

Variables and Expressions Guide Notes

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

x, y, z, a, r, d, s

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

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

Various ways to represent a product of x and y :



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

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 | $= 8x$ |
| b. The difference between 16 and x squared | $= 16 - x^2$ |
| c. The sum of 7 and m | $= 7 + m$ |
| d. x divided by three | $= \frac{x}{3}$ |
| e. Four times eight plus n | $= 4(8 + n)$ |

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

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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 n th power	$x \cdot x \cdot x \cdot x \cdot x \cdot \dots \cdot x$

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.

- $3^2 = 3 \cdot 3 = 9$
- $4^3 = 4 \cdot 4 \cdot 4 = 64$
- $5^2 = 5 \cdot 5 = 25$
- $6^2 = 6 \cdot 6 = 36$
- $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$

Translating **Algebraic Expression** into **Verbal Expression**:

Example: $4m$

Algebraic Expression:	4	.	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.

- $3 - t$ = the difference between 3 and t
- $y + 9$ = the sum of y and 9
- $\frac{6}{s}$ = the ratio between 6 and s
- $4z$ = the product of 4 and z
- $21d - 3$ = the difference between 21 times d and 3