

# Translating Expressions

## Add

Increase	sum
more than	higher
increased by	plus
together	add

## Subtract

less than	difference
decreased by	lower
decrease	minus
fewer	

## Multiply

times	area
product of	
twice	
three times (etc.)	

## Divide

quotient	per	split
divided by	shared	
	each	out of

## Equal to

is  
was  
yields

"Than" is a switch word:  
 $5 \text{ less than } 6 \Rightarrow 6 - 5$

Name: Teacher Guide / Answer Key

# vocabulary

$$+ 3x^2 - 1x + 2 - 4x$$

term

variable

constant

coefficient

# Combining -LIKE TERMS-

Like terms have the same variable and the same degree.

## "TO DO" List

- ☐ Add invisible "+" signs.
- ☐ Add invisible "1" coefficients.
- ☐ Color like terms with matching patterns/colors.
- ☐ Color, doodle, & embellish key ideas!

## Try It

Simplify.

1  $3y - x - 6y - 1 + 2xy + 4 + xy$   
 $-x - 3y + 3xy + 3$

2  $4ab - a^2 + 3a - b + a^2 - 2b - ab$   
 $3a + 3ab - 3b$

like terms  
add (while sticking with the +/- signs in front of each term)

To write an expression in standard form, order terms so that the degree (power) decreases from left to right. Constants will be last. Variables should be in alphabetical order.



## Combining like terms - Practice

Simplify each expression. Write each answer in standard

- Additional Notes:
- Distribute First!
  - Answers should be in standard form
- Early finishers:
- Have students add all terms in the blender!

### Example-1

$$3 - 5w + 12 + 2w - 3$$

$$-3w + 12$$

### Example-2

$$7 - 4j - 2j^2 - 5j^3 + j^2 - j$$

$$-5j^3 - j^2 - 5j + 7$$

### Example-3

$$4(x - 3) + x - (3x + 7)$$

$$2x - 19$$

### Example-4

$$8a - a(b + 6) + 2b(a - b) + a$$

$$-2b^2 + 3a + ab$$



# GENERATING EQUIVALENT expressions

## Parts of an Algebraic Expression

terms	the <u>parts</u> of an expression that are <u>separated</u> by + or - <u>signs</u>
coefficients	<u>numbers</u> that are <u>multiplied</u> by at least one <u>variable</u> $\rightarrow 2x$
like terms	terms with the same <u>variable(s)</u> raised to the same <u>power(s)</u>

Practice combining like terms.

$z^2 + z + 4z^3 + 2z + 2z^2$ $3z + 3z^2 + 4z^3$	$2x + 4x - 6 + 3x - 4$ $9x - 10$
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$7a^2 - a^2 + 3 + 2a^2 + 5$ $8a^2 + 8$ or $8(a^2 + 1)$	$y + 4 + 3(y + 3) + 7$ $y + 4 + 3y + 9 + 7$ $4y + 20$ or $4(y + 5)$
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Use properties to generate equivalent expressions.

$6x^2 - 4x^2 = 2x^2$	$3y^2 + 3(4y^2 - 2)$
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$3a + 4(a + 5)$ $3a + 4a + 20$ $= 7a + 20$	$3y^2 + 12y^2 - 6$ $15y^2 - 6$
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$\frac{1}{4}(16 + 4x)$ $4 + x$
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## Using Properties to Simplify Expressions

