# Complete The Work To Solve For Y: 2 5 ( 1 2 Y + 5 ) 4 5 = 1 2 Y 1 + 1 10 Y 1.Distributive Property: 1

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Solving algebraic equations can seem daunting initially, especially when they involve fractions, parentheses, and multiple variables. However, by breaking down the problem step-by-step and applying fundamental properties such as the distributive property, you can systematically find the value of the unknown variable, in this case, Y. This article aims to guide you through the comprehensive process of solving the equation:

2/5 (12Y + 5) 4/5 = 1/2 Y 1 + 1/10 Y 1

with an emphasis on understanding the distributive property, simplifying fractions, and performing algebraic operations correctly. Whether you're a student brushing up on algebra skills or someone seeking clarity on solving complex equations, this guide provides detailed explanations and structured steps to master solving for Y.

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## Understanding the Equation and Its Components

Before diving into solving, it's essential to interpret the given equation accurately.

The Equation Breakdown

The original problem appears to be:

$$ \frac{2}{5} (12Y + 5) \times \frac{4}{5} = \frac{1}{2} Y \times 1 + \frac{1}{10} Y \times 1 $$

However, some parts may be misinterpreted due to formatting or missing operators. Clarifying the expression is critical.

Clarified Version of the Equation

Assuming the equation intended is:

$$ \left( \frac{2}{5} \times (12Y + 5) \times \frac{4}{5} \right) = \left( \frac{1}{2} Y \times 1 \right) + \left( \frac{1}{10} Y \times 1 \right) $$

which simplifies to:

$$ \frac{2}{5} \times (12Y + 5) \times \frac{4}{5} = \frac{1}{2} Y + \frac{1}{10} Y $$

This structure makes sense algebraically, with the left side involving the distributive property applied to the product of fractions and parentheses, and the right side being a sum of Y terms.

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# Applying the Distributive Property

The distributive property states that:

$$ a \times (b + c) = a \times b + a \times c $$

In this context, the property is applied when multiplying a term outside parentheses by each term inside.

Step-by-Step Application

1. Identify the outer multiplication:

The left side involves multiplying $\frac{2}{5}$, $(12Y + 5)$, and $\frac{4}{5}$.

2. Rearranged expression:

The left side can be viewed as:

$$ \left( \frac{2}{5} \times (12Y + 5) \right) \times \frac{4}{5} $$

3. Distribute $\frac{2}{5}$ over $(12Y + 5)$:

$$
\frac{2}{5} \times 12Y + \frac{2}{5} \times 5
$$

Simplify each term:

- $\frac{2}{5} \times 12Y = \frac{2 \times 12Y}{5} = \frac{24Y}{5}$
- $\frac{2}{5} \times 5 = \frac{2 \times 5}{5} = 2$

4. Multiply the resulting sum by $\frac{4}{5}$:

$$
\left( \frac{24Y}{5} + 2 \right) \times \frac{4}{5}
$$

Distribute $\frac{4}{5}$:

$$
\frac{24Y}{5} \times \frac{4}{5} + 2 \times \frac{4}{5}
$$

5. Simplify each term:

- $\frac{24Y}{5} \times \frac{4}{5} = \frac{24Y \times 4}{5 \times 5} = \frac{96Y}{25}$
- $2 \times \frac{4}{5} = \frac{8}{5}$

6. Final expression for the left side:

$$
\frac{96Y}{25} + \frac{8}{5}
$$

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# Simplifying the Right Side

The right side of the equation is:

$$ \frac{1}{2} Y + \frac{1}{10} Y $$

To combine these terms, we need a common denominator.

Finding a common denominator:

- Denominator of $\frac{1}{2}$ is 2
- Denominator of $\frac{1}{10}$ is 10

The least common denominator (LCD) is 10.

