# \Six Times A Larger Number Is Equal To The Sum Of A Smaller Number And 18. The Difference Of Twice The

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Understanding algebraic expressions and equations is fundamental to solving many mathematical problems. One common type involves relationships between two numbers where multiples, sums, and differences are involved. A typical problem states: "Six times a larger number is equal to the sum of a smaller number and 18," and further explores the difference of twice one of these numbers. This article delves into such problems, guiding you through their meaning, methods of solving, and practical applications.

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## Understanding the Problem Statement

Before jumping into solving the problem, it's essential to interpret what it means.

### Breaking Down the Statement

The phrase "Six times a larger number is equal to the sum of a smaller number and 18" indicates:

- There are two numbers involved: a larger number and a smaller number.
- The larger number, when multiplied by six, equals the sum of the smaller number plus 18.

Further, the phrase "The difference of twice the" hints at an additional relationship involving twice a number, likely the larger or smaller number.

### Clarifying the Variables

Let's denote:

- The smaller number as x.
- The larger number as y.

The problem suggests y > x, though this inequality will be confirmed or used during solving.

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# Formulating the Mathematical Equations

Based on the problem statement, we can formulate the key equations.

## Primary Equation

"Six times a larger number is equal to the sum of a smaller number and 18" translates to:

$$ 6y = x + 18 $$

Alternatively, solving for x:

$$ x = 6y - 18 $$

## Additional Relationship: The Difference of Twice the Number

The phrase "The difference of twice the" is incomplete but suggests an expression like "the difference of twice the larger number and some other value," or "the difference of twice the smaller number and some value."

A common interpretation in similar problems is:

- "The difference of twice the larger number and the smaller number" or
- "The difference of twice the smaller number and the larger number."

For the purposes of this article, let's explore both possibilities.

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# Exploring Different Scenarios

Scenario 1: Difference of Twice the Larger Number and the Smaller Number

Here, the phrase "the difference of twice the larger number and the smaller number" can be written as:

$$ 2y - x $$

Scenario 2: Difference of Twice the Smaller Number and the Larger Number

Alternatively:

$$ 2x - y $$

Each scenario can lead to different equations and solutions.

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## Solving the Equations Step-by-Step

Let's analyze both scenarios separately.

### Scenario 1: 2y - x

Given $x = 6y - 18$, substitute into $2y - x$:

$$
2y - (6y - 18) = 2y - 6y + 18 = -4y + 18
$$

The value of this expression depends on $y$, which we can find by establishing additional conditions or constraints.

Suppose the problem states that this difference equals a specific number, say k. Without a specific value, we can analyze how the difference varies with $y$.

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### Scenario 2: 2x - y

Express $x$ in terms of $y$:

$$
x = 6y - 18
$$

Calculate $2x - y$:

$$
2(6y - 18) - y = 12y - 36 - y = 11y - 36
$$

\]

Again, without a specific value, this expression depends on $y$. To find particular solutions, additional information or constraints are needed.

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# Finding Specific Solutions

Suppose the problem states: "Find the values of the numbers when the difference of twice the larger number and the smaller number is 10."

Using Scenario 1:

$$
2y - x = 10
$$

Substitute $x = 6y - 18$:

$$
2y - (6y - 18) = 10
$$
$$
2y - 6y + 18 = 10
$$
$$
-4y + 18 = 10
$$
$$
-4y = -8
$$
$$
y = 2
$$

Now, find $x$:

$$
x = 6(2) - 18 = 12 - 18 = -6
$$

Solution:

- Larger number $y = 2$
- Smaller number $x = -6$

Check the original statement:

\[
6 \times 2 = -6 + 18
\]
\[
12 = 12
\]

The condition holds. So, these are valid solutions.

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# Analyzing Different Values and Conditions

By changing the value of the difference (e.g., 15, 20, etc.), you can find different pairs of \( x \) and \( y \).

Example: Difference equals 20

\[
2y - x = 20
\]

Substitute \( x = 6y - 18 \):

\[
2y - (6y - 18) = 20
\]
\[
2y - 6y + 18 = 20
\]
\[
-4y + 18 = 20
\]
\[
-4y = 2
\]
\[
y = -\frac{1}{2}
\]

Calculate \( x \):

\[
x= 6(-\frac{1}{2}) - 18 = -3 - 18 = -21
\]

Check:

\[

6 \times -\frac{1}{2} = -21 + 18
\]
\[
-3 = -3
\]

Condition holds. Larger number \( y = -\frac{1}{2} \), smaller number \( x = -21 \).

