Say It With Symbols Investigation 23 Answers

Say It With Symbols
Investigation: 2.3
Pg. 26
Topic: Using Equations

Name: Key
Period: _____
Date: _____

Tony and Paco will operate the water tub concession stand at Water City. Tony is responsible for designing the building that will store the rafts. Paco is responsible for deciding the rental fee for the tubes.

| A. Every concession stand must have a rectangular floor space and a perimeter of 88 meters. Tony wants the greatest area possible. ✱ $A = \ell(\pm P - \ell)$ ✱ $\frac{1}{2} \cdot 88 = 44$ | 1. Write an equation for the area in terms of the length. L is only variable $A = \ell(44 - \ell)$ OR $A = 44\ell - \ell^2$
 2. What is the maximum area for the rectangular floor space? ✱ square is if $\ell = 22$ then $22^2 = 484 m^2$ largest area $88 \div 4 = 22$ |

B. Paco knows that on a typical day, the number of tube rentals n is related to the price to rent each tube p. Records from other water park locations suggest:
- If the tube are free (no price), there will be 54 rentals.
- Each increase of $1 in the price will result in one less tube rented.

Paco uses this information to write the following equations:
- Equation 1: $n = 54 - (1)p$
- Equation 2: $I = np$, where I is the daily income

| B1. Do these equations make sense? Explain | yes #1: 54 is the average tube rental, & it will decrease (−) one tube for every $1 increase in price (p)

 #2: number of rentals times price is how much you take in |

| B2. Write an equation for income in terms of the number of rentals n. ✱ need to start by getting eqn 1 in terms of n. | $n = 54 - 1p$
 $n = 54 - p$
 $+p \quad +p$
 $n + p = 54$
 $-n \quad -n$
 $p = 54 - n$ ← put into Income equation for P

 $I = n(54 - n)$
 OR
 $I = 54n - n^2$ |

| B3. The expenses for storage and maintenance of the rented tubes are $10 per tube. Write an equation for daily profit D in terms of the number of rentals n. | Expense = 10n
 $D = \underbrace{n(54-n)}_{income} - \underbrace{10n}_{expense}$
 $D = 54n - n^2 - 10n = 44n - n^2$ |

Profit (D) = Income − Expense

THE "SAY IT WITH SYMBOLS" INVESTIGATION SERIES IS A CAPTIVATING WAY TO ENGAGE STUDENTS IN THE WORLD OF MATHEMATICS AND LOGIC. SPECIFICALLY, INVESTIGATION 23 DELVES INTO THE REALM OF ALGEBRAIC EXPRESSIONS AND EQUATIONS, REQUIRING LEARNERS TO INTERPRET AND MANIPULATE SYMBOLS TO ARRIVE AT THE CORRECT ANSWERS. THIS ARTICLE PROVIDES AN IN-DEPTH EXPLORATION OF INVESTIGATION 23, DISCUSSING ITS OBJECTIVES, METHODOLOGIES, AND THE ANSWERS TO THE CHALLENGES POSED WITHIN IT.

OBJECTIVES OF INVESTIGATION 23

THE PRIMARY OBJECTIVES OF INVESTIGATION 23 ARE TO:

1. DEVELOP ALGEBRAIC SKILLS: STUDENTS ENHANCE THEIR ABILITY TO UNDERSTAND AND MANIPULATE ALGEBRAIC EXPRESSIONS.
2. ENCOURAGE LOGICAL THINKING: THE INVESTIGATION PROMPTS STUDENTS TO THINK CRITICALLY ABOUT THE RELATIONSHIPS

between different algebraic symbols.
3. Promote Problem Solving: Through various challenges, learners are tasked with solving equations and interpreting results.

Understanding Symbols in Algebra

In algebra, symbols represent numbers and operations. Familiarity with these symbols is crucial for success in mathematics. The common symbols include:

- Variables: Typically represented by letters (e.g., x, y), variables stand in for unknown values.
- Operators: Symbols such as + (addition), - (subtraction), × (multiplication), and ÷ (division) denote mathematical operations.
- Equations: Statements that assert the equality of two expressions, often involving variables (e.g., $2x + 3 = 7$).

Key Concepts in Investigation 23

Investigation 23 introduces several key concepts which are foundational for solving the problems presented:

- Translating Words into Symbols: Students learn to convert verbal statements into symbolic representations. For example, "five more than a number" can be represented as $x + 5$.
- Solving Linear Equations: The investigation focuses on solving equations involving one variable, emphasizing the importance of isolating the variable.
- Understanding Inequalities: Students are also introduced to inequalities, learning how to interpret and solve them.

