

The distributive property 9/23

Objective: Use the distributive property to simplify expressions.

New Vocabulary.	In your own words	Example
Distributive Property	"giving" a number throughout parenthesis	$a(b+c)$
term	a number &/or a variable together	$2x$ or $3x^2y$ or -12
constant	something that stays the same a number	7
coefficient	The number that comes before the variable	$2x$
like terms	Terms with the same variable(s)	$3x^2$ and $7x^2$
variable	a letter	x, y, a

Distributive Property

Let a, b , and c be real numbers.

$$a(b+c) = ab+ac \quad \text{or} \quad (b+c)a = ab+ac$$

"a times b plus c equals a times b plus a times c."

Distribute the 4 throughout the parenthesis using multiplication.

$$4(20+b) = 4(20) + 4(b)$$

$$= 80 + 24$$

$$= \boxed{104}$$

$$a(b-c) = ab-ac \quad \text{or} \quad (b-c)a = ab-ac$$

"a times b minus c equals a times b minus a times c."

Distribute the 7 throughout the parenthesis using multiplication.

$$7(30-2) = 7(30) - 7(2)$$

$$= 210 - 14$$

$$= \boxed{196}$$

Example 1: Simplifying Expressions.

1) $3(x+8)$

2) $(5b-4)(-7)$

Practice

1) $5(x+7)$

$$\boxed{5x + 35}$$

2) $12(3 - \frac{1}{6}t)$

$$12(3) - 12(\frac{1}{6}t)$$

$$36 - \frac{12}{1}(\frac{1}{6}t)$$

$$36 - \frac{12}{6}t$$

$$\boxed{36 - 2t}$$

3) $(0.4 + 1.1c)3$

4) $(2y-1)(-y)$

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Main Ideas/Questions

Notes/Examples

Distributive Property

Recall:

$$a(b+c) = ab+ac$$

$$\text{or } a(b-c) = ab-ac$$

1. $7(x+4) \rightarrow 7(x) + 7(4)$

$$7x + 28$$

2. $2(b-3)$

$$2b - 6$$

3. $-4(y+3)$

$$-4y - 12$$

4. $-5(m-2)$

$$-5m + 10$$

5. $-1(y-9)$

$$-1(y-9)$$

$$-y + 9$$

6. $8(4-b)$

$$32 - 8b$$

7. $-4(-w-10)$

$$4w + 40$$

8. $5(2m-3)$

$$10m - 15$$

9. $-3(2x-4)$

$$-6x + 12$$

10. $3(m+n)$

$$3m + 3n$$

11. $x(y+4)$

$$xy + 4x$$

12. $d(c-4)$

$$cd - 4d$$

13. $6a(b+2c)$

$$6ab + 12ac$$

14. $2(x-y+8)$

$$2x - 2y + 16$$

15. $x(2y-5z+1)$

$$2xy - 5xz + x$$

16. $\frac{1}{4}(8x-4)$

$$\frac{8x}{1} \left(\frac{1}{4} \right) - \frac{4}{1} \left(\frac{1}{4} \right) = \frac{8x}{4} - \frac{4}{4}$$

$$= 2x - 1$$

17. $\frac{1}{6} \left(\frac{3}{5}x + 18 \right)$

$$\frac{3}{5}x \left(\frac{1}{6} \right) + \frac{18}{1} \left(\frac{1}{6} \right)$$

$$= \frac{3}{30}x + \frac{18}{6} \rightarrow \frac{1}{10}x + 3$$

18. $-\frac{1}{8} \left(\frac{4}{5}x - 24 \right)$

$$-\frac{1}{8} \left(\frac{4}{5}x \right) - \frac{1}{8} \left(\frac{24}{1} \right)$$

$$= -\frac{4}{40}x + \frac{24}{8} \Rightarrow -\frac{1}{10}x + 3$$

Distribute AND Combine!

