Algebraic Expressions

1. Algebraic Expression: *An expression that may contain letters, numbers, and symbols.*

2. Examples of algebraic expressions:
   $5x + 2$ $3y - 7$ $x^2 + 3$

3. **Variable:** A *symbol*, usually a *letter* that stands for an unknown number.

4. Examples of variables: x n y k
   (any letter can be a variable)

5. *Terms*: Parts of an algebraic expression separated by addition or subtraction signs

6. Examples of terms:
   $5x$ 2 $3y$ -7 x^2 3

7. **Coefficient:** The numerical *factor* of a term that contains a variable

8. Variables by themselves have a coefficient of *1*

9. Examples of coefficients: $5x$ $1y$ $7x^2$

10. *Remember* A number right next to a variable means to *multiply.* $5x$ means "5 times the value of x"

11. **Constant:** a term without a *variable.*
    (a number without a Letter)

12. Examples of constant:
    7 -3 5

13. Label each part of the algebraic expression below.

Coefficients 3 and 2

Variables g and h

$$3g + 2h - 1$$

terms 3g, 2h, and -1

Constant -1

Name:_____   Date:_____

Practice: Algebraic Expressions

#1 Identify the variables in the algebraic expression below:	#2 Identify the coefficients in the algebraic expression below:
$4x + 2y$ x and y	$3a - b + 1$ 3 and -1

#3 Identify the terms in the algebraic expression below:	#4 Identify the variables in the algebraic expression below:
$7h - 2 + x^2$ 7h, -2, and x^2	$h + 2g - 5f$ h, g, and f

#5 Identify the constants in the algebraic expression below:	#6 Identify the coefficients in the algebraic expression below:
$4 + 5r - s + 9$ 4 and 9	$4w - x + 10$ 4 and -1

#7 Label each part of the algebraic expression below:

Variables
f, g, and h

Coefficients
5, -2, and 1

$5f - 2g + h - 1$

Constant: -1

Terms:
5f, -2g, h, and -1

Name _____

1 Which expression is the product of *multiply* 2 factors?

- ● 8(5 + n)   *Add / Sum*
- Ⓑ 2 + h
- Ⓒ $\frac{x}{3}$ *division / Quotient*
- Ⓓ t − 9   *subtract / difference*

4 Which is the coefficient in the expression 23y + 5?

- Ⓐ y   *variable*
- Ⓑ 5   *constant*
- Ⓒ 23y   *term*
- ● 23

2 Write the answer from the list to correctly complete the sentence.

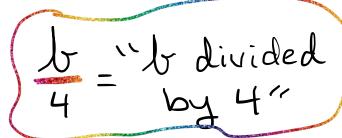In the expression n + 23, 23 is a _____.

| coefficient | factor | (term) | sum |

5 How many terms are in the following expression?

56xy + 5 − 6x + $\frac{y}{20}$

- Ⓐ 2
- ● 4
- Ⓒ 5
- Ⓓ 8

3 Which expression is a quotient?

- Ⓐ 9r   *product*
- ● $\frac{b}{12}$
- Ⓒ 15 + d   *sum*
- Ⓓ m − 4   *difference*

$$\frac{b}{4} = \text{"b divided by 4"}$$

6 Place an X in the table to describe each expression.

	Sum (+)	Difference (−)	Product (×)	Quotient (÷)
4t			X	
6 − u		X		
f + 10	X			
27(v + 3)	X		X	
42 + k	X			
$\frac{t}{13}$				X

7 What are the factors in the expression "7 times the sum of 2 and x"?

$$7 \quad \text{and} \quad 2+x \qquad 7(2+x)$$

8 What is the sum in the expression $14 + b - 27d$?

$$14 + b$$

9 Jasmine is buying beans. She bought r pounds of red beans that cost $3 per pound and b pounds of black beans that cost $2 per pound. The total amount of her purchase is given by the expression $3r + 2b$.

Select **all** the terms in the expression.

Ⓐ 2

Ⓑ 2b

Ⓒ 3

Ⓓ 3r

Ⓔ +

10 Darryl is buying apples and bananas. He bought a pounds of apples that cost $2 per pound and b pounds of bananas that cost $1 per pound. The total amount of her purchase is given by the expression $2a + b$.

Select **all** the terms in the expression.

Ⓐ 2a

Ⓑ 2

Ⓒ a

Ⓓ b

Ⓔ 2$a + b$

WRITING ALGEBRAIC EXPRESSIONS

GUIDED NOTES

IMPORTANT VOCABULARY:

- **Algebraic Expression:** An expression that contains _Letters_, _Symbols_ and _numbers_
- **Switch Phrase:** _Keywords_ that tell you to _Switch_ the order of terms.

WRITING ALGEBRAIC EXPRESSIONS

1. You can translate a _Word_ _phrase_ to an algebraic expression.
2. Operation _Key_ _Words_ can help you choose the correct operation.
3. Fill in two key words for each operation.

Addition	Subtraction
Sum more than all together total	difference less than less

Multiplication	Division
Product times each per	Quotient Share equally Each per

CONTEXT
*

4. If the variable is _given_, that variable must be used.
5. If no variable is given, you may choose any _letter_ you like.

$5 \cdot 2 = 2 \cdot 5$

6. Addition and multiplication are _Commutative_ so the order of the terms does not matter.

$5 + 2 = 2 + 5$

7. A number or a variable right next to another variable means to _multiply_.
8. Subtraction and division are not _Commutative_, so the order of terms must stay the same.