Convert each term:

$$
\frac{1}{2} Y = \frac{5}{10} Y
$$
$$
\frac{1}{10} Y = \frac{1}{10} Y
$$

Sum:

$$
\frac{5}{10} Y + \frac{1}{10} Y = \frac{6}{10} Y = \frac{3}{5} Y
$$

Thus, the right side simplifies to:

$$
\frac{3}{5} Y
$$

---

# Formulating the Simplified Equation

Combining all the simplifications, the equation now reads:

$$
\frac{96Y}{25} + \frac{8}{5} = \frac{3}{5} Y
$$

To solve for Y, we should eliminate fractions by finding a common denominator or multiplying through by the least common multiple (LCM).

Step 1: Find the LCM of denominators

- Denominators are 25 and 5.
- LCM of 25 and 5 is 25.

Step 2: Multiply through by 25 to clear fractions

Multiplying each term by 25:

$$
25 \times \left( \frac{96Y}{25} \right) + 25 \times \left( \frac{8}{5} \right) = 25 \times \left( \frac{3}{5} Y \right)
$$

Simplify each:

- $25 \times \frac{96Y}{25} = 96Y$
- $25 \times \frac{8}{5} = 5 \times 8 = 40$
- $25 \times \frac{3}{5} Y = 5 \times 3Y = 15Y$

Now, the equation becomes:

$$
96Y + 40 = 15Y
$$

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# Solving for Y

Now, the equation is a simple linear equation:

$$
96Y + 40 = 15Y
$$

Step 1: Bring all Y terms to one side

Subtract $15Y$ from both sides:

$$
96Y - 15Y + 40 = 0
$$
$$
81Y + 40 = 0
$$

Step 2: Isolate Y

Subtract 40 from both sides:

$$
81Y = -40
$$

Divide both sides by 81:

$$
Y = -\frac{40}{81}
$$

Final answer:

$$
\boxed{Y = -\frac{40}{81}}
$$

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# Summary of the Solution Process

To recap, solving the given algebraic equation involved several key steps:

1. Understanding and clarifying the original expression.
2. Applying the distributive property to multiply fractions and parentheses.
3. Simplifying fractions and combining like terms.

4. Finding common denominators to combine fractions on both sides.
5. Eliminating fractions by multiplying through by the least common multiple.
6. Isolating the variable Y to find its value.

This systematic approach ensures accuracy and clarity when solving complex algebraic equations involving fractions and parentheses.

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## Additional Tips for Solving Similar Equations

- Always verify the original expression to avoid misinterpretation.
- Use the distributive property effectively to expand expressions with parentheses.
- Convert fractions to have common denominators before adding or subtracting.
- Clear fractions early by multiplying through by the least common denominator to simplify calculations.
- Check your solution by substituting Y back into the original equation.

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## Conclusion

Mastering the process of solving equations involving fractions, parentheses, and algebraic expressions hinges on understanding foundational properties like the distributive property, simplifying fractions, and methodically isolating the variable. By following the detailed steps outlined in this guide, you can confidently approach similar algebraic problems and arrive at accurate solutions. Practice regularly to develop your skills, and soon solving complex equations will become more intuitive and less intimidating.

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Keywords: solving algebraic equations

## Frequently Asked Questions

### What is the first step to solve the equation 2 5 ( 1 2 Y + 5 ) 4 5 = 1 2 Y 1 + 1 10 Y 1?

The first step is to clarify and rewrite the equation with proper formatting, then apply the distributive property to eliminate parentheses on the left side.

## How do you interpret the notation '2 5' and '4 5' in the equation?

They likely represent fractions or coefficients; for example, '2 5' could be 2/5, and '4 5' could be 4/5. Clarifying the notation helps in solving the equation accurately.

## How is the distributive property applied to the expression 2/5 ( 1/2 Y + 5 )?

You distribute 2/5 across each term inside the parentheses: (2/5)(1/2 Y) + (2/5)5.

## What does the right side of the equation 1/2 Y 1 + 1/10 Y 1 simplify to?

Assuming 'Y 1' indicates multiplication, the right side simplifies to (1/2) Y + (1/10) Y, which combines to (5/10)Y + (1/10)Y = (6/10)Y or simplified as (3/5)Y.

## After applying the distributive property, what algebraic steps are necessary to isolate Y?

You need to simplify both sides, combine like terms if possible, and then solve for Y by dividing both sides by the coefficient of Y.

