

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related is a fundamental skill in algebra that bridges the gap between everyday language and mathematical notation. This process is essential for solving real-world problems because it allows us to translate complex scenarios into a format that can be manipulated mathematically. Whether you're tackling word problems in school, solving practical situations, or preparing for standardized tests, understanding how to convert descriptive language into algebraic expressions is crucial.

In this comprehensive guide, we will explore the step-by-step process of translating English phrases into algebraic expressions, provide illustrative examples, and demonstrate how to set up related equations. This will enable you to develop a strong foundation in algebraic problem-solving, enhance your critical thinking skills, and improve your ability to approach mathematical problems systematically.

Understanding the Importance of Translating English Phrases into Algebra

Why Is This Skill Essential?

Translating English phrases into algebraic expressions allows us to:

- Simplify complex real-world situations into manageable mathematical models
- Solve problems more efficiently
- Develop logical reasoning skills
- Prepare for higher-level math and standardized testing

For example, consider the phrase: "The sum of a number and 7." To solve such a problem, you need to convert this phrase into an algebraic expression, typically written as $(x + 7)$.

Common Challenges in Translation

- Ambiguity in language
- Multiple interpretations of the same phrase
- Correctly setting up the equation after translation

Addressing these challenges involves understanding key keywords and their corresponding algebraic operations.

Key Words and Phrases in Algebraic Translation

Understanding common keywords helps in translating phrases accurately:

Keyword/Phrase	Operation	Example
Sum of	Addition	The sum of a number and 5 $\rightarrow (x + 5)$
Difference of	Subtraction	The difference of a number and 3 $\rightarrow (x - 3)$
Product of	Multiplication	The product of a number and 4 $\rightarrow (4x)$
Quotient of	Division	The quotient of a number and 2 $\rightarrow (\frac{x}{2})$
Increased by	Addition	A number increased by 10 $\rightarrow (x + 10)$
Decreased by	Subtraction	A number decreased by 6 $\rightarrow (x - 6)$
Less than	Subtraction (reversal)	5 less than a number $\rightarrow (x - 5)$
More than	Addition (reversal)	7 more than a number $\rightarrow (x + 7)$
Is	Equals	The sum of 3 and a number is 10 $\rightarrow (3 + x = 10)$

Step-by-Step Approach to Translating English Phrases into Algebraic Expressions

Step 1: Read the Problem Carefully

- Understand what is being asked.
- Identify the key quantities and relationships.
- Highlight keywords that indicate operations.

Step 2: Assign Variables to Unknown Quantities

- Choose a variable (commonly x , y , or z) to represent the unknown.

Step 3: Translate Each Part of the Phrase

- Convert descriptive phrases into algebraic expressions using the keywords.
- Be attentive to the order of operations and the context.

Step 4: Set Up the Equation(s)

- Use the translated expressions to formulate equations based on the relationships described.

Step 5: Solve the Equation(s)

- Simplify and solve for the variable.
- Verify the solution within the context of the problem.

Illustrative Examples of Translation and Equation Setup

Example 1: Basic Translation

Problem: "The sum of a number and 8 is 15."

Solution:

- Step 1: Identify the key phrase: "sum of a number and 8."
- Step 2: Assign a variable: (x) .
- Step 3: Translate: "sum of a number and 8" $\rightarrow (x + 8)$.
- Step 4: Set up the equation: $(x + 8 = 15)$.
- Step 5: Solve: $(x = 15 - 8 = 7)$.

Result: The number is 7.

Example 2: More Complex Translation

Problem: "Three times a number decreased by 4 equals 11."

Solution:

- Step 1: Identify key phrases: "Three times a number" and "decreased by 4."
- Step 2: Assign variable: (x) .
- Step 3: Translate:
 - "Three times a number" $\rightarrow (3x)$.
 - "Decreased by 4" $\rightarrow (3x - 4)$.
- Step 4: Set up the equation: $(3x - 4 = 11)$.
- Step 5: Solve:
 - $(3x = 11 + 4 = 15)$.
 - $(x = \frac{15}{3} = 5)$.

Result: The number is 5.

Example 3: Setting Up Multiple Equations

Problem: "A rectangle has a length that is 3 meters more than its width. The perimeter of the rectangle is 34 meters. Find the dimensions of the rectangle."

Solution:

- Step 1: Understand the relationships:

- Length: (L)
- Width: (W)
- $(L = W + 3)$
- Perimeter: $(2L + 2W = 34)$

- Step 2: Assign variables:

- (W) : width
- (L) : length

- Step 3: Translate:

- $(L = W + 3)$
- $(2L + 2W = 34)$

- Step 4: Set up equations:

- From the first: $(L = W + 3)$
- Substitute into the second:
 $(2(W + 3) + 2W = 34)$

- Step 5: Simplify and solve:

- $(2W + 6 + 2W = 34)$
- $(4W + 6 = 34)$
- $(4W = 28)$
- $(W = 7)$
- $(L = 7 + 3 = 10)$

Result: Width = 7 meters, Length = 10 meters.