To **simplify an expression** means to ensure there are **no parentheses** and **no like terms**. In order to do this, **distribute first (if needed), then combine like terms.**

Examples

19. $8(2x-3) - 6x$ - Distribute

$$16x - 24 - 6x$$

$$16x - 6x - 24$$
 - Combine like-terms

$$10x - 24$$

20. $9(2k-4) - 2(7k-12)$

$$18k - 36 - 14k + 24$$

$$18k - 14k - 36 + 24$$

$$4k - 12$$

21. $10 - 1(y-6) - y$

$$10 - y + 6 - y$$

$$16 - 2y$$

22. $6 + 8(4w-7) - 1(2w+1)$

$$6 + 32w - 56 - 2w - 1$$

$$32w - 2w - 56 + 6 - 1$$

$$30w - 51$$

23. $\frac{9}{4} \left(\frac{10}{3}x - \frac{4}{1} \right) - \frac{1}{4} \left(\frac{2x}{1} - \frac{8}{1} \right)$

$$\frac{90}{12}x - \frac{36}{4} - \frac{2}{4}x + \frac{8}{4}$$

$$\frac{90}{12}x - \frac{2}{4}x - 9 + 2$$

$$\frac{90}{12}x - \frac{2}{12}x - 7 \Rightarrow \frac{88}{12}x - 7$$

$$= 7x - 7$$

24. $\frac{7}{8} \left(\frac{4}{5}x + \frac{16}{1} \right) + \frac{3}{5} \left(\frac{1}{2}x - \frac{10}{1} \right)$

$$\frac{28}{40}x + \frac{112}{8} + \frac{3}{10}x - \frac{30}{5}$$

$$\frac{28}{40}x + \frac{3}{10}x + \frac{112}{8} - \frac{30}{5}$$

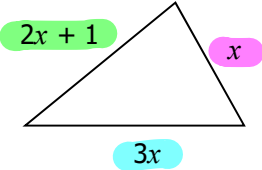
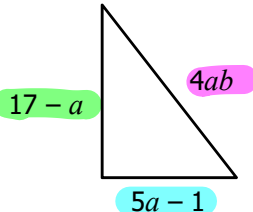
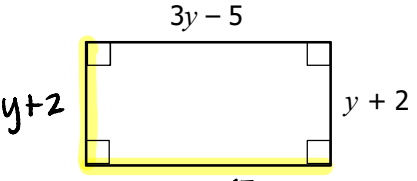
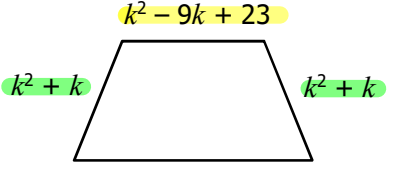
$$\frac{28}{40}x + \frac{12}{40}x + 14 - 6 \rightarrow \frac{40}{40}x + 8 \rightarrow x + 8$$

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples								
Parts of an Expression	$7x + 3 - 5x + 8 + 4x - 1$ Variable Terms (Terms WITH a variable) $7x, -5x, 4x$ letters Coefficients (Number NEXT TO a variable) $7, -5, 4$ numbers in front of letter Constant Terms (Terms WITHOUT a variable) $3, 8, -1$ numbers								
Combining Like Terms	You can simplify an algebraic expression by combining like terms. This means to combine common variable terms and constant terms. Example: Simplify the expression below: $7x + 3 - 5x + 8 + 4x - 1 = 6x + 10$								
Examples	Directions: Simplify each expression. <table><tr><td>1. $3x + 6x$ $= 9x$</td><td>2. $9a - 10a$ $-1a = -a$</td></tr><tr><td>3. $7m - 5m - 6$ $= 2m - 6$</td><td>4. $9 - 6w + 5$ $14 - 6w$</td></tr><tr><td>5. $7p - 1 - 9p + 5$ $7p - 9p - 1 + 5$ $= -2p + 4$</td><td>6. $5h - 6 - 8 + 7h$ $12h - 14$</td></tr><tr><td>7. $5x + 7y - x + 2y + 3x$</td><td>8. $26a + 2b - 4a + 10b$ $26a - 4a + 2b + 10b$ $22a + 12b$</td></tr></table>	1. $3x + 6x$ $= 9x$	2. $9a - 10a$ $-1a = -a$	3. $7m - 5m - 6$ $= 2m - 6$	4. $9 - 6w + 5$ $14 - 6w$	5. $7p - 1 - 9p + 5$ $7p - 9p - 1 + 5$ $= -2p + 4$	6. $5h - 6 - 8 + 7h$ $12h - 14$	7. $5x + 7y - x + 2y + 3x$	8. $26a + 2b - 4a + 10b$ $26a - 4a + 2b + 10b$ $22a + 12b$
1. $3x + 6x$ $= 9x$	2. $9a - 10a$ $-1a = -a$								
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7. $5x + 7y - x + 2y + 3x$	8. $26a + 2b - 4a + 10b$ $26a - 4a + 2b + 10b$ $22a + 12b$								