$$-2 + (-7x)$$

Commutative:  $-7x - 2$

$$-2x + 3 + (-x) + 2$$

Commutative  $-2x - x + 3 + 2$

Combine like terms  $\boxed{-3x + 5}$

$$\frac{3}{4}x - \frac{5}{7} + 11x + \frac{2}{7}$$

Commutative Property:  $\frac{3}{4}x + 11x - \frac{5}{7} + \frac{2}{7}$

Combine like terms:  $\boxed{11\frac{3}{4}x - \frac{3}{7}}$

$$\frac{5}{3} - x + \frac{1}{3}$$

Commutative

$$\frac{5}{3} - \frac{1}{3} - x$$

Combine  $\boxed{-x + \frac{2}{3}}$

$$2x + 3$$

Commutative property  $2x + 3 \Rightarrow 3 + 2x$

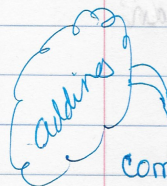
$$2x + 3x + 5$$

$$(2x + 3x) + 5$$

ASSOCIATIVE

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

## Adding & Subtracting Expressions



$$(-2.1x + 3.7) + (5 + 4.9x)$$

Commutative property  $\rightarrow -2.1x + 4.9x + 3.7 + 5$

Add  $\rightarrow \boxed{2.8x + 8.7}$

Clara is planning a party. She has budgeted \$30 for Sandwiches, \$25 for drinks, and \$25 for gift bags.

Sandwiches = \$2.50 per person

drinks = \$1.50 per person

bags = \$3 per person

How much money will Clara have left if  $x$  people come? including herself

Combine expressions:  $(30 - 2.5x) + (25 - 1.5x) + (25 - 3x)$

Commutative prop:  $-2.5x - 1.5x - 3x + 30 + 25 + 25$

Combine like terms:  $\boxed{-7x + 80}$

Use Substitution:  $-7x + 80$ ; let  $x = 5$

$$-7(5) + 80$$

order of operations:  $-35 + 80$  (multiply)

$$45 \text{ (add)}$$

Clara will have \$45 left if 5 people, including herself, come.



Subtracting

$$\left(\frac{5}{6}x + \frac{1}{9}\right) - \left(\frac{4}{9} - x\right) \quad \text{distribute the negative}$$

$$\frac{5}{6}x + \frac{1}{9} - \frac{4}{9} + x \quad \text{change sign}$$

Commutative:  $\frac{5}{6}x + x + \frac{1}{9} - \frac{4}{9}$

Make x a fraction:  $\frac{5}{6}x + \frac{6}{6}x + \frac{1}{9} - \frac{4}{9}$

add:  $\frac{11}{6}x - \frac{3}{9}$

Simplify:  $\boxed{\frac{11}{6}x - \frac{1}{3}}$  (Standard form)

$$(5x+3)-(3x+4)$$

Distributive:  $5x+3-3x-4$

Commutative:  $5x-3x+3-4$

add:  $\boxed{2x-1}$

$$\left(\frac{3}{4}x - \frac{2}{3}\right) - \left(-\frac{5}{6} + 2x\right)$$

Distribute:  $\frac{3}{4}x - \frac{2}{3} + \frac{5}{6} - 2x$

Commutative:  $-2x + \frac{3}{4}x - \frac{2}{3} + \frac{5}{6}$

Change Fraction:  $-\frac{8}{12} + \frac{9}{12} - \frac{4}{6} + \frac{5}{6}$

add:  $\boxed{-\frac{5}{12}x + \frac{1}{6}}$

Adding Expressions with more than one variable

$$\left(\frac{3}{7}y - \frac{x}{4} + 10\right) + \left(\frac{13}{4}x - \frac{y}{7} - 23\right)$$

Commutative:  $\frac{3}{7}y - \frac{y}{7} - \frac{x}{4} + \frac{13}{4}x + 10 - 23$

Associative:  $\left(\frac{3}{7}y - \frac{1}{7}y\right) + \left(-\frac{1}{4}x + \frac{13}{4}x\right) + 10 - 23$

Distribute:  $y\left(\frac{3}{7} - \frac{1}{7}\right) + x\left(-\frac{1}{4} + \frac{13}{4}\right) + 10 - 23$

add/subtract:  $y\left(\frac{2}{7}\right) + x\left(\frac{12}{4}\right) - 13$

Standard form:  $\boxed{\frac{2}{7}y + 3x - 13}$

Standard form

⇒ variables in abc order.

