Indicator 15 Class Notes by Mrs. Joshi

Rewrite Sums Using Distributive Property with GCF

7. Use the distributive property to express the sum of two whole numbers with a common factor as a multiple of a sum of two whole numbers with no common factor.

1.4 Lesson

Key Idea

Distributive Property

Words To multiply a sum or difference by a number, multiply each number in the sum or difference by the number outside the parentheses. Then evaluate.

Numbers $3(7 + 2) = 3 \times 7 + 3 \times 2$ **Algebra** $a(b + c) = ab + ac$

$3(7 - 2) = 3 \times 7 - 3 \times 2$ $a(b - c) = ab - ac$

EXAMPLE 1   Using Mental Math

Use the Distributive Property and mental math to find 8×53.

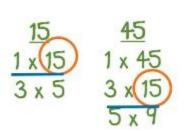|	
$8 \times 53 = 8(50 + 3)$	Write 53 as 50 + 3.
$= 8(50) + 8(3)$	Distributive Property
$= 400 + 24$	Multiply.
$= 424$	Add.

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How do you create an equivalent
expression showing the GCF of two
addends using the Distributive Property?

For example, how can the
Distributive Property help us to write
an equivalent expression using the
GCF for 24 + 9?

Factors of 24 and 9 are: **Using 3 as the GCF and Distributive Property**

$$24 + 9$$

$$(3 \times 8) + (3 \times 3)$$

$$3(8 + 3)$$

24   9
1 x 24   1 x 9
2 x 12   3 x 3
3 x 8
4 x 6

GCF of 24 and 9 = 3

Factors of 24 = {1, 2, 3, 4, 6, 8, 12, 24}
Factors of 9 = {1, 3, 9}

How can the Distributive Property
help us to write an equivalent
expression using the GCF for 15 + 45?

15   45
1 x (15)   1 x 45
3 x 5   3 x (15)
                5 x 9

GCF of 15 and 45 = 15

15 + 45
(1 x 15)+ (3 x 15)

15 + 45 = 15(1 + 3)

Apply the distributive property to factor out the greatest common factor.

$35 + 50 = \boxed{}$

5 is the greatest common factor of 35 and 50.

$35 + 50$

$= 5 \cdot 7 + 5 \cdot 10$

$= 5(7 + 10)$ Apply the distributive property.

The answer:

$5(7 + 10)$

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Apply the distributive property to factor out the greatest common factor.

$$9 + 15 = \boxed{}$$

3 is the greatest common factor of 9 and 15.

$$9 + 15$$

$$= 3 \cdot 3 + 3 \cdot 5$$

$$= 3(3 + 5) \qquad \text{Apply the distributive property.}$$

The answer:

$$3(3 + 5)$$

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Apply the distributive property to factor out the greatest common factor.

$$12 + 20 = \boxed{}$$

4 is the greatest common factor of 12 and 20.

$12 + 20$

$= 4 \cdot 3 + 4 \cdot 5$

$= 4(3 + 5)$ Apply the distributive property.

The answer:

$4(3 + 5)$

Apply the distributive property to factor out the greatest common factor.

$$24 + 28 = \boxed{}$$

4 is the greatest common factor of 24 and 28.

$24 + 28$

$= 4 \cdot 6 + 4 \cdot 7$

$= 4(6 + 7)$ Apply the distributive property.

The answer:

$4(6 + 7)$

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Apply the distributive property to factor out the greatest common factor.

$35 + 14 = \boxed{}$

7 is the greatest common factor of 35 and 14.

$35 + 14$

$= 7 \cdot 5 + 7 \cdot 2$

$= 7(5 + 2)$ Apply the distributive property.

The answer:

$7(5 + 2)$

Apply the distributive property to factor out the greatest common factor.

$44 + 48 = \boxed{}$

4 is the greatest common factor of 44 and 48.

$44 + 48$

$= 4 \cdot 11 + 4 \cdot 12$

$= 4(11 + 12)$ Apply the distributive property.

The answer:

$4(11 + 12)$

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Apply the distributive property to factor out the greatest common factor.

$15 + 21 = \boxed{}$

3 is the greatest common factor of 15 and 21.

