

How Many Is This $2(9 - 7r) + 8r$

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Understanding algebraic expressions is fundamental to mastering mathematics, especially when it involves simplifying expressions, solving for variables, or evaluating the expressions for specific values. The expression $2(9 - 7r) + 8r$ is a linear algebraic expression that combines constants and variables, specifically the variable r . To interpret and analyze this expression thoroughly, we need to understand how to expand, simplify, and evaluate it. This article delves into the steps involved in simplifying such an expression, explores its components, and provides a comprehensive explanation suitable for learners at various levels.

Breaking Down the Expression

Understanding the Components

The given expression is:

```
```plaintext
2(9 - 7r) + 8r
```
```

At first glance, it appears to be a combination of a product and a sum involving the variable r . The expression consists of:

- A multiplication: 2 times the binomial $(9 - 7r)$
- An addition: $+ 8r$

The goal is to simplify this expression to a form that clearly shows its dependence on r or to evaluate it for specific values of r .

Why Simplify Algebraic Expressions?

Simplification provides several benefits:

- Clarity: It presents the expression in a straightforward form.
- Ease of evaluation: Simplified expressions are easier to compute for specific values.
- Preparation for solving equations: Simplified forms are essential when solving for variables.
- Understanding relationships: It helps in analyzing how the expression behaves as r varies.

Step-by-Step Simplification of the Expression

Step 1: Distribute the 2 across the parentheses

Distributive property states that:

```
```plaintext
a(b + c) = a b + a c
```
```

Applying this to our expression:

```
```plaintext
2(9 - 7r) = 2 9 - 2 7r = 18 - 14r
```
```

Step 2: Rewrite the expression with the distributed terms

Now, the original expression becomes:

```
```plaintext
18 - 14r + 8r
```
```

Step 3: Combine like terms

The terms involving r are $-14r$ and $+8r$. Combining these:

```
```plaintext
-14r + 8r = -6r
```
```

Now, the simplified expression is:

```
```plaintext
18 - 6r
```
```

Final Simplified Form

The original expression $2(9 - 7r) + 8r$ simplifies to:

```
```plaintext
18 - 6r
```
```

This linear expression clearly shows how the value depends on r .

Evaluating the Expression for Specific Values of r

Once simplified, evaluating the expression becomes straightforward. For any given r , substitute the value into the simplified form:

```
```plaintext
18 - 6r
```
```

Example Calculations

- $r = 0$: $18 - 6(0) = 18 - 0 = 18$
- $r = 1$: $18 - 6(1) = 18 - 6 = 12$
- $r = 2$: $18 - 6(2) = 18 - 12 = 6$
- $r = -1$: $18 - 6(-1) = 18 + 6 = 24$

These calculations demonstrate how the value of r influences the overall value of the expression.

Graphical Interpretation of the Expression

The Graph of $y = 18 - 6r$

The simplified expression $18 - 6r$ can be viewed as a linear function:

- Slope: -6 (indicates the rate at which the value decreases as r increases)
- Y-intercept: 18 (the value of the expression when $r = 0$)

Plotting this line on a coordinate plane provides visual insight into how r affects the value of the expression.

Key features of the graph:

- It is a straight line
- The slope is negative, indicating an inverse relationship
- The line crosses the y -axis at 18

Applications and Contexts of the Expression

Understanding such an expression is not just an academic exercise; it has practical applications in various fields:

1. Economics

- Cost functions: where r could represent units produced, and the expression models total cost or profit.

2. Physics

- Speed or velocity models: where r could symbolize time or distance.

3. Business and Finance

- Forecasting and trend analysis, where r might represent growth rates or other variables.

4. Algebraic problem-solving

- As a foundation for solving more complex equations and modeling real-world scenarios.