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## Applications and Importance of Such Problems

Problems involving relationships between multiple variables, such as the ones we've explored, are common in algebra, physics, economics, and engineering.

Key applications include:

- Solving for unknown quantities based on given ratios or differences.
- Modeling real-world scenarios where relationships involve multiples and sums.
- Developing problem-solving skills critical for advanced mathematics and science.

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## Tips for Solving Similar Algebraic Problems

To effectively approach problems like "Six times a larger number is equal to the sum of a smaller number and 18," consider the following tips:

- Clearly define variables to represent unknown quantities.
- Translate word problems into algebraic equations accurately.
- Identify all relationships and constraints provided.
- Solve equations systematically, substituting known expressions.
- Check your solutions by substituting back into the original conditions.

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# Summary and Final Thoughts

Understanding how to interpret and solve problems involving multiple relationships between two numbers is essential in algebra. The problem "Six times a larger number is equal to the sum of a smaller number and 18" demonstrates the process of translating words into equations, solving for variables, and checking solutions.

By exploring different scenarios—such as calculating the difference of twice the larger or smaller number—you can develop a flexible approach to similar problems. Remember, the key to mastering such problems lies in careful variable definition, systematic solution steps, and validating your answers.

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# Further Practice Problems

To reinforce your understanding, try solving these problems:

1. Find two numbers where six times the larger equals the sum of the smaller and 18, and the difference of twice the larger number and the smaller is 10.

2. If the larger number is 5 more than twice the smaller, and six times the larger equals the sum of the smaller and 18, find both numbers.

3. Determine two numbers where the sum of six times the larger and twice the smaller is 40, and the larger is three times the smaller.

Practicing such problems will enhance your algebraic reasoning and problem-solving skills, paving the way for success in mathematics and related fields.

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In conclusion, understanding and solving problems involving relationships like "Six times a larger number is equal to the sum of a smaller number and 18" require careful interpretation, formulation of equations, and systematic solutions. With practice, you'll be able to tackle similar problems confidently and efficiently.

# Frequently Asked Questions

## What is the algebraic expression for the statement 'Six times a larger number is equal to the sum of a smaller number and 18'?

If we let the smaller number be x and the larger number be y, then the equation is 6y = x + 18.

## How can we find the values of x and y from the given statement?

By setting up equations based on the statement and solving simultaneously, for example: 6y = x + 18, and additional information about the difference of twice the numbers.

## What does 'The difference of twice the' refer to in this context?

It likely refers to the difference between twice one of the numbers, for example, 2y - 2x or 2x - 2y, depending on the problem's specifics.

## How can the phrase 'The difference of twice the' be used to form an equation?

It can be translated into an equation like 2y - 2x = some value or 2x - 2y = some value, which can then be combined with the original equation to solve for the numbers.

## What steps should be taken to solve for the larger and smaller numbers in this problem?

First, write down the equations based on the given statements, then substitute or eliminate variables to solve for one number, and finally find the other. For example, use 6y = x + 18 and the difference equation to find x and y.

# Additional Resources

Six Times A Larger Number Is Equal To The Sum Of A Smaller Number And 18. The Difference Of Twice The – this intriguing statement hints at a classic algebraic problem that combines multiplication, addition, and subtraction to find unknown values. Whether you're a student brushing up on algebra or simply someone interested in mathematical reasoning, understanding how to interpret and solve such problems is essential. This article provides a comprehensive guide, breaking down the problem step-by-step, exploring various methods, and offering practical tips to master similar algebraic puzzles.

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Understanding the Problem

Before diving into the solution, it’s important to carefully interpret what the statement means. The phrase “Six Times A Larger Number Is Equal To The Sum Of A Smaller Number And 18” suggests a relationship involving two unknowns: a larger number and a smaller number. The latter part, “The Difference Of Twice The”, indicates an additional layer involving the difference of some value doubled, which might be a continuation or a related part of the problem.

Breaking Down the Statement

Let’s parse the problem into manageable parts:

- "Six times a larger number" indicates the larger number multiplied by 6.
- "Is equal to the sum of a smaller number and 18" suggests a simple equation where the larger multiple equals the sum of the smaller number and 18.
- "The difference of twice the" appears incomplete but hints at a subsequent related expression involving the difference of two quantities, possibly involving twice some number.

