

Solving Practical Problems with 2 Step Equations

STRAND: Patterns, Functions and Algebra

STRAND CONCEPT: Equality/Solving Equations

SOL 7.12

Remediation Plan Summary

The student will solve two step linear equations in one variable, including practical problems that require the solution of a two-step linear equation in one variable.

Common Errors and Misconceptions

- Students sometimes have difficulty translating the practical situation to the algebraic equation that represents it
- Students sometimes have difficulty determining the coefficients and constants from the practical situation
- Students also sometimes confuse integer operations and switch the positive and negative signs.

Materials

- Review of One-Step Equations warm-up (attached)
- Practice with Two-Step Equations activity sheet (attached)
- Sample Practical Problems activity sheet (attached)
- Student whiteboards and dry-erase markers.

Introductory Activity

Distribute the One-Step Equation warm-up. Ask students to recall how to solve one-step equations. Review with them how to solve algebraically by performing the same inverse operation to both sides. Solve the four one-step equation examples using the Review of One-Step Equations warm-up sheet.

Plan for Instruction

1. Now that one-step equations have been reviewed (Grade 6 standard), begin discussing two-step equations (Grade 7 standard). Present students with the following scenario as a think-pair-share activity: Janie and Marcy are going to the arcade. It costs \$5.00 to get into the arcade, and \$2 for each game. If Janie has \$25, how many games can she play? Have students represent the scenario with a 2-step equation ($2x+5=25$) and solve it on their whiteboards.
2. Discuss the scenario and students' equations as a class, incorporating vocabulary when possible (constant, coefficient, variable, etc). Use different manipulatives to represent variables and numbers and a balance scale with pictures to model and solve the equation. Emphasize maintaining balance by applying properties. Make connections

between the concrete, the pictorial, and the symbolic. Have students check the solution using substitution.

3. Complete a few 2-step equation examples with the students and ask them to complete the examples along with you on their whiteboards. Emphasize the algebraic steps with inverse operations and include examples that have negative numbers. Integer operation rules may need to be reviewed. Remind students that solutions can also be checked by using substitution.
4. Ask the students to complete the Practice with Two-Step Equations activity sheet. This can be completed independently or in thoughtfully paired groups.
6. Once the students have a good foundation, turn the focus to practical problems. Ask the students to translate, solve, and check the given the Sample Practical Problems activity sheet.

Pulling It All Together (Reflection)

Discuss the solutions to the Sample Practical Problems Activity sheet. Be sure to discuss different strategies, and ask students to share out their strategies.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Virginia Department of Education 2018

Warm-up Review of One-Step Equations

Solve the following equations using the inverse operation.

$$p + 5 = 12$$

$$3p = 21$$

$$\frac{x}{10} = 60$$

$$22 = x - 7$$

Additional Practice with Two-Step Equations

Directions: Isolate the variable through the inverse operation. Show your work as you solve each equation. Check your work.

$9 + 6x = 27$	$\frac{n}{5} + 6 = 10$
$66 = 8b + 2$	$1 - 11n = 78$
$-143 = 1 - 7.2x$	$2x + \frac{1}{2} = -5$
$\frac{x-7}{-3} = 4$	$\frac{3}{4}x - 5 = 10$

Sample Practical Problems

Name _____ Date _____

Write an equation and solve. Check your solution.

1. The quotient of x and three increased by 10 is 16. What is x ?
2. Six increased by product of x and three is 21. What is x ?
3. Twice x decreased by four is 32. What is x ?
4. The local craft fair charges the vendors a flat rate of \$15 plus \$10 for each hour that they spend at the fair. If the vendor owed \$65, how many hours did he remain at the craft fair?
5. During the fall, you charge \$10 to go to a house and rake the leaves and an additional \$8 for every hour that you rake the yard. If you earned \$42, how many hours did you spend raking the leaves?
6. You spent \$2000 on new furniture. The local furniture store allows you to make a down payment of \$400 and then pay the remaining balance in four equal monthly payments. How much are the monthly payments?
7. A cellphone company charges \$17 plus \$0.25 for each text message sent. The total bill was \$45.50. How many text messages were sent?