 + 66$ using the greatest common factor.

8. Use a common-factor model for $81 - 27$.

Answer Key

1. $18 + 42 = 6(3 + 7) = 60$.
2. $35 - 15 = 5(7 - 3) = 20$.
3. One 16-by-5 rectangle; area 80 square units.
4. $27 + 45 = 9(3 + 5) = 72$.
5. $56 - 24 = 8(7 - 3) = 32$.
6. $36 + 54 = 18(2 + 3) = 90$ cans.
7. $44 + 66 = 22(2 + 3) = 110$.
8. $81 - 27 = 27(3 - 1) = 54$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The GCF is 6: $18/6 = 3$ and $42/6 = 7$.
2. Factor and compute: $6(3 + 7) = 6 \times 10 = 60$.
3. Expanding returns $6 \times 3 + 6 \times 7 = 18 + 42$.

Problem 2

1. The GCF is 5: $35/5 = 7$ and $15/5 = 3$.
2. Factor and compute: $5(7 - 3) = 5 \times 4 = 20$.
3. Expanding returns $5 \times 7 - 5 \times 3 = 35 - 15$.

Problem 3

1. The two areas are $32 = 16(2)$ and $48 = 16(3)$, so each can use a shared side of 16 units.
2. Join the rectangles along that side. Their lengths add to $2 + 3 = 5$ units.
3. The joined area is $16(2 + 3) = 16(5) = 80$ square units.

Problem 4

1. The GCF is 9: $27/9 = 3$ and $45/9 = 5$.
2. Factor and compute: $9(3 + 5) = 9 \times 8 = 72$.
3. Expanding returns $9 \times 3 + 9 \times 5 = 27 + 45$.

Problem 5

1. The GCF is 8: $56/8 = 7$ and $24/8 = 3$.
2. Factor and compute: $8(7 - 3) = 8 \times 4 = 32$.
3. Expanding returns $8 \times 7 - 8 \times 3 = 56 - 24$.

Problem 6

1. The GCF is 18: $36/18 = 2$ and $54/18 = 3$.
2. Factor and compute: $18(2 + 3) = 18 \times 5 = 90$.
3. There are 5 groups of 18 cans, making 90 cans total.

Problem 7

1. The GCF is 22: $44/22 = 2$ and $66/22 = 3$.
2. Factor and compute: $22(2 + 3) = 22 \times 5 = 110$.
3. Expanding returns $22 \times 2 + 22 \times 3 = 44 + 66$.

Problem 8

1. The GCF is 27: $81/27 = 3$ and $27/27 = 1$.
2. Factor and compute: $27(3 - 1) = 27 \times 2 = 54$.
3. Expanding returns $27 \times 3 - 27 \times 1 = 81 - 27$.
4. Think of 81 as three rows of 27; removing one row leaves $2(27) = 54$.

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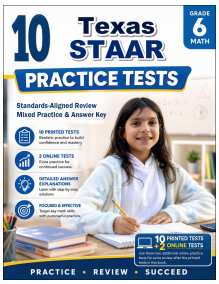

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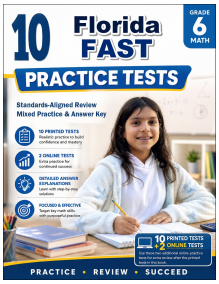

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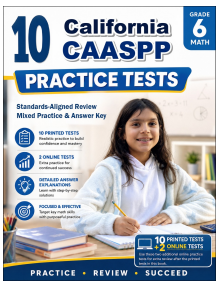

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