Solving Linear Equations with Multiplication and Division

Student Name: _____

Class: _____

Due Date: _____

Introduction to Solving Linear Equations

Welcome to this worksheet on solving linear equations with multiplication and division! In this activity, you will learn how to use the multiplication and division properties of equality to solve linear equations. You will also have the opportunity to practice solving a variety of equations and apply your knowledge to real-world problems.

Key Concepts:

- Linear equations and their properties
- Multiplication and division properties of equality
- Real-world applications of linear equations

Section 1: Understanding Linear Equations

A linear equation is a mathematical statement that expresses the equality of two expressions. It can be written in the form of ax = b, where a and b are constants and x is the variable. For example, 2x = 6 is a linear equation.

Exercise 1: Identifying Linear Equations

Identify whether each of the following equations is a linear equation or not.

1. 2x + 3 = 7
2. x^2 + 4 = 9
3. 3x - 2 = 11
4. x/2 + 1 = 3

Section 2: Solving Linear Equations with Multiplication

To solve a linear equation with multiplication, we can use the multiplication property of equality. This property states that if two expressions are equal, then multiplying both expressions by the same value will result in two new expressions that are also equal.

Exercise 2: Solving Linear Equations with Multiplication

Solve each of the following equations using the multiplication property of equality.

1. 2x = 12
2. 4x = 28
3. 5x = 35
4. 3x = 24

Section 3: Solving Linear Equations with Division

To solve a linear equation with division, we can use the division property of equality. This property states that if two expressions are equal, then dividing both expressions by the same value will result in two new expressions that are also equal.

Exercise 3: Solving Linear Equations with Division

Solve each of the following equations using the division property of equality.

1. x/3 = 9
2. x/2 = 7
3. x/5 = 3
4. x/4 = 8

Section 4: Mixed Review

Solve each of the following equations using either the multiplication or division property of equality.

Exercise 4: Mixed Review

1. 2x = 16
2. x/4 = 8
3. 3x = 24
4. x/2 = 9

Section 5: Real-World Applications

Linear equations can be used to model real-world problems. For example, if a book costs $15 and a 10% discount is applied, the new price can be found using the equation 0.9x = 15, where x is the original price.

Exercise 5: Real-World Applications

1. A shirt is on sale for 20% off its original price of $25. What is the sale price?
2. A car travels 250 miles in 5 hours. How many miles does it travel per hour?
3. A bakery sells 250 loaves of bread per day. If each loaf costs $2, how much money does the bakery make in a day?
4. A group of friends want to share some candy equally. If they have 48 pieces of candy and there are 8 friends, how many pieces of candy will each friend get?

Conclusion

Congratulations on completing this worksheet on solving linear equations with multiplication and division! You have learned how to use the multiplication and division properties of equality to solve linear equations and applied your knowledge to real-world problems. Remember to practice regularly to become more confident and proficient in solving linear equations.

Extension Activity:

Research and create a list of 5 real-world problems that can be solved using linear equations. Write a short description of each problem and the equation used to solve it.

Section 6: Word Problems Involving Linear Equations

Word problems involving linear equations require you to use the skills you have learned to solve real-world problems. You will need to read the problem carefully, identify the variables and constants, and then use the appropriate operations to solve for the unknown variable.

Example 1: Solving a Word Problem

Tom has been saving money for a new bike and has $120 in his savings account. He wants to buy a bike that costs $180. If he saves $12 per week, how many weeks will it take him to have enough money to buy the bike?

Solution:

Let x be the number of weeks it will take Tom to save enough money. The equation to represent this situation is 12x + 120 = 180.

Solving for x, we get:

12x = 60

x = 5

Therefore, it will take Tom 5 weeks to save enough money to buy the bike.

Section 7: Graphing Linear Equations

Graphing linear equations is a way to visualize the relationship between the variables. A linear equation can be graphed on a coordinate plane, with the x-axis representing the independent variable and the y-axis representing the dependent variable.

Graphing a Linear Equation

To graph a linear equation, you can use the slope-intercept form, which is y = mx + b, where m is the slope and b is the y-intercept.

Example Graph:

Graph the equation y = 2x + 3.

The slope of this equation is 2, and the y-intercept is 3. To graph the equation, plot the y-intercept (0, 3) and then use the slope to find another point on the line.

Section 8: Systems of Linear Equations

A system of linear equations is a set of two or more linear equations that have the same variables. To solve a system of linear equations, you can use the substitution method or the elimination method.

Solving a System of Linear Equations

Solve the system of equations:

2x + 3y = 7

x - 2y = -3

Solution:

Using the substitution method, we can solve for x in the second equation and then substitute that value into the first equation.

x = -3 + 2y

Substituting this value into the first equation, we get:

2(-3 + 2y) + 3y = 7

Simplifying and solving for y, we get:

y = 1

Substituting this value back into one of the original equations, we can solve for x:

x = -3 + 2(1)

x = -1

Therefore, the solution to the system is x = -1 and y = 1.

Section 9: Review and Practice

Now that you have learned about linear equations, it's time to practice what you have learned. Complete the following exercises to reinforce your understanding of linear equations.

Exercises

Solve each of the following equations:

1. 2x + 5 = 11
2. x - 3 = 7
3. 4x = 28
4. x/2 + 2 = 6

Section 10: Challenge Problems

Now that you have practiced solving linear equations, it's time to try some challenge problems. These problems will require you to use all of the skills you have learned to solve more complex equations.

Challenge Problems

Solve each of the following equations:

1. 2x + 5 = 11
2. x - 3 = 7
3. 4x = 28
4. x/2 + 2 = 6

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