

11. Circle The Name Of The Student Who Correctly Wrote The Equation Modeled Below. Then, Find The Solution

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When it comes to understanding and solving equations, students often encounter challenges that test their grasp of algebraic concepts. Properly modeling a real-world situation with an algebraic equation is crucial, as it lays the foundation for finding the correct solution. In many classrooms, teachers present multiple students' attempts to model a problem, asking learners to identify the correct representation before solving it. This exercise not only evaluates students' understanding of the problem but also their ability to translate verbal descriptions into mathematical expressions accurately. In this article, we will explore how to determine which student's equation correctly models a given scenario, followed by the detailed steps to find its solution.

Understanding the Importance of Correct Equation Modeling

Before diving into the specifics of identifying the correct equation, it's essential to understand why accurate modeling matters. When students translate real-world problems into equations, they:

- Clarify the problem: Breaking down the scenario into variables and relationships.
- Enable precise calculations: Ensuring the mathematical expression reflects the actual situation.
- Facilitate solution accuracy: Reducing errors that may arise from misinterpretation.

Incorrect modeling can lead to flawed solutions, misinforming learners about the problem's nature. Therefore, recognizing the correct equation is a critical step in problem-solving.

Analyzing the Given Scenario

Suppose a problem describes a situation such as:

"A student is saving money to buy a new bicycle. The student saves \$15 each week. After 'w' weeks, the total amount saved is \$135. Write an equation that models this situation."

Multiple students' equations are presented, but only one correctly captures the situation. The goal is to:

1. Identify which student's equation correctly models the problem.
2. Solve the correct equation to find the number of weeks needed.

Student Equations Presented:

- Student A: $S = 15w + 135$
- Student B: $S = 15w$
- Student C: $S = 135w$
- Student D: $S = 15 + 135w$

Step 1: Determine Which Equation Is Correct

Let's analyze each one:

- Student A: $S = 15w + 135$

Interpretation: The total savings S is equal to \$15 per week times the number of weeks w , plus an initial \$135. This suggests the student started with \$135 before saving weekly, which doesn't match the scenario where the savings start at zero and accumulate over time.

- Student B: $S = 15w$

Interpretation: The total savings S equals \$15 per week times the number of weeks. This aligns with starting from zero savings and accumulating \$15 each week.

- Student C: $S = 135w$

Interpretation: The total savings increase by \$135 each week. This would imply that the student saves \$135 every week, which contradicts the original problem stating \$15 weekly.

- Student D: $S = 15 + 135w$

Interpretation: Total savings equal \$15 plus \$135 times the number of weeks, which again misrepresents the scenario.

Conclusion: The equation $S = 15w$ (Student B) correctly models the situation where the student starts with zero savings and saves \$15 each week.

Finding the Solution: How Many Weeks to Save \$135?

Having identified the correct equation, the next step is to find the number of weeks needed to save at least \$135.

Step 1: Set Up the Equation

Given:

$$\begin{aligned} &S = 15w \end{aligned}$$

We want to find w when $S = 135$:

$$\begin{aligned} &15w = 135 \end{aligned}$$

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Step 2: Solve for w

Divide both sides by 15:

$$\begin{aligned} & \left[\right. \\ w &= \frac{135}{15} \\ & \left. \right] \end{aligned}$$

$$\begin{aligned} & \left[\right. \\ w &= 9 \\ & \left. \right] \end{aligned}$$

Step 3: Interpret the Result

It takes 9 weeks for the student to save exactly \$135 at a rate of \$15 per week.

Additional Consideration:

- If the goal was to save at least \$135, then 9 weeks is sufficient.
- If the student wants to save more than \$135, they would need to wait longer, but based on the linear model, exactly 9 weeks will achieve the \$135 mark.

Additional Tips for Solving Similar Problems

Understanding how to model and solve such problems is essential for effective algebra learning. Here are some tips:

1. Carefully Read the Scenario

Identify key details:

- Starting point (initial amount, if any)
- Rate of change (per week, per day, per hour)
- What the total represents

2. Translate Words into Variables and Expressions

- Use variables like w for weeks, t for time, etc.
- Express the relationships clearly, such as "per week" or "initial amount."

3. Check the Equations for Logical Consistency

- Does the equation account for initial amounts?
- Does the rate match the description?
- Is the equation linear or nonlinear, and does that fit the scenario?

4. Solve Step-by-Step

- Isolate the variable.
- Perform inverse operations carefully.
- Interpret the solution in the context of the problem.

Common Mistakes to Avoid

- Confusing starting amounts with rates.
- Misreading the problem and adding unnecessary terms.
- Forgetting to check units or what each term represents.
- Assuming the solution without verifying the modeling.

Summary

In modeling real-world problems with equations, accuracy in translating the scenario into a mathematical expression is key. In our example, the correct equation was $(S = 15w)$, as it accurately reflects saving \$15 each week starting from zero. By solving $(15w = 135)$, we found that it takes 9 weeks to reach a savings goal of \$135. Recognizing correct modeling helps prevent errors and ensures effective problem-solving strategies.

Remember: Always analyze the problem carefully, verify each step, and interpret your solutions within the context of the scenario to develop strong algebraic reasoning skills.

Frequently Asked Questions

What is the main goal of the problem titled 'Circle The Name Of The Student Who Correctly Wrote The Equation Modeled Below'?

The main goal is to identify the student who accurately wrote the modeled equation and then find its solution.

How can I determine which student wrote the correct equation in this problem?

Compare each student's equation to the modeled equation and select the one that matches exactly, then proceed to solve that equation.

What steps should I follow to find the solution after identifying the correct equation?

Simplify and solve the equation step-by-step, applying algebraic principles to find the value of the variable.

Why is it important to verify the correctness of the written equation before solving?

Verifying ensures that the equation is accurately represented and prevents errors in solving or selecting the correct student.

What common mistakes should I watch out for when solving equations in this type of problem?

Be cautious of sign errors, incorrect distribution, or mistakes in combining like terms that can lead to incorrect solutions.

Can this type of problem be approached using a visual or diagrammatic method?

While primarily algebraic, drawing diagrams or visual models can help understand the problem context before solving the equation.

What strategies can help in quickly identifying the correct student's equation?

Carefully compare each student's written equation with the modeled equation, paying attention to coefficients, variables, and operations used.

How do I check if my solution to the equation is correct?

Substitute your solution back into the original equation to verify if both sides are equal, confirming correctness.

What skills are essential for solving equations like the one in this problem?

Strong algebraic skills, attention to detail, and the ability to verify solutions are essential for accurately solving such equations.

Additional Resources

Circle The Name Of The Student Who Correctly Wrote The Equation Modeled Below. Then, Find The Solution is a common instructional prompt that encourages students to carefully analyze a modeled equation, identify the correct student representation, and then solve for the unknown. This task combines skills in reading comprehension, critical thinking, and mathematical problem-solving. In this comprehensive guide, we will explore how to approach such questions systematically, the importance of understanding modeled equations, and strategies for accurately identifying and solving the problem at hand.