Common Mistakes to Avoid When Translating Phrases

- Misinterpreting keywords: For example, confusing "less than" with "more than."
- Forgetting to reverse the order in subtraction when necessary.
- Overlooking the need to set up multiple equations in multi-variable problems.
- Ignoring the context, leading to incorrect assumptions about the sign or operation.

Practice Problems for Mastery

1. "A number decreased by 5 is 12."
2. "The product of a number and 6 is 42."
3. "A number increased by twice another number equals 20."
4. "The sum of a number and its double is 36."
5. "Five more than twice a number equals 19."

Solutions and Translations for Practice Problems

1. $(x - 5 = 12)$
2. $(6x = 42)$
3. $(x + 2y = 20)$
4. $(x + 2x = 36)$
5. $(2x + 5 = 19)$

Conclusion

Mastering the art of translating English phrases into algebraic expressions is foundational for problem-solving in mathematics. It requires careful reading, understanding of keywords, and logical organization of the information provided. By practicing with various types of problems—from simple to complex—you can develop confidence in setting up equations accurately and efficiently.

Remember, the key steps involve:

- Recognizing key phrases and keywords.
- Assigning appropriate variables.
- Translating phrases into algebraic expressions carefully.
- Setting up and solving the resulting equations.

With consistent practice, you'll become proficient in transforming real-world language into the language of algebra, enabling you to tackle a wide array of mathematical challenges with confidence.

Empower your problem-solving skills today by practicing translating English phrases into algebraic expressions and setting up equations—an essential skill for success in mathematics!

Frequently Asked Questions

How do I translate the phrase 'the sum of a number and 7' into an algebraic expression?

You can represent the number as x , so the expression is $x + 7$.

What does the phrase 'twice a number decreased by 5' translate to in algebra?

It translates to $2x - 5$, where x is the number.

How can I set up an algebraic expression for 'the product of a number and 3'?

The expression is $3x$, with x representing the number.

What is the algebraic expression for 'the difference between a number and 10'?

It is $x - 10$, where x is the number.

How do I represent 'a number divided by 4' as an algebraic expression?

The expression is $x/4$, with x being the number.

Translate 'the square of a number' into an algebraic expression.

It becomes x^2 , where x is the number.

What algebraic expression represents 'the sum of two numbers, x and y '?

The expression is $x + y$.

How do I translate 'five more than twice a number' into an algebraic expression?

It translates to $2x + 5$.

Set up an algebraic expression for 'the difference between the product of a number and 6, and 8'?

The expression is $6x - 8$.

Additional Resources

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related Equations

Introduction

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related Equations — this instruction is fundamental in bridging the gap between everyday language and mathematical reasoning. It forms a core skill in algebra, enabling students and professionals alike to interpret word problems accurately and develop precise models that can be solved systematically. Whether tackling a simple problem involving basic operations or dealing with complex real-world scenarios, this process of translation and equation setup is vital for problem-solving success. This article delves into the methodology behind translating English phrases into algebraic expressions, illustrating each step with clear explanations and examples, and guiding readers through effective strategies for setting up and solving related equations.

Understanding the Translation Process

Before jumping into specific examples, it's crucial to understand why translating words into algebra is important. Algebra provides a universal language for expressing relationships, quantities, and changes. When faced with a problem in words, the goal is to convert those words into symbols and expressions that mirror the problem's structure.

Key Steps in the Translation Process:

1. Identify the Unknowns: Determine what quantities are unknown and assign variables (e.g., x , y , z) to represent them.
2. Read Carefully: Break down the problem into smaller parts, focusing on each phrase.
3. Recognize Keywords: Certain words hint at specific operations:
 - Addition: "sum," "more than," "increased by"
 - Subtraction: "difference," "less than," "decreased by"
 - Multiplication: "product," "times," "of"
 - Division: "quotient," "per," "out of"
4. Translate Phrases: Convert each phrase into an algebraic expression, considering the context.
5. Combine Expressions: Assemble the expressions into an equation that models the entire problem.

Deep Dive into Translation Techniques

Recognizing Common Phrases and Their Algebraic Equivalents

Phrase in English	Algebraic Expression	Explanation
----- ----- -----		
"a number"	x	The unknown number being solved for.
"the sum of a and b"	$a + b$	Addition of two quantities.

"the difference between a and b"	$a - b$	Subtraction, with a as minuend and b as subtrahend.
"product of a and b"	$a \times b$ or ab	Multiplication.
"the quotient of a and b"	$a \div b$ or a/b	Division.
"more than"	$a +$	If "a more than b," then $b + a$.
"less than"	$a -$	If "less than b," then $b - a$.
"twice a"	$2a$	Two times a.
"the double of a"	$2a$	Same as above.
"half of a"	$a/2$	Dividing a by 2.