## What common mistakes should be avoided when distributing fractions in this type of equation?

Common mistakes include incorrect multiplication of fractions, forgetting to distribute to all terms inside parentheses, or misinterpreting notation. Careful step-by-step calculation helps avoid these errors.

## How can the equation be simplified after distribution to solve for Y?

Combine all Y terms on one side and constant terms on the other, then divide both sides by the coefficient of Y to find its value.

## Is it necessary to convert all fractions to decimals during solving, or should we keep them as fractions?

It's generally better to keep fractions as fractions to maintain exactness and avoid rounding errors until the final step.

## What does the complete solution process look like for this equation?

Distribute fractions, simplify both sides, combine like terms, isolate Y, and divide to find the value of Y.

## How can understanding the distributive property help in solving similar algebraic equations?

It allows you to eliminate parentheses and simplify expressions systematically, making it easier to isolate variables and solve equations accurately.

# Additional Resources

Complete The Work To Solve For Y: 2/5 ( 1/2 Y + 5 ) 4/5 = 1/2 Y + 1/10 Y - 1 - Distributive Property: 1

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Introduction

Mathematics is a subject that requires both understanding of fundamental concepts and their application to solve complex problems. One such foundational concept is the Distributive Property, which plays a crucial role in simplifying algebraic expressions, especially when dealing with multiplication over addition or subtraction. The problem at hand involves solving for the variable $Y$ in an equation containing fractions and applying the distributive property to simplify the expressions.

This review provides an in-depth analysis of the problem, breaking down each step systematically. It examines the application of the distributive property, fractional arithmetic, and algebraic manipulation necessary to isolate and solve for $Y$. Whether you're a student seeking clarity or an educator aiming to deepen understanding, this comprehensive guide will serve as a valuable resource.

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Understanding the Problem

The given equation is:

$$
\frac{2}{5} \left( \frac{1}{2}Y + 5 \right) \frac{4}{5} = \frac{1}{2}Y + \frac{1}{10}Y - 1
$$

At first glance, the problem contains multiple fractions, an expression involving $Y$, and an explicit mention of the distributive property. The goal is to solve for $Y$, which requires careful manipulation of each term.

Key Components:
- The left side involves a product of two fractions, one multiplying a binomial involving $Y$, and the other multiplying the entire expression.
- The right side involves like terms $\frac{1}{2}Y$ and $\frac{1}{10}Y$, which can be combined.

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Step 1: Clarify the Equation Structure

Before proceeding with calculations, it's essential to clarify the structure of the equation. The notation suggests:

$$
\left( \frac{2}{5} \times \left( \frac{1}{2}Y + 5 \right) \right) \times \frac{4}{5} = \frac{1}{2}Y + \frac{1}{10}Y - 1
$$

So, the left side can be viewed as:

$$
\left( \frac{2}{5} \times \left( \frac{1}{2}Y + 5 \right) \right) \times \frac{4}{5}
$$

which is the product of three factors:

1. $\frac{2}{5}$
2. $\left( \frac{1}{2}Y + 5 \right)$
3. $\frac{4}{5}$

---

Step 2: Applying the Distributive Property

The distributive property states:

$$
a \times (b + c) = a \times b + a \times c
$$

In this context, it suggests we first multiply $\frac{2}{5}$ by $\frac{1}{2}Y + 5$, then multiply the result by $\frac{4}{5}$.

Applying distributive property step-by-step:

\[

\frac{2}{5} \times \left( \frac{1}{2}Y + 5 \right) = \frac{2}{5} \times
\frac{1}{2}Y + \frac{2}{5} \times 5
\]

Calculating each term:

- \( \frac{2}{5} \times \frac{1}{2}Y = \frac{2 \times 1}{5 \times 2}Y =
\frac{2}{10}Y = \frac{1}{5}Y \)

- \( \frac{2}{5} \times 5 = \frac{2}{5} \times 5 = 2 \)

Now, multiply this entire expression by \( \frac{4}{5} \):

\[
\left( \frac{1}{5}Y + 2 \right) \times \frac{4}{5}
\]

