

## Core Skills Analysis

### Mathematics

- Ebony learned to perform algebraic substitution by replacing variables with given values, including negative numbers.
- She developed understanding of how to handle negative numbers within algebraic expressions during the substitution process.
- Ebony practiced evaluating expressions accurately while maintaining correct operation orders and sign usage.
- She enhanced skills in simplifying algebraic expressions after substitution, reinforcing foundational algebraic manipulation.

### Tips

To deepen Ebony's understanding of algebraic substitution with negative numbers, consider incorporating real-life problem scenarios where she can apply substitution, such as budget calculations involving debts or temperature changes. Engaging Ebony in creating her own algebraic expressions using both positive and negative values can promote creativity and reinforce concepts. Use visual aids, like number lines or algebra tiles, to help her conceptualize how negative values impact the expression outcomes. Finally, introduce simple word problems that require substitution to build context and application skills.

### Book Recommendations

- [Algebra Survival Guide: A Conversational Handbook for the Thoroughly Befuddled](#) by Josh Rappaport: This book breaks down algebra concepts in an engaging, easy-to-grasp style perfect for young learners building confidence with substitution and negative numbers.
- [The Manga Guide to Algebra](#) by Hiroyuki Kojima & Shin Takahashi: An illustrated guide that uses storytelling and visuals to explore algebraic concepts like substitution, suitable for middle school students.
- [Algebra: Structure and Method, Book 1](#) by Richard G. Brown: A classic textbook providing clear explanations and practice exercises in algebra basics, including substitution of negative numbers.

### Learning Standards

- Mathematics KS3: Solve linear equations in one variable including those with negative numbers (NC 2014, Year 8, Number - 1N)
- Mathematics KS3: Use algebraic notation to express formulae and relationships (Using & applying mathematics - 6a and 6b)
- Mathematics KS3: Substitute values into formulae and expressions (Number - 1b)

### Try This Next

- Create a worksheet with expressions requiring substitution of both positive and negative integers, including some multi-step calculations.
- Design a quiz with multiple-choice and open-ended questions to test substitution accuracy and understanding of negative signs in algebraic expressions.

### Growth Beyond Academics

Ebony likely demonstrated growing confidence and persistence as she practiced substituting negative numbers within algebraic expressions, a task that can initially cause confusion. Successfully navigating

these problems can boost her mathematical self-efficacy and encourage a curious mindset towards algebra.