2-1 Solving One-Step Equations

Vocabulary

Review

1. Circle the *multiplicative inverse* of $\frac{1}{2}$. Underline the *additive inverse* of $\frac{1}{2}$.

2	1	$\frac{1}{2}$	$-\frac{1}{2}$	-2

2. Circle the *multiplicative inverse* of –3. Underline the *additive inverse* of -3.

3	1	$\frac{1}{3}$	$-\frac{1}{3}$	-3

Vocabulary Builder

isolate (verb) EYE suh layt

Main Idea: To **isolate** a variable in an equation means you get the variable with a coefficient of 1 alone on one side of the equation.

Other Word Forms: isolation (noun), isolated (adjective)

variable *isolated*
$x = 12$

variable NOT *isolated*
$5x = 60$

Use Your Vocabulary

3. Choose the correct form of the word *isolate* to complete each statement.

isolate isolation isolated

A very ill patient was placed in ? , away from the other patients. _____

In order to ? a variable, you may need to perform mathematical operations. _____

A person living on a small island felt ? from the rest of the world. _____

4. Circle the equations that show the variable *isolated*.

$4x + 1 = 13$	$x = 12 - 7$	$\frac{x}{3} = 10$	$\frac{2}{5} = x$

take note

Property Addition and Subtraction Properties of Equality

5. Complete the table.

Property	Algebra	Example
Addition Property of Equality	For any real numbers a, b, and c, if $a = b$, then $a + c = b +$ ____.	$n - 7 = 12$ $n - 7 + 7 = 12 +$ ____
Subtraction Property of Equality	For any real numbers a, b, and c, if $a = b$, then $a - c = b -$ ____.	$n + 8 = 9$ $n + 8 -$ ____ $= 9 -$ ____

Problem 1 Solving an Equation Using Subtraction

Got It? **What is the solution of $y + 2 = -6$? Check your answer.**

6. Underline the correct word to complete each sentence.

The equation $y + 2 = -6$ shows addition / subtraction.

The inverse of that operation is addition / subtraction.

7. Use the justifications to solve the equation.

$y + 2 = -6$	Write the original equation.
$y + 2 -$ ____ $=$ ____ $-$ ____	Subtract 2 from each side.
$y =$ ____	Simplify.

8. Check your answer by substituting it in the original equation for y. Then simplify.

Does ____ $+ 2 = -6$? Yes / No

take note

Property Multiplication and Division Properties of Equality

9. Complete the table.

Property	Algebra	Example
Multiplication Property of Equality	For any real numbers a, b, and c, if $a = b$, then $a \cdot c = b \cdot$ ____.	$\frac{x}{5} = 10$ $\frac{x}{5} \cdot 5 = 10 \cdot$ ____
Division Property of Equality	For any real numbers a, b, and c, such that $c \neq 0$, if $a = b$, then $\frac{a}{c} = \frac{b}{\text{____}}$.	$6x = 30$ $\frac{6x}{6} = \frac{30}{\text{____}}$

Problem 3 Solving an Equation Using Division

Got It? **What is the solution of $10 = 15x$? Check your answer.**

10. The equation is solved below. Write a justification for each step.

$10 = 15x$ _____

$\frac{10}{15} = \frac{15x}{15}$ _____

$\frac{2}{3} = x$ _____

11. Check your answer.

$10 \stackrel{?}{=} 15 \cdot$ ____

$10 =$ ____

Problem 4 Solving an Equation Using Multiplication

Got It? **What is the solution of $19 = \frac{r}{3}$?**

12. Underline the correct word or number to complete the sentence.

To isolate the variable, you should multiply / divide each side of the equation by 3 / 19.

13. When you isolate the variable, you obtain $r =$ ____.

Problem 5 Solving an Equation Using Reciprocals

Got It? **What is the solution of $12 = \frac{3}{4}x$? Check your answer.**

14. To solve the equation, divide / multiply both sides of the equation by the reciprocal of $\frac{3}{4}$.

15. **Multiple Choice** Choose the reciprocal of $\frac{3}{4}$.

(A) $\frac{3}{4}$ (B) $\frac{1}{4}$ (C) $\frac{4}{3}$ (D) 4

16. Use the reciprocal of $\frac{3}{4}$ to solve $12 = \frac{3}{4}x$ for x.

17. Now check your answer. Does $12 = \frac{3}{4} \cdot$ ____ ? Yes / No

Problem 6 Using a One-Step Equation as a Model

Got It? **An online DVD rental company offers gift certificates that you can use to purchase rental plans. You have a gift certificate for $30. The plan you select costs $5 per month. How many months can you purchase with the gift certificate?**

18. Complete the model to solve the problem.

Relate cost per month | times | number of months | is | amount of the gift certificate

Define Let $m =$ _____.

Write $ _____ · _____ = $ _____

19. Solve the equation to find the number of months you can purchase.

Lesson Check • Do you UNDERSTAND?

Vocabulary **Which property of equality would you use to solve $3 + x = -34$? Why?**

20. What operation does the equation $3 + x = -34$ show?

addition | division | multiplication | subtraction

21. Which property of equality would you use to solve $3 + x = -34$? Explain.

_____

_____

Math Success

Check off the vocabulary words that you understand.

☐ equivalent equations ☐ isolate ☐ inverse operations ☐ Addition Property

☐ Subtraction Property ☐ Multiplication Property ☐ Division Property

Rate how well you can *use the properties of equality*.

Need to review 0 2 4 6 8 10 Now I get it!