



# Algebra1Coach.com

## Variables and Expressions

Unit 1 Lesson 1

# VARIABLES AND EXPRESSIONS

## Students will be able to:

write mathematical expressions for verbal expressions,  
and vice versa.

## Key Vocabulary:

- Variables
- Algebraic Expression
- Factors
- Product
- Power
- Base
- Exponent

## VARIABLES AND EXPRESSIONS

**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*

## VARIABLES AND EXPRESSIONS

**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**.

# VARIABLES AND EXPRESSIONS

## Translating Verbal Expression into Algebraic Expression:

### Addition

Plus  
Sum of  
More than  
Increased by  
Combined  
Together  
Total of  
Added to

### Subtraction

Minus  
Difference between/of  
Less than  
Decreased by  
Fewer than

### Multiplication

Times  
Product of  
Multiplied by

### Division

Divided  
Quotient of  
Ratio of  
Per  
Out of  
percent

# VARIABLES AND EXPRESSIONS

## Translating Verbal Expression into Algebraic Expression:

**Example:** three more than a number  $x$

<b>Verbal Expression:</b>	three	more than	a number $x$
<b>Algebraic Expression:</b>	3	+	$x$

# VARIABLES AND EXPRESSIONS

**Sample Problem 1:** Write each expression algebraically.

- a. The product of 8 and a number  $x$
- b. The difference between 16 and  $x$  squared
- c. The sum of 7 and  $m$
- d.  $x$  divided by three
- e. Four times eight plus  $n$

## VARIABLES AND EXPRESSIONS

**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  $n$

$$= 4(8 + n)$$



## VARIABLES AND EXPRESSIONS

**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


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

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	$x \cdot x \cdot x \cdot x \cdot x \cdot \dots \cdot x$

# VARIABLES AND EXPRESSIONS

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

**Example:**  $2^6$

<b>Power:</b>	$2^6$	$= 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$	$2^6 = 64$
<b>Base:</b>	$2$		
<b>Exponent:</b>	$6$	6 factors of 2	

# VARIABLES AND EXPRESSIONS

**Sample Problem 2:** Find each value.

*A.*  $3^2$

*B.*  $4^3$

*C.*  $5^2$

*D.*  $6^2$

*E.*  $2^4$

# VARIABLES AND EXPRESSIONS

**Sample Problem 2:** Find each value.

$$A. \quad 3^2 = 3 \cdot 3 = 9$$

$$B. \quad 4^3 = 4 \cdot 4 \cdot 4 = 64$$

$$C. \quad 5^2 = 5 \cdot 5 = 25$$

$$D. \quad 6^2 = 6 \cdot 6 = 36$$

$$E. \quad 2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$$

## Translating Algebraic Expression into Verbal Expression:

**Example:**  $4m$

**Algebraic Expression:**

$$\underbrace{4} \quad \underbrace{\cdot} \quad \underbrace{m}$$

**Verbal Expression:**

four times a number  $m$

The product of 4 and  $m$

## VARIABLES AND EXPRESSIONS

**Sample Problem 3:** Write a verbal expression for each algebraic expression.

A.  $3 - t$

B.  $y + 9$

C.  $\frac{6}{s}$

D.  $4z$

E.  $21d - 3$

## VARIABLES AND EXPRESSIONS

**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**