Practice Problems

To solidify understanding, consider the following practice exercises:

1. Evaluate $2(9 - 7r) + 8r$ when $r = 3$.

2. Simplify the expression $3(4 + 5r) - 2r$.

3. Find the value of r when the expression $18 - 6r = 0$.

4. Graph the simplified expression $18 - 6r$ and interpret its slope and intercepts.

Summary and Key Takeaways

- The original expression $2(9 - 7r) + 8r$ can be simplified using the distributive property and combining like terms.
- The simplified form $18 - 6r$ clearly shows the linear relationship between the expression and the variable r .
- Evaluating the expression involves substituting specific values of r into the simplified form, making calculations easier.
- Graphing the expression provides visual insights into the relationship and helps interpret the influence of r on the overall value.
- Such algebraic expressions are foundational in many practical applications across disciplines.

In conclusion, understanding how to manipulate and interpret algebraic expressions like $2(9 - 7r) + 8r$ is essential for developing strong mathematical skills and applying them effectively in real-world situations. Simplification not only streamlines calculations but also enhances comprehension of the relationships between variables.

Frequently Asked Questions

What is the simplified form of the expression $2(9 - 7r) + 8r$?

First, distribute 2 inside the parentheses: $2 \cdot 9 = 18$ and $2 \cdot (-7r) = -14r$. Then, add $8r$: $18 - 14r + 8r = 18 - 6r$. So, the simplified form is $18 - 6r$.

How do I evaluate $2(9 - 7r) + 8r$ when $r = 2$?

Substitute $r = 2$ into the expression: $2(9 - 7 \cdot 2) + 8 \cdot 2 = 2(9 - 14) + 16 = 2(-5) + 16 = -10 + 16 = 6$.

What is the value of $2(9 - 7r) + 8r$ when $r = 0$?

Substitute $r = 0$: $2(9 - 7 \cdot 0) + 8 \cdot 0 = 2(9 - 0) + 0 = 18 + 0 = 18$.

How can I factor the expression $2(9 - 7r) + 8r$?

First, simplify to $18 - 14r + 8r = 18 - 6r$. The factored form is $6(3 - r)$.

What is the coefficient of r in the simplified form of the expression?

The simplified form is $18 - 6r$, so the coefficient of r is -6 .

How does the value of the expression change as r increases?

Since the expression is $18 - 6r$, it decreases by 6 units for each increase of 1 in r .

Is the expression $2(9 - 7r) + 8r$ linear?

Yes, after simplification, it becomes $18 - 6r$, which is a linear expression in r .

What is the domain of the expression $2(9 - 7r) + 8r$?

Since the expression is defined for all real numbers r , its domain is all real numbers, $(-\infty, \infty)$.

How do I find the value of r when the expression equals zero?

Set the simplified expression $18 - 6r$ equal to zero: $18 - 6r = 0$. Solve for r : $6r = 18$, so $r = 3$.

Can this expression be used to model any real-world situation?

Yes, if the relationship between variables can be represented by a linear function similar to $18 - 6r$, this expression can model such situations.

Additional Resources

How Many Is This $2(9 - 7r) + 8r$: A Comprehensive Breakdown and Step-by-Step Guide

In the world of algebra, expressions like "How many is this $2(9 - 7r) + 8r$ " often appear as foundational concepts for students and enthusiasts alike. Understanding how to simplify such expressions not only helps in solving equations but also builds a strong mathematical intuition. This guide aims to walk you through the intricacies of this specific expression, breaking it down into manageable steps, and providing clarity on the process involved in simplifying algebraic expressions. Whether you're a student preparing for exams or a curious learner, this detailed analysis will enhance your grasp of algebraic manipulation.

Understanding the Expression

Before diving into calculations, it's crucial to understand what the expression " $2(9 - 7r) + 8r$ " entails.

- The expression contains:
 - A multiplication operation involving a binomial $(9 - 7r)$ multiplied by 2.
 - An additional term $8r$.
- The variable r is assumed to be a real number, and the goal is to simplify the entire expression to its simplest form, preferably in terms of r .

Why Simplify Algebraic Expressions?