⇒ constants last

$$4 - \frac{2}{3}b + \frac{1}{4}a + \frac{1}{2}a + \frac{1}{6}b - 7$$

C:  $\frac{1}{4}a + \frac{1}{2}a - \frac{2}{3}b + \frac{1}{6}b + 4 - 7$

common denom:  $\frac{1}{4}a + \frac{2}{4}a - \frac{4}{6}b + \frac{1}{6}b + 4 - 7$

add:  $\frac{3}{4}a - \frac{3}{6}b - 3$

Simplify:  $\boxed{\frac{3}{4}a - \frac{1}{2}b - 3}$

Make Sure you box in your answer



## Subtracting Expressions with More than One Variable

$$\frac{3}{7}y - \frac{x}{4} + 10 \text{ from } \frac{13}{4}x - \frac{y}{7} - 23$$

(Switch expressions)

$$\left(\frac{13}{4}x - \frac{1}{7}y - 23\right) - \left(\frac{3}{7}y - \frac{1}{4}x + 10\right)$$

Distribute:

$$\frac{13}{4}x - \frac{1}{7}y - 23 - \frac{3}{7}y + \frac{1}{4}x - 10$$

Commutative:

$$\frac{13}{4}x + \frac{1}{4}x - \frac{1}{7}y - \frac{3}{7}y - 23 - 10$$

add: (combine like terms)

$$\boxed{\frac{14}{4}x - \frac{4}{7}y - 33}$$

Distribute:  $[10y - 9x] - (5y + x)$

Distribute:  $10y + 9x - 5y - x$

Commutative:  $9x - x + 10y - 5y$

Combine:  $\boxed{8x + 5y}$

$$-\frac{d}{12}$$

## Expressions With More than one operation

$$3 + 6 \times (5 + 4) \div 3 - 7$$

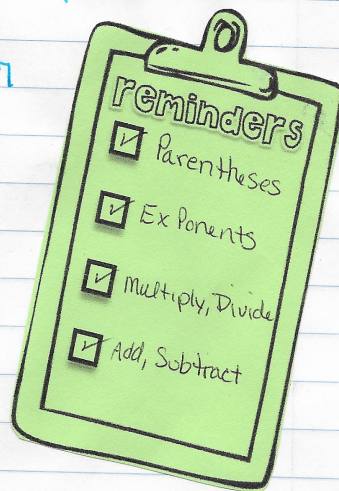
Parentheses  $3 + 6 \times 9 \div 3 - 7$

Multiply  $3 + 54 \div 3 - 7$

Divide  $3 + 18 - 7$

Add  $21 - 7$

Subtract  $\boxed{14}$



$$-3(-5z - 9) + 2n$$

Distribute:  $15z + 27 + 2n$

Standard form:  $2n + 15z + 27$

$$-\frac{d}{12} + 2 - 14x \div 2 + 3d - 7$$

collapse fractions:  $-\frac{1}{12}d + 2 - 14x \div 2 + 3d - 7$

Divide:  $-\frac{1}{12}d + 2 - 7x + 3d - 7$

common denominator:  $-\frac{1}{12}d + 2 - 7x + \frac{36}{12}d - 7$

Commutative:  $-\frac{1}{12}d + \frac{36}{12}d - 7x + 2 - 7$

Combine:  $\boxed{\frac{35}{12}d - 7x - 5}$



## Expressions with more than one operation

5 more than twice a number

$$5 + 2x \Rightarrow 2x + 5$$

four times a number increased by 7

$$4n + 7$$

nine less than the quotient of six & a number

$$\frac{6}{n} - 9$$

ten less than a number divided by twelve

$$\frac{n}{12} - 10$$

two more than a number cubed (cube vs square)

$$x^3 + 2$$

one more than a number squared when  $n=4$

$$n^2 + 1 \Rightarrow 4^2 + 1 \Rightarrow 16 + 1 = 17$$

① Replace key words with variables, numbers, & operations

② Substitute the given value for the variable

③ Use order of operations to simplify

a number cubed minus five when  $n=3$

$$n^3 - 5 \Rightarrow 3^3 - 5 \Rightarrow 27 - 5 = 22$$

the quotient of twenty and a number decreased

by four when  $n=5$

$$\frac{20}{n} - 4 \Rightarrow \frac{20}{5} - 4 = 4 - 4 = 0$$

Six more than the product of nine and a number when  $q=6$

$$9q + 6 \Rightarrow 9(6) + 6 = 54 + 6 = 60$$