$15 + 21$

$= 3 \cdot 5 + 3 \cdot 7$

$= 3(5 + 7)$ Apply the distributive property.

The answer:

$3(5 + 7)$

Apply the distributive property to factor out the greatest common factor.

$55 + 35 = \boxed{}$

5 is the greatest common factor of 55 and 35.

$55 + 35$

$= 5 \cdot 11 + 5 \cdot 7$

$= 5(11 + 7)$ Apply the distributive property.

The answer:

$5(11 + 7)$

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Apply the distributive property to factor out the greatest common factor.

$6 + 30 =$ [ ]

6 is the greatest common factor of 6 and 30.

$$6 + 30$$

$$= 6 \cdot 1 + 6 \cdot 5$$

$$= 6(1 + 5) \qquad \text{Apply the distributive property.}$$

The answer:

$$6(1 + 5)$$

Apply the distributive property to factor out the greatest common factor.

$4 + 10 =$ [ ]

2 is the greatest common factor of 4 and 10.

$$4 + 10$$

$$= 2 \cdot 2 + 2 \cdot 5$$

$$= 2(2 + 5) \qquad \text{Apply the distributive property.}$$

The answer:

$$2(2 + 5)$$

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Apply the distributive property to factor out the greatest common factor.

$90 + 27 = \boxed{}$

9 is the greatest common factor of 90 and 27.

$$90 + 27$$

$$= 9 \cdot 10 + 9 \cdot 3$$
$$= 9(10 + 3) \qquad \text{Apply the distributive property.}$$

The answer:

$$9(10 + 3)$$

Apply the distributive property to factor out the greatest common factor.

$75 + 20 = \boxed{}$

5 is the greatest common factor of 75 and 20.

$$75 + 20$$

$$= 5 \cdot 15 + 5 \cdot 4$$
$$= 5(15 + 4) \qquad \text{Apply the distributive property.}$$

The answer:

$$5(15 + 4)$$

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Apply the distributive property to factor out the greatest common factor.

$16 + 36 = \boxed{}$

4 is the greatest common factor of 16 and 36.

$16 + 36$

$= 4 \cdot 4 + 4 \cdot 9$

$= 4(4 + 9)$ Apply the distributive property.

The answer:

$4(4 + 9)$

Apply the distributive property to factor out the greatest common factor.

$56 + 32 = \boxed{}$

8 is the greatest common factor of 56 and 32.

$56 + 32$

$= 8 \cdot 7 + 8 \cdot 4$

$= 8(7 + 4)$ Apply the distributive property.

The answer:

$8(7 + 4)$

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EXAMPLE 2   **Simplifying Algebraic Expressions**

Use the Distributive Property to simplify the expression.

a. $4(n + 5)$

$$4(n + 5) = 4(n) + 4(5)$$ Distributive Property

$$= 4n + 20$$ Multiply.

b. $12(y - 3)$

$$12(y - 3) = 12(y) - 12(3)$$ Distributive Property

$$= 12y - 36$$ Multiply.

EXAMPLE 3   **Standardized Test Practice**

Which expression is equivalent to $9(6 + x + 2)$?

(A) $9x + 8$ (B) $9x + 54$ (C) $9x + 56$ (D) $9x + 72$

$$9(6 + x + 2) = 9(6) + 9(x) + 9(2)$$ Distributive Property

$$= 54 + 9x + 18$$ Multiply.

$$= 9x + 54 + 18$$ Commutative Property of Addition

$$= 9x + 72$$ Add 54 and 18.

∴ The correct answer is (D).

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EXAMPLE 4 Real-Life Application

José is x years old. His brother, Felipe, is 2 years older than José. Their aunt, Maria, is three times as old as Felipe. Write and simplify an expression that represents Maria's age in years.

Name	Description	Expression
José	He is x years old.	x
Felipe	He is 2 years *older* than José. So, *add* 2 to x.	$x + 2$
Maria	She is three *times* as old as Felipe. So, *multiply* 3 and $(x + 2)$.	$3(x + 2)$

$$3(x + 2) = 3(x) + 3(2) \qquad \text{Distributive Property}$$
$$= 3x + 6 \qquad \text{Multiply.}$$

∴ Maria's age in years is represented by the expression $3x + 6$.