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## MASTERING THE LANGUAGE OF ALGEBRA: A GUIDE TO WORD PHRASES FOR ALGEBRAIC EXPRESSIONS

Mathematics is often described as a universal language, but for many students, the transition from everyday English into the symbolic world of algebra can feel like learning a foreign dialect. At the heart of this transition lies the ability to decode **word phrases for algebraic expressions**. Whether you are helping a child with homework, revisiting foundational math as an adult, or preparing for a standardized test, understanding how to translate words into mathematical symbols is a critical skill. This guide will walk you through the essential vocabulary, common pitfalls, and practical strategies to become fluent in converting verbal statements into clean, solvable algebraic expressions.

## WHAT ARE ALGEBRAIC EXPRESSIONS AND WORD PHRASES?

Before diving into translation, it is important to define the two components of this process. An **algebraic expression** is a mathematical phrase that combines numbers, variables (like  $x$  or  $y$ ), and operation symbols (such as  $+$ ,  $-$ ,  $\times$ ,  $\div$ ) without an equals sign. For example,  $3x + 7$  is an algebraic expression. On the other hand, a **word phrase** is a statement in everyday language that describes a mathematical relationship. The phrase "seven more than triple a number" is the verbal counterpart of the expression  $3x + 7$ .

Learning to map these word phrases accurately to algebraic expressions is the foundation for solving equations, modeling real-world scenarios, and progressing in advanced mathematics. It requires recognizing how specific words and sentence structures indicate particular operations and orders of operations.

## KEY MATHEMATICAL OPERATIONS: THE VOCABULARY OF TRANSLATION

Every algebraic expression is built from four basic operations. Each operation has a unique set of signal words that consistently appear in word phrases. Mastering these keywords is the first step toward fluency.

## Addition Keywords

Addition is often indicated by words that suggest combining or increasing. Common words and phrases include:

- **Sum**: "the sum of a number and eight" translates to  $x + 8$
- **Plus**: "a number plus twelve" becomes  $n + 12$
- **Increased by**: "a value increased by five" is  $y + 5$
- **More than**: "seven more than a number" translates to  $x + 7$  (note: order matters here)
- **Added to**: "three added to a number" becomes  $n + 3$
- **Total**: "the total of a number and four" is  $x + 4$

## Subtraction Keywords

Subtraction words often indicate a decrease, difference, or removal. Key phrases include:

- **Difference**: "the difference of a number and ten" translates to  $x - 10$  (order matters: difference of A and B usually means A minus B)
- **Minus**: "a number minus six" is  $n - 6$
- **Less than**: "five less than a number" becomes  $x - 5$  (a very common point of confusion, as the number comes first in the expression)
- **Decreased by**: "a number decreased by nine" translates to  $y - 9$
- **Subtracted from**: "seven subtracted from a number" is  $n - 7$  (again, careful with order)
- **Fewer than**: "three fewer than a number" becomes  $x - 3$

## Multiplication Keywords

Multiplication often appears through words that imply repeated addition or scaling. Look for:

- **Times**: "six times a number" translates to  $6x$
- **Product**: "the product of a number and four" becomes  $4x$
- **Multiplied by**: "a number multiplied by three" is  $3x$
- **Of**: "half of a number" often indicates multiplication by a fraction:  $(1/2)x$
- **Twice**: "twice a number" translates to  $2x$
- **Triple**: "triple a number" becomes  $3x$

## Division Keywords

Division words suggest splitting or sharing among parts. Common terms include:

- **Quotient**: "the quotient of a number and five" translates to  $x/5$
- **Divided by**: "a number divided by eight" is  $n/8$
- **Divided into**: "eight divided into a number" becomes  $x/8$  (order matters)
- **Per**: "miles per hour" indicates a rate, often expressed as a fraction
- **Ratio of**: "the ratio of a number to seven" translates to  $x/7$
- **Separated equally**: often a cue for division in word problems

## THE ART OF ORDER: WHY SEQUENCE MATTERS

One of the most challenging aspects of translating **word phrases for algebraic expressions** is correctly handling the order of terms. English does not always place the first number mentioned first in the expression. For instance, consider the phrase "five less than a number." A common beginner mistake is to write  $5 - x$ , but the correct expression is  $x - 5$ . The phrase "less than" reverses the order. Similarly, "the sum of a number and three" is straightforward:  $x + 3$ . However, "three more than a number" also yields  $x + 3$ .

