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VARIABLES AND EXPRESSIONS

N-GEN MATH[®] 7



Recall that a **variable** is a letter that represents a number (or quantity) that is either unknown or is changing (variable). An **expression** is a **combination of variables and normal numbers** using operations such as addition, subtraction, multiplication, division, and exponentiation.

Exercise #1: Given the expression $3n + 7$ answer the following questions.

- (a) If $n = -2$ should we first add 7 to n or multiply n by 3? Explain. (b) Evaluate the expression when $n = -2$. Show the substitution of the value.

When we look at an **algebraic expression** (one that has variables in it), it is very important that we interpret the expression correctly by remembering our **order of operations**.

Order of Operations (P.E.M.D.A.S.)

When evaluating an expression, the following order is conventional:

1. Expressions within **P**arentheses or grouped together (such as in a numerator or denominator).
2. **E**xponentiation
3. **M**ultiplication/**D**ivision (from left to right)
4. **A**ddition/**S**ubtraction (from left to right)

Exercise #2: For each of the following expressions, evaluate it for the given value of the variable using order of operations. In each case, be sure to show your substitution.

(a) $10 + 5x$ for $x = 2$

(b) $2n^2 - 7$ for $n = -3$

(c) $\frac{9y-1}{y+1}$ for $y = 4$

(d) $-\frac{4}{3}x + 5$ for $x = -12$



Exercise #3: For the expression $5x + 2y - 7z$ do the following:

- (a) Evaluate this expression when $x = 2$, $y = 10$, and $z = 5$. Show your substitution. (b) Which operations did you do first? Which did you do last?

In the last exercise, the expression was made up of three **terms**, those being $5x$, $2y$, and $7z$. A **term** is a **combination of variables** and numbers **using multiplication or division**. They are separated from other terms by addition and subtraction.

Exercise #4: For each of the following expressions, state all its terms.

(a) $4x^2 + 7$

(b) $12x + 2y - 11$

(c) $3y^2 - 2xy + x^2$

(d) $4x^3 - 2x^2 + 7x + 10$

(e) $x^2 - y^2$

(f) $\frac{x}{2} + 3z - 6$

Expressions can have as little as one term and as many as an infinite number of terms. We give special names to expressions that have one, two, or three terms:

SPECIAL TYPES OF EXPRESSIONS

Monomial: An algebraic expression consisting of a single term, for example $5x$

Binomial: An algebraic expression with exactly two terms, for example $2x + 10$

Trinomial: An algebraic expression with exactly three terms, for example $3x + 2y - 7$.

Exercise #5: For each expression, circle each of its terms and then state whether it is a monomial, binomial, or trinomial.

(a) $\frac{1}{2}x - 3$

(b) $4c^2 + 2c - 5$

(c) $4y^3 + 2$

(d) $6n^3$

(e) $5x - \frac{z}{4}$

(f) $\frac{7y}{3}$



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VARIABLES AND EXPRESSIONS
N-GEN MATH[®] 7 HOMEWORK

FLUENCY

1. If the expression $5 + 2x$ was evaluated for $x = 4$ its value would be

(1) 11

(3) 22

(2) 13

(4) 28

2. Which of the following is the value of the expression $3y + 5(x - 8)$ when $x = 11$ and $y = -2$?

(1) 9

(3) -3

(2) -12

(4) 15

3. When the expression $\frac{6x}{x^4 + 5}$ is evaluated for $x = 2$, the result can be written as

(1) 7

(3) $\frac{5}{2}$

(2) $\frac{4}{7}$

(4) $\frac{12}{13}$

4. Which of the following expressions is an example of a binomial?

(1) $4x^2$

(3) $2W + 2L$

(2) $4x^2 + 3x - 7$

(4) $\frac{n}{2}$

5. Which of the following is an example of trinomial?

(1) $4xyz$

(3) $\frac{2x}{y} + 7z$

(2) $2xy + 5z$

(4) $3x + 2y + 5z$



6. Find the value of each of the following expressions for the values of the variables given. Show your substitutions and steps in your evaluation. Some problems will involve negative numbers. Express any fractional answers in simplest form.

(a) $5x - 2$ for $x = 8$

(b) $4n^2$ for $n = 5$

(c) $2x + 3y$ for $x = 5$ and $y = -2$

(d) $\frac{2}{5}x + 3$ for $x = -20$

(e) $\frac{-5n-1}{n+3}$ for $n = 4$

(f) $\frac{x^2-5}{5x-7}$ for $x = 3$

7. For each of the following expressions, circle each term and then state how many terms the expression has.

(a) $6x + 8$

(b) $2x^2 - 3x + 7$

(c) $\frac{3x}{2}$

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(d) $x^2 - 16$

(e) $2x + 7 + 4x + 11$

(f) $x^2 + 2xy - 4y^2$

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