Grade 7 Equation Word Problems: Define the Variable First

Original tasks 1, 2, 3 / complete keys

Task 1

A rope is cut into two pieces. One piece is 3 feet longer than the other, and the total length is 15 feet. Define the variable, write an equation, and find the length of each piece.

Answer: The shorter piece is 6 feet and the longer piece is 9 feet.

Reason: Let s be the length of the shorter piece in feet. The longer piece is s + 3 feet. The total is s + (s + 3) = 15. Combine like terms: 2s + 3 = 15. Subtract 3: 2s = 12. Divide by 2: s = 6. The longer piece is 6 + 3 = 9 feet. Check: 6 + 9 = 15 feet.

Check: Substitute 6 into the original relationship: 6 + (6 + 3) = 15, which matches the total. Confirm both lengths are positive and in feet.

Task 2

A class buys pencils that cost 2 dollars each and pays a 5-dollar delivery fee. The total cost is 21 dollars. Define the variable, write an equation, and find the number of pencils.

Answer: The class bought 8 pencils.

Reason: Let p be the number of pencils. The cost is 2p + 5 dollars, which equals 21 dollars. So 2p + 5 = 21. Subtract 5: 2p = 16. Divide by 2: p = 8. Check: 2 times 8 is 16, and 16 plus 5 is 21.

Check: Substitute 8 into the cost relationship: 2(8) + 5 = 21, which matches the total. Confirm the answer is a whole number because pencils are countable.

Task 3

A number is multiplied by 3, then 4 is subtracted. The result is 20. Define the variable, write an equation, and find the number.

Answer: The number is 8.

Reason: Let n be the number. Three times the number is 3n. Subtracting 4 gives 3n - 4. The result is 20, so 3n - 4 = 20. Add 4 to both sides: 3n = 24. Divide by 3: n = 8. Check: 3 times 8 is 24, and 24 minus 4 is 20.

Check: Substitute 8 into the original operations: 3(8) - 4 = 20, which matches the result. Confirm the order of operations matches the story.

Grade 7 Equation Word Problems: Define the Variable First

Original tasks 4 / complete keys

Task 4

A rectangle has a length that is 2 meters more than its width. The perimeter is 20 meters. Define the variable, write an equation, and find the width and length.

Answer: The width is 4 meters and the length is 6 meters.

Reason: Let w be the width in meters. The length is w + 2 meters. Perimeter is 2w + 2(w + 2) = 20. Expand: 2w + 2w + 4 = 20. Combine: 4w + 4 = 20. Subtract 4: 4w = 16. Divide by 4: w = 4. The length is 4 + 2 = 6 meters. Check: 2(4) + 2(6) = 8 + 12 = 20 meters.

Check: Substitute 4 and 6 into the perimeter formula: 2(4) + 2(6) = 20, which matches. Confirm the length is 2 meters more than the width and both are positive.

Grade 7 Equation Word Problems: Define the Variable First

Source rubric / reflection

- [ ] Defines the variable in words with a unit.
- [ ] Writes a one-variable equation that matches the word relationship.
- [ ] Solves using inverse operations with each step shown.
- [ ] Checks the solution in the original context and states the answer with units.
- [ ] Uses consistent units throughout the work.

Reflection: What did you check, what did you change, and what will you try next?