Combining Like-terms

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with Exponents	Terms with the same exponents or combination of variables and exponents are considered like terms. When combined, be sure to NOT change their exponents! combining the coefficients!	
Examples	9. $5x^2 + 7x^2$ like terms, combine! $5 + 7 = \boxed{12x^2}$ variable/exponent are identical.	10. $-15n^5 + 4n^5$ $-15 + 4 = \boxed{-11n^5}$
	11. $8c^3 - 7c^3 + 16c^3$ $1c^3 + 16c^3 = \boxed{17c^3}$	12. $8k^2 - k - 5k + 7 - 2k^2$ $8k^2 - 2k^2 - 1k - 5k + 7$ rearrange order - commutative property $\boxed{6k^2 - 6k + 7}$
	13. $-4a^2b + 7 + 10a^2b$ $-4a^2b + 10a^2b + 7$ $\boxed{6a^2b + 7}$	14. $x^2 + 2xy - 7xy + 4y^2$ $\boxed{x^2 - 5xy + 4y^2}$
	15. $a^2 + 7ab - 10ab + b^2$ $\boxed{a^2 - 3ab + b^2}$	16. $4x^2 - 7 + 2x - 3x^2 + 8x - 6$ $\boxed{x^2 + 10x - 13}$
Geometric Applications	Directions: Give the perimeter of each figure as a simplified expression.	
	17.  $p = 2x + 1 + x + 3x$ $p = 2x + 1x + 3x + 1$ $\boxed{p = 6x + 1}$	18.  $p = 17 - a + 4ab + 5a - 1$ $p = -1a + 5a + 4ab + 17 - 1$ $\boxed{p = 4a + 4ab + 16}$
	19.  $= 2(3y - 5) + 2(y + 2)$ $= 6y - 10 + 2y + 4$ $= 6y + 2y - 10 + 4$ $= \boxed{8y - 6}$	20.  $\cancel{k^2 - 9k + 23} + \cancel{k^2 + k} + \cancel{k^2 + k} + 2k^2 - 17$ $k^2 + k^2 + k^2 + 2k^2 - 9k + k + k + 23 - 17$ $\boxed{5k^2 - 7k + 6}$

10/1 Do Now

$$1. \frac{2}{3} + \frac{5}{8} \Rightarrow \frac{16}{24} + \frac{15}{24} = \frac{31}{24}$$

Improper Fraction

Divide numerator by denominator.

Least Common Multiple

3: 3, 6, 9, 12, 15, 18, 21, 24, 27

8: 8, 16, 24, 32

$$\begin{array}{r} 1\overline{)24} \\ 24 \overline{)31} \\ \underline{-24} \\ 7 \end{array}$$

Equivalent Fractions

$$\frac{2}{3} \times \frac{8}{8} = \frac{16}{24}$$

↑
1

$$\frac{5}{8} \times \frac{3}{3} = \frac{15}{24}$$

↑
1

$$2. 1\frac{3}{5} - \frac{2}{4} \rightarrow 1\frac{12}{20} - \frac{10}{20} = 1\frac{2}{20}$$

Needs to be reduced.
Common factor

L.C.M.

5: 5, 10, 15, 20, 25

4: 4, 8, 12, 16, 20

2: 1, 2

20: 1, 2, 4, 5, 10, 20

$$1\frac{2}{20} \div 2 = \boxed{1\frac{1}{10}}$$

Equivalent Fractions

$$1\frac{3}{5} \times \frac{4}{4} = 1\frac{12}{20}$$

↑
1

$$\frac{2}{4} \times \frac{5}{5} = \frac{10}{20}$$

↑
1