Translating Word Problems: Step-by-Step Strategy

1. Read the problem thoroughly.
2. Identify the key quantities and assign variables.
3. Extract the phrases that describe relationships.
4. Translate each phrase into an algebraic expression.
5. Assemble the expressions into an equation.
6. Simplify and solve the algebraic equation.

Practical Examples

Let's explore some common types of problems and their translation processes.

Example 1: Simple Addition

Problem:

"A number increased by 7 equals 15."

Translation Steps:

- Unknown number: x
- "A number increased by 7": $x + 7$
- "equals 15": $x + 7 = 15$

Equation:

$$x + 7 = 15$$

Solution:

$$x = 15 - 7$$

$$x = 8$$

This straightforward example demonstrates how to convert a simple phrase into an algebraic equation.

Example 2: Subtraction and Multiplication

Problem:

"Twice a number decreased by 3 is equal to 9."

Translation Steps:

- Unknown number: x
- "Twice a number": $2x$
- "Decreased by 3": $- 3$
- "is equal to 9": $= 9$

Equation:

$$2x - 3 = 9$$

Solution:

$$2x = 9 + 3$$

$$2x = 12$$

$$x = 12 / 2$$

$$x = 6$$

This example highlights how combining multiple phrases requires careful translation and stepwise solving.

Example 3: Multiple Operations

Problem:

"The sum of a number and 4 is twice another number, which is 3 less than 10."

Translation Steps:

- First number: x
- Second number: y
- "The sum of a number and 4": $x + 4$
- "is twice another number": $2y$
- "which is 3 less than 10": $y = 10 - 3$ or $y = 7$

Expressed as equations:

$$x + 4 = 2y$$

and

$$y = 10 - 3 = 7$$

Substitute $y = 7$ into the first equation:

$$x + 4 = 2(7)$$

$$x + 4 = 14$$

$$x = 14 - 4$$

$$x = 10$$

Setting Up Equations from Word Problems

In more complex problems, multiple steps and relationships are involved. The key is to carefully parse each part of the phrase, translate it, and then combine the expressions.

Example 4: Mixture of Relationships

Problem:

"A rectangle has a length that is 3 meters more than its width. The perimeter of the rectangle is 34 meters. Find the length and the width."

Step-by-step translation:

- Let w = width
- Length: $l = w + 3$
- Perimeter: $P = 2(l + w)$
- Given perimeter: $P = 34$

Set up the equation:

$$2(w + 3 + w) = 34$$

Simplify:

$$2(2w + 3) = 34$$

Distribute:

$$4w + 6 = 34$$

Solve:

$$4w = 34 - 6$$

$$4w = 28$$

$$w = 7$$

Find l :

$$l = 7 + 3 = 10$$

Result:

Width = 7 meters, Length = 10 meters.

Tips for Effective Translation and Equation Setup

- Read carefully: Ensure understanding of every phrase before translating.
- Use consistent variables: Assign variables meaningfully, especially in multi-variable problems.
- Break down complex phrases: Divide long sentences into smaller parts.
- Check keywords: Recognize language cues that suggest specific operations.
- Verify units: Keep track of units to ensure consistent and meaningful equations.
- Double-check translations: Confirm that the algebraic expressions accurately reflect the problem context.

Common Pitfalls and How to Avoid Them

- Misinterpreting keywords: Words like "more than" and "less than" are often confused. Remember, "more than" means addition, while "less than" indicates subtraction.
- Incorrect variable assignment: Assign variables based on the problem's structure, not arbitrarily.
- Overlooking relationships: Some problems involve multiple interconnected relationships; ensure all

are captured.

- Ignoring context: Always interpret phrases considering the real-world scenario to avoid nonsensical equations.

Conclusion

Translating English phrases into algebraic expressions and setting up the related equations is a fundamental skill that underpins successful problem-solving in mathematics. This process requires careful reading, recognition of keywords, and systematic breakdown of phrases. With practice, one can develop a keen eye for these translations, enabling efficient and accurate modeling of various scenarios. Whether solving simple addition or tackling complex multi-step problems, mastering this skill unlocks the power of algebra to understand and resolve real-world challenges with clarity and confidence.

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related

Translate Each English Phrase In The Following Problem Into An Algebraic Expression And Set Up The Related

Related Articles

- [Uh-oh. You Failed To Present An Offer On Behalf Of Your Client In A Timely Manner. As A Result, The Seller](#)
- [Vail Resorts, Inc., Owns And Operates Five Premier Year-round Ski Resort Properties \(Vail Mountain, Beaver](#)
- [As Winter Drew On, Mollie Became More And More Troublesome. She Was Late For Work Every Morning And Excused](#)

[Back to Home](#)