Here are three reliable rules to keep order straight:

- **For addition and multiplication, order does not change the value.**  $x + 5$  is the same as  $5 + x$ , and  $2x$  is the same as  $x \cdot 2$ . However, convention usually places the number before the variable in multiplication.
- **For subtraction and division, order is critical.** "A

number minus seven" is  $x - 7$ , while "seven minus a number" is  $7 - x$ . The specific wording dictates the sequence.

- **Look for the subject of the sentence.** The item being acted upon usually comes first in the expression. For example, in "a number decreased by ten," the subject is "a number," so it becomes  $x - 10$ .

## MOVING BEYOND SINGLE OPERATIONS: MULTI-STEP PHRASES

Real-world math rarely involves just one operation. Word problems often combine multiple actions into a single phrase. Decoding these **multi-step word phrases for algebraic expressions** requires careful reading and a step-by-step approach.

Consider the phrase: "three times the sum of a number and five." Here, two operations are involved: addition inside a sum, followed by multiplication by three. The correct expression is  $3(x + 5)$ . The parentheses are essential because they indicate that the addition happens first, and then the multiplication applies to the entire sum. Without parentheses,  $3x + 5$  would mean something entirely different: multiply the number by three, then add five.

Another common example: "the sum of twice a number and seven." This phrase breaks down as: twice a number ( $2x$ ) plus seven ( $+ 7$ ), resulting in  $2x + 7$ . Notice here that there is no multiplication over the sum; the multiplication only affects the variable. The presence or absence of the word "sum" (or "difference," "product," "quotient") is your clue as to whether parentheses are needed.

## STEP-BY-STEP STRATEGY FOR TRANSLATING WORD PHRASES

When faced with a word phrase, follow a systematic process to ensure accuracy. This method works for simple phrases as well as complex ones.

1. **Read the entire phrase carefully.** Do not rush. Identify what the unknown quantity is, and assign it a variable (commonly  $x$ ,  $n$ , or  $y$ ).
2. **Identify the main operation.** Look for the words that signal addition, subtraction, multiplication, or division. Underline or highlight them.
3. **Determine the order of operations.** Decide which operation happens first. Words like "sum of" or "product of" often indicate a grouping that should be enclosed in parentheses.
4. **Write the expression step by step.** Start with the variable, then add each operation in the correct sequence. Use parentheses to clarify grouping.
5. **Verify by reading it back.** Translate your algebraic

expression back into a word phrase. Does it match the original? If not, adjust.

For example, take the phrase: "twice the difference of a number and four."

- Step 1: Let the number be  $x$ .
- Step 2: "Difference of a number and four" means subtraction:  $x - 4$ .
- Step 3: "Twice" means multiply by 2. It applies to the entire difference.
- Step 4: Expression:  $2(x - 4)$ .
- Step 5: Reading back: "two times the quantity  $x$  minus four" matches the original phrase.

## COMMON MISTAKES AND HOW TO AVOID THEM

Even experienced students can stumble when translating **word phrases for algebraic expressions**. Here are the most frequent errors and how to steer clear of them.

## Reversing the Order in Subtraction and Division

As noted, phrases like "five less than a number" are often miswritten as  $5 - x$  instead of  $x - 5$ . A helpful trick: read "less than" as "subtract from." "Five less than a number" means "subtract five from a number," which clearly indicates  $x - 5$ .

## Forgetting Parentheses

When a phrase involves a sum or difference being multiplied or divided by another number, parentheses are non-negotiable. For example, "the quotient of a number and three, plus two" is  $(x/3) + 2$ , while "the quotient of a number and the sum of three and two" is  $x/(3 + 2)$ . The placement of the word "and" and the presence of a grouping word like "sum" are your signals.

## Misinterpreting "Twice the Sum" vs. "The Sum of Twice"

Compare "twice the sum of  $x$  and  $y$ " ( $2(x + y)$ ) with "the sum of twice  $x$  and  $y$ " ( $2x + y$ ). These are different expressions. Pay attention to what quantity the adverb "twice" modifies. In the first, it modifies the entire sum; in the second, it modifies