$5 - 2 \neq 2 - 5$

$6 \div 2 \neq 2 \div 6$

9. Examples of switch phrases:
   "less than"   "goes into"
   "subtracted from"

5 less than 7 → 7 − 5
5 minus 7 → 5 − 7

5 less 7 →
5 − 7

Name:_____ Date:_____

WRITING ALGEBRAIC EXPRESSIONS
PRACTICE PROBLEMS

Write an algebraic expression for each word phrase

#1 **The sum of 5 and g**	#2 **The product of 8 and k**
$5 + g$	$8k$ $8 \cdot k$ $8(k)$ $(8)(k)$

#3 **7 <u>less than</u> w**	#4 **8 divided by y**
$w - 7$	$\dfrac{8}{y}$ $8 \div y$ $y\sqrt{8}$

#5 **The difference of 12 and d**	#6 **5 greater than the product of 6 and h**
$12 - d$	$5 + 6h$

#7 **b split into 14 equal groups**	#8 **5 less than the product of ½ and j**
$\dfrac{b}{14}$ $b \div 14$	$\dfrac{1}{2}j - 5$

#9 **g squared increased by 8**	#10 **m decreased by half of n**
$g^2 + 8$	$m - \dfrac{n}{2}$ $m - (n \div 2)$ $m - \dfrac{1}{2}n$

#11 Tickets to the amusement park cost $12 for adults and $8 for kids. Write an algebraic expression to show the cost of *a* adults and *k* kids

$12a + 8k$

Name: _____   Date: _____

WRITING ALGEBRAIC EXPRESSIONS ASSESSMENT
Select the correct answer for each question.

1. Write an algebraic expression for the word phrase "4 greater than x"
   - a) $4 + x$
   - b) $x - 4$
   - c) $4x$
   - d) $4 - x$

2. Write an algebraic expression for the word phrase "8 goes into t"
   - a) $8 + t$
   - b) $t - 8$
   - c) $t \div 8$
   - d) $8 \div t$

3. Write an algebraic expression for the word phrase "5 times as much as n"
   - a) $5 - n$
   - b) $n - 5$
   - c) $5n$
   - d) $5 \div n$

4. Jermaine makes c cookies and splits them evenly between 7 friends. Which expression represents how many cookies each friend gets?
   - a) $7 + c$
   - b) $7c$
   - c) $c \div 7$
   - d) $7 \div c$

5. Sabrina is raising money for a class trip. She needs to raise $150. So far, she has raised d dollars. Which expression represents how much money she still needs to raise?
   - a) $150 - d$
   - b) $d - 150$
   - c) $150 + d$
   - d) $150 \div d$

6. Each week, Veronica volunteers 13 hours at the animal shelter. If she volunteers for h hours, how many total hours does she volunteer?
   - a) $13 + h$
   - b) $h - 13$
   - c) $13h$
   - d) $13 \div h$

Answer the question below. Be sure to show all of your work.

7. Marshall Middle School is planning a field trip to see *Romeo and Juliet* at the local theater. The cost of a teacher ticket is $25 and the cost of a student ticket is $13. Write an expression to show the cost of *t* teacher tickets and *s* student tickets.

1 Which expression below represents
"*k* more than 8"?

Ⓐ 8*k*   Ⓒ 8 − *k*

Ⓑ 8 + *k*   Ⓓ $\frac{8}{k}$

2 Which statement below could be
represented by the expression 7 − *t*?

Ⓐ *t* less than 7   Ⓒ *t* more than 7

Ⓑ 7 times *t*   Ⓓ 7 less than *t*

3 Which statement below **cannot** be
represented by the expression *t* − 16?

Ⓐ 16 less than *t*

Ⓑ *t* decreased by 16

Ⓒ *t* less than 16

Ⓓ 16 subtracted from *t*

4 Marcus and Judy are picking apples. At
the end of the day, Marcus has *a*
apples. Judy has 5 times as many
apples as Marcus.

How many apples does Judy have in
terms of *a*?

Ⓐ *a* −5   Ⓒ $\frac{5}{a}$

Ⓑ 5 + *a*   Ⓓ 5*a*

5 Which expression can be used to
represent "3 times the sum of a
number and 12.75"?

Ⓐ 3(*k* + 12.75)

Ⓑ 3*k* + 12.75

Ⓒ *k* + 12.75 × 3

Ⓓ 3*k* × (*k* + 12.75)

6 Select **all** the statements that could be
represented by the expression *d* − 10.

Ⓐ 10 less than *d*

Ⓑ 10 more than *d*

Ⓒ *d* decreased by 10

Ⓓ *d* less than 10

Ⓔ *d* minus 10

Ⓕ *d* increased by 10

7 Select **all** the statements that indicate
addition.

Ⓐ 8 plus *j*

Ⓑ *k* fewer than 10

Ⓒ *r* increased by 7

Ⓓ 14 divided by *n*

Ⓔ 11 decreased by *h*

Ⓕ 6 more than *s*

Name _____

8 Place an X in the table to show which operation is indicated by each statement.

	+	−	×	÷
5 more than n				
11 fewer than w				
the quotient of k and 4				
y less than 8				
2 times r				

9 Rebecca and Clark are playing baseball. During the first hour, Rebecca has r hits and Clark has 3 more hits than Rebecca. During the second hour, Clark has c hits and Rebecca hits 5 fewer than twice the number of Clark's hits.

Expression for the number of hits Clark made in the first hour: _____

Expression for the number of hits Rebecca made in the second hour: _____

10 The zoo has lions, tigers, and bears. There are t tigers in the zoo. There are 3 more lions than tigers in the zoo. The number of bears is 2 times the number of lions.

Expression for the number of lions in the zoo: _____

Expression for the number of bears in the zoo: _____