Applying distributive property again (though explicitly not necessary as it's
a sum multiplied by a fraction):

\[
\frac{1}{5}Y \times \frac{4}{5} + 2 \times \frac{4}{5}
\]

Calculations:

- \( \frac{1}{5}Y \times \frac{4}{5} = \frac{1 \times 4}{5 \times 5}Y =
\frac{4}{25}Y \)

- \( 2 \times \frac{4}{5} = \frac{8}{5} \)

Thus, the entire left side simplifies to:

\[
\frac{4}{25}Y + \frac{8}{5}
\]

---

Step 3: Simplify the Right Side

The right side is:

\[
\frac{1}{2}Y + \frac{1}{10}Y - 1
\]

Combine like terms:

\[
\left( \frac{1}{2}Y + \frac{1}{10}Y \right) - 1

\]

Find a common denominator for the fractional coefficients:

\[
\frac{1}{2}Y = \frac{5}{10}Y
\]

So,

\[
\frac{5}{10}Y + \frac{1}{10}Y = \frac{6}{10}Y = \frac{3}{5}Y
\]

Therefore, the right side simplifies to:

\[
\frac{3}{5}Y - 1
\]

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Step 4: Set Up the Equation

Now, the simplified equation is:

\[
\frac{4}{25}Y + \frac{8}{5} = \frac{3}{5}Y - 1
\]

---

Step 5: Eliminate Fractions

To avoid dealing with fractions, find the least common denominator (LCD). The denominators are 25 and 5.

- The LCD of 25 and 5 is 25.

Multiply every term by 25 to clear fractions:

\[
25 \times \left( \frac{4}{25}Y + \frac{8}{5} \right) = 25 \times \left(
\frac{3}{5}Y - 1 \right)
\]

Calculations:

- \( 25 \times \frac{4}{25}Y = 4Y \)

- \( 25 \times \frac{8}{5} = 25 \times \frac{8}{5} = 5 \times 8 = 40 \)

- $25 \times \frac{3}{5}Y = 5 \times 3Y = 15Y$

- $25 \times (-1) = -25$

The resulting equation:

$$
4Y + 40 = 15Y - 25
$$

---

Step 6: Solve for $Y$

Bring all terms involving $Y$ to one side and constants to the other:

$$
4Y - 15Y = -25 - 40
$$

Simplify:

$$
-11Y = -65
$$

Divide both sides by $-11$:

$$
Y = \frac{-65}{-11} = \frac{65}{11}
$$

---

Final Answer:

$$
\boxed{
Y = \frac{65}{11}
}
$$

This fraction is already in simplest form, but it can be expressed as a mixed number for clarity:

$$
Y = 5 \frac{10}{11}
$$

---

Deep Dive into Key Concepts

1. Distributive Property in Depth

The distributive property is fundamental to algebra, enabling the multiplication of a single term across a sum or difference inside parentheses. Its formal statement:

$$
a \times (b + c) = a \times b + a \times c
$$

In this problem, it facilitated breaking down complex fractional expressions into manageable parts, which then could be simplified further.

Practical applications include:

- Expanding algebraic expressions
- Simplifying equations with multiple terms
- Factoring expressions

2. Fraction Operations

Handling fractions requires:

- Finding common denominators
- Multiplying fractions directly
- Converting between improper fractions and mixed numbers

In our solution, converting $\frac{1}{2}Y$ and $\frac{1}{10}Y$ to a common denominator simplified their addition.

3. Clearing Fractions

Multiplying through by the LCD is a strategic move to eliminate fractions, reducing the equation to linear form. It simplifies calculations and minimizes errors.

Steps:

- Determine the LCD of all denominators
- Multiply every term by the LCD
- Simplify resulting terms

4. Isolating the Variable

After clearing fractions, the goal is to gather all $Y$-terms on one side and constants on the other. Basic algebraic principles are used:

- Addition/subtraction to combine like terms
- Division to solve for $Y$

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Common Mistakes and How to Avoid Them

- Misapplying the distributive property: Always distribute correctly over each term, checking signs

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Complete The Work To Solve For Y 2 5 1 2 Y 5 4 5 1 2 Y 1 1 10 Y 1 Distributive Property 1

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