For clarity, it’s best to focus first on the core part of the problem, which is:

> Six times a larger number = the sum of a smaller number and 18.

This can be expressed algebraically as:

$6 L = S + 18$

where:

- $L$ = larger number
- $S$ = smaller number

The phrase "The Difference Of Twice The" suggests that there's a second related part involving the difference of two quantities doubled, which might be used to find the relationship between $L$ and $S$ or to solve for these variables.

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Setting Up the Algebraic Equations

Given the initial statement, the first step is to translate the words into algebraic expressions:

Step 1: Define Variables

- Let L = larger number
- Let S = smaller number

Step 2: Write the Main Equation

From "Six times a larger number is equal to the sum of a smaller number and 18," we get:

$6L = S + 18$

This is our primary equation.

Step 3: Incorporate the Second Part

The phrase "The Difference Of Twice The" is incomplete but suggests a second equation involving the difference of two quantities doubled.

Suppose it refers to the difference between the larger and smaller number, doubled, which is a common pattern in such problems. Then, it could be expressed as:

$2(L - S)$

This might relate to another value, such as a given number or an expression that equals some value.

For a comprehensive understanding, let's assume the second part of the problem states:

> The difference between the larger and smaller number, doubled, equals 10.

Expressed as:

$2(L - S) = 10$

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Solving the System of Equations

Now, with these two equations, we can proceed to find the values of L and S.

Equations Summary:

1. $6L = S + 18$
2. $2(L - S) = 10$

Step 1: Simplify the Second Equation

Divide both sides by 2:

$L - S = 5$

Step 2: Express S in terms of L

From L - S = 5, we get:

$S = L - 5$

Step 3: Substitute into the First Equation

Recall $6L = S + 18$, substitute $S = L - 5$:

$$6L = (L - 5) + 18$$

Simplify:

$$6L = L - 5 + 18$$

$$6L = L + 13$$

Step 4: Solve for L

Bring all terms to one side:

$$6L - L = 13$$

$$5L = 13$$

Divide both sides by 5:

$$L = 13/5 = 2.6$$

Step 5: Find S

Using $S = L - 5$:

$$S = 2.6 - 5 = -2.4$$

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Interpreting the Results

The solutions are:

- $L = 2.6$
- $S = -2.4$

These values satisfy the equations derived from the problem, assuming the second part of the problem pertains to the difference between the numbers doubled being 10.

Note: The negative value for S indicates that in some contexts, smaller numbers can be negative, especially in algebraic scenarios. If the problem requires positive integers, then this solution might suggest a different interpretation or additional constraints.

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Practical Application and Variations

1. Handling Different Conditions

Depending on additional constraints (e.g., both numbers are positive integers), the problem might have no solution or require reinterpreting the initial assumptions.

2. Adjusting the Second Part

If the phrase "The Difference Of Twice The" refers to a different value or involves more complex relationships, you can modify the second equation accordingly. For example:

- If the difference doubled is 20, then: $2(L - S) = 20$
- If it involves other operations or constants, set up the equations accordingly.

3. Solving Similar Problems

This type of problem exemplifies how to:

- Translate word problems into equations
- Use substitution and elimination methods
- Interpret solutions within context

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Tips for Solving Algebraic Word Problems

- Read carefully: Identify all variables and relationships.
- Define variables: Assign symbols to unknown quantities.
- Translate words into equations: Be precise to avoid misinterpretation.
- Simplify step-by-step: Work systematically to avoid errors.
- Check solutions: Substitute back into original equations.
- Consider context: Think about whether solutions make sense (positive, integer, etc.).

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Conclusion

Understanding the statement "Six Times A Larger Number Is Equal To The Sum Of A Smaller Number And 18. The Difference Of Twice The" involves breaking down the problem into algebraic expressions, setting up equations, and solving systematically. While the initial interpretation may vary based on context,

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the core principles remain the same: define variables, translate words into
algebra, and solve using substitution or elimination.

Mastering such problems enhances critical thinking and problem-solving
skills, vital in mathematics and beyond. With practice, you'll be able to
approach similar puzzles confidently, whether in academic settings or real-
world scenarios involving quantitative reasoning.

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Remember: Always verify your solutions and consider the context of the
problem to ensure they make sense logically and mathematically.
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