Name: _____ Period: _____ Date: _____

Variables and Expressions Guide Notes

VARIABLES are symbols used to represent unspecified numbers or values. Any letter can be used as a variable.

$$x, \quad y, \quad z, \quad a, \quad r, \quad d, \quad s$$

ALGEBRAIC EXPRESSION consists of one or more numbers and variables along with one or more arithmetic operation.

$$6y, \quad 7x - 3, \quad 9 + \frac{r}{s}, \quad k \cdot 5j, \quad 5ab \div 3cd$$

Various ways to represent a product of x and y:

$$xy, \quad x \cdot y, \quad x(y), \quad (x)y, \quad (x)(y)$$

In each expression above, the quantities being multiplied are called **factors**, and the result is called the **product**.

Translating Verbal Expression into Algebraic Expression:

Addition	Subtraction	Multiplication	Division
Plus	Minus	Times	Divided
Sum of	Difference between/of	Product of	Quotient of
More than	Less than	Multiplied by	Ratio of
Increased by	Decreased by		Per
Combined	Fewer than		Out of
Together			percent
Total of			
Added to			

Example: three more than a number x

Verbal Expression:	three	more than	a number x
Algebraic Expression:	3	+	x
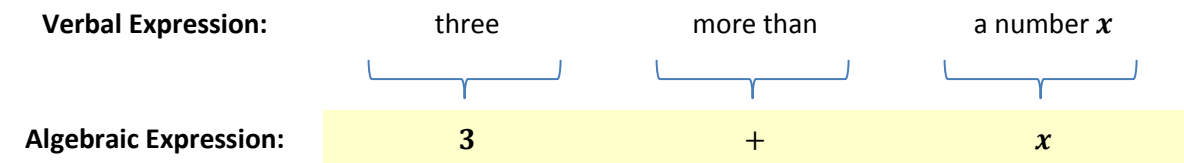
Sample Problem 1: Write each expression algebraically.

a. The product of 8 and a number x $\qquad = 8x$

b. The difference between 16 and x squared $\qquad = 16 - x^2$

c. The sum of 7 and m $\qquad = 7 + m$

d. x divided by three $\qquad = \dfrac{x}{3}$

e. Four times eight plus n $\qquad = 4(8 + n)$

POWER is an expression that represents repeated multiplication of the same factor.

$$x^n$$

where: x = base

n = exponent, which corresponds to the number of times the base is used as a factors

Variables and Expressions Guide Notes

Symbol	Words	Meaning
2^1	**2** to the first power	**2**
2^2	**2** to the second power	$2 \cdot 2$
2^3	**2** to the third power	$2 \cdot 2 \cdot 2$
2^4	**2** to the fourth power	$2 \cdot 2 \cdot 2 \cdot 2$
2^5	**2** to the fifth power	$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
$2n^6$	**2** times n to the sixth power	$2 \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n$
x^n	x to the nth power	$x \cdot x \cdot x \cdot x \cdot x \cdot \ldots \cdot x$

Example: 2^6

Power:	2^6	$= 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$	$2^6 = 64$
Base:	2		
Exponent:	6	6 factors of 2	

Sample Problem 2: Find each value.
- a. 3^2 $= 3 \cdot 3$ $= 9$
- b. 4^3 $= 4 \cdot 4 \cdot 4$ $= 64$
- c. 5^2 $= 5 \cdot 5$ $= 25$
- d. 6^2 $= 6 \cdot 6$ $= 36$
- e. 2^4 $= 2 \cdot 2 \cdot 2 \cdot 2$ $= 16$

Translating Algebraic Expression into Verbal Expression:

Example: 4m

Algebraic Expression:	4	$\cdot$	m
Verbal Expression:	four	times	a number m

The product of 4 and m

Sample Problem 3: Write a verbal expression for each algebraic expression.
- a. $3 - t$ = the difference between **3** and t
- b. $y + 9$ = the sum of y and **9**
- c. $\frac{6}{s}$ = the ratio between **6** and s
- d. $4z$ = the product of **4** and z
- e. $21d - 3$ = the difference between **21** times d and **3**

Algebra1Coach.com