Steps to Solve Problems in Investigation 23

To tackle the problems presented in Investigation 23, students should follow a systematic approach. Here are the steps involved:

1. Read the Problem Carefully: Understanding the question is the first step toward finding the solution.
2. Identify Known and Unknown Values: Determine what information is provided and what needs to be found.
3. Translate the Problem into Symbols: Convert the verbal or written problem into an algebraic expression or equation.
4. Perform Algebraic Operations: Use algebraic techniques to manipulate the equation or inequality to isolate the variable.
5. Check Your Solutions: Substitute the found values back into the original equation to verify correctness.

Common Techniques for Solving Equations

Several techniques can assist students in solving the equations presented in Investigation 23:

- Combining Like Terms: Simplifying expressions by combining terms that have the same variable.
- Using the Distributive Property: Applying the distributive property to eliminate parentheses and simplify equations.
- Isolating the Variable: Rearranging the equation to get the variable on one side and the constant on the other.

Answers to Investigation 23 Problems

While the specific problems in Investigation 23 can vary, a general format of answers can be provided for common types of questions that may appear. Below are sample problems and their solutions:

Sample Problem 1

Problem: "Three times a number decreased by 4 equals 5."

Symbolic Representation: $3x - 4 = 5$

Solution Steps:
1. Add 4 to both sides: $3x = 9$
2. Divide by 3: $x = 3$

Answer: The number is 3.

Sample Problem 2

Problem: "The sum of a number and 7 is greater than 12."

Symbolic Representation: $x + 7 > 12$

Solution Steps:
1. Subtract 7 from both sides: $x > 5$

Answer: The number must be greater than 5.

Sample Problem 3

Problem: "Twice a number plus 8 equals 20."

Symbolic Representation: $2x + 8 = 20$

Solution Steps:
1. Subtract 8 from both sides: $2x = 12$
2. Divide by 2: $x = 6$

Answer: The number is 6.

Tips for Success in Algebraic Investigations

To excel in investigations like Investigation 23, students should consider the following tips:

- Practice Regularly: Regular practice helps reinforce the concepts learned and improves problem-solving skills.
- Utilize Resources: Make use of textbooks, online tutorials, and study groups to enhance understanding.
- Ask Questions: If a concept is unclear, seeking clarification from teachers or peers can be invaluable.
- Stay Organized: Keeping work organized helps in tracking steps taken to solve problems, making it easier to identify mistakes.

Conclusion

Investigation 23 from the "Say It With Symbols" series serves as a vital stepping stone in a student's mathematical journey. By emphasizing the understanding and manipulation of algebraic symbols, students not only gain confidence in their abilities but also build a strong foundation for more advanced mathematical concepts. The answers provided are just a glimpse into the types of problems students can expect, and with practice and perseverance, they can master the art of solving algebraic expressions and equations. Engaging with the material, utilizing effective strategies, and maintaining a positive attitude will ultimately lead to success in this investigation and beyond.

Frequently Asked Questions

What is the main focus of 'Say It With Symbols Investigation 23'?

The main focus is to explore how symbols can represent different meanings and convey messages effectively.

What type of symbols are examined in Investigation 23?

A variety of symbols including mathematical, linguistic, and cultural symbols are examined.

How does Investigation 23 encourage critical thinking?

It encourages critical thinking by challenging participants to interpret symbols and understand their contexts.

What skills does 'Say It With Symbols Investigation 23' aim to develop?

It aims to develop analytical skills, creativity, and the ability to communicate ideas visually.

Are there any specific examples of symbols analyzed in this investigation?

Yes, examples may include mathematical symbols like '+', linguistic symbols like letters, and cultural symbols like emojis.

How are participants assessed in Investigation 23?

Participants are typically assessed through their ability to interpret, create, and explain the use of symbols in various contexts.

What age group is 'Say It With Symbols Investigation 23' designed for?

It is generally designed for middle to high school students, but can be adapted for various age groups.

Can 'Say It With Symbols Investigation 23' be integrated into other subjects?

Yes, it can be integrated into subjects like art, math, and language studies to enhance cross-disciplinary learning.

What resources are recommended for completing Investigation 23?

Recommended resources include books on symbolism, online articles, and tools for creating visual representations.

What is the expected outcome after completing Investigation 23?

The expected outcome is for participants to gain a deeper understanding of how symbols function in communication and to enhance their interpretive skills.

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