Simplification helps in:

- Reducing complexity for easier interpretation.
- Solving equations by isolating variables.
- Comparing expressions more effectively.
- Preparing for further calculations like derivatives, integrals, or solving for specific values.

Step-by-Step Breakdown of " $2(9 - 7r) + 8r$ "

Let's now examine each part of the expression thoroughly.

Step 1: Distribute the 2 across the parentheses

The distributive property states that:

For any numbers or expressions a , b , and c :

$$a(b + c) = ab + ac$$

Applying this to $2(9 - 7r)$:

- Multiply 2 by 9:
 $2 \cdot 9 = 18$
- Multiply 2 by $-7r$:
 $2 \cdot (-7r) = -14r$

Therefore, $2(9 - 7r)$ simplifies to:

$$18 - 14r$$

Step 2: Rewrite the expression

Replacing $2(9 - 7r)$ with its simplified form, the original expression becomes:

$$18 - 14r + 8r$$

Step 3: Combine like terms

Notice that $-14r$ and $8r$ are like terms (both contain r). Combining them:

$$-14r + 8r = -6r$$

Thus, the entire simplified expression is:

$$18 - 6r$$

Final Simplified Expression

The algebraic expression " $2(9 - 7r) + 8r$ " simplifies to:

$$18 - 6r$$

Interpreting the Simplified Expression

What does " $18 - 6r$ " tell us?

- It's a linear expression in r .
- The coefficient -6 indicates the rate at which the expression decreases as r increases.
- The constant term 18 is the value of the expression when $r = 0$.

Possible Uses of the Simplified Expression

- Evaluating for specific values of r :
- For example, if $r = 2$, then:
 $18 - 6(2) = 18 - 12 = 6$
- Graphing:
- This expression can be plotted as a straight line with a slope of -6 and a y -intercept of 18 .
- Setting equal to another expression:
- Useful in solving equations or inequalities involving r .

Practical Applications and Examples

Example 1: Find the value of r when the expression equals zero

Set the simplified expression equal to zero:

$$18 - 6r = 0$$

Solve for r :

- Subtract 18 from both sides:

$$-6r = -18$$

- Divide both sides by -6 :

$$r = (-18) / (-6) = 3$$

Answer: When $r = 3$, the original expression equals zero.

Example 2: Graph the expression with respect to r

- Equation: $y = 18 - 6r$
- Slope: -6
- Y -intercept: $(0, 18)$

Plotting this line will give visual intuition about how r affects the value of the expression.

Example 3: Find the value of the expression for $r = -2$

Substitute $r = -2$:

$$18 - 6(-2) = 18 + 12 = 30$$

This shows that at $r = -2$, the expression evaluates to 30.

Common Mistakes and Tips

- Forgetting to distribute: Always remember to distribute multiplication over parentheses.
- Mixing like terms: Ensure that you combine only like terms (terms with the same variables and exponents).
- Sign errors: Pay attention to negative signs during distribution and combination.
- Variable assumptions: Remember that r can be any real number unless specified otherwise.

Summary and Key Takeaways

- The expression $2(9 - 7r) + 8r$ simplifies to $18 - 6r$ after applying the distributive property and combining like terms.
- Understanding the step-by-step process of distribution and combination enhances algebraic fluency.
- The simplified form makes it easier to evaluate, graph, or solve for specific values of r .
- This process exemplifies fundamental algebra skills that serve as building blocks for more complex mathematics.

Final Thoughts

Mastering the simplification of expressions like $2(9 - 7r) + 8r$ is essential for progressing in algebra and higher mathematics. By systematically distributing, combining like terms, and interpreting the result, learners develop a solid foundation for tackling more challenging problems. Remember, practice makes perfect—so take time to work through various similar expressions to build confidence and proficiency.

If you're interested in further exploring algebraic expressions or have specific questions, feel free to reach out or consult additional resources for practice problems and explanations.

[How Many Is This \$2\(9 - 7r\) + 8r\$](#)

How Many Is This $2(9 - 7r) + 8r$

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