

21 Less Than Three-fifths Of A Number

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Understanding mathematical expressions and their real-world applications is essential for students, educators, and professionals alike. One such expression that often appears in algebra and problem-solving contexts is "21 less than three-fifths of a number." This phrase encapsulates a simple yet crucial concept: calculating a fraction of a number and then adjusting that value by subtracting a specific amount. In this comprehensive guide, we will explore what "21 less than three-fifths of a number" means, how to interpret and evaluate it, and its applications in various scenarios.

Deciphering the Phrase: "21 Less Than Three-Fifths Of A Number"

The phrase "21 less than three-fifths of a number" can seem complex at first glance, but breaking it down helps clarify its meaning and how to approach it mathematically.

Understanding the Components

- Three-fifths of a number: This refers to multiplying the unknown number by the fraction $\frac{3}{5}$.
- Less than: Indicates subtraction; you're subtracting a certain amount (in this case 21) from the previous quantity.

Interpreting the Phrase

Putting it together:

- First, find three-fifths of a number, which is $(\frac{3}{5}) \times n$, where n is the unknown number.
- Then, subtract 21 from this value to get the final expression.

Mathematically, this can be written as:

$$(\frac{3}{5}) \times n - 21$$

This expression represents "21 less than three-fifths of a number."

Mathematical Representation and Formulation

To solve problems involving "21 less than three-fifths of a number," it's important to understand how to formulate the expression and set up equations.

Expressing the Phrase as an Algebraic Equation

Suppose the unknown number is n . Then,

Expression: $(3/5) \times n - 21$

If a problem states that this expression equals some value or asks for the value of n , you can set up an equation accordingly.

Example:

If "21 less than three-fifths of a number is 39," then:

$$(3/5) \times n - 21 = 39$$

You can then solve for n .

General Form

In general, the phrase can be represented as:

$$(3/5) \times n - 21 = ?$$

where $?$ is the known total or value provided in the problem.

Solving Problems Involving "21 Less Than Three-fifths Of A Number"

Let's explore the step-by-step approach to solving such problems, including solving for the unknown number.

Step 1: Translate the Phrase into an Equation

Identify the components:

- The fraction part: $(3/5) \times n$
- The subtraction: minus 21
- The total value (if provided)

Example:

"Find the number if 21 less than three-fifths of it is 39."

Translate to:

$$(3/5) \times n - 21 = 39$$

Step 2: Isolate the Variable

Add 21 to both sides:

$$(3/5) \times n = 39 + 21$$

Simplify:

$$(3/5) \times n = 60$$

Step 3: Solve for n

Multiply both sides by the reciprocal of $3/5$, which is $5/3$:

$$n = 60 \times (5/3)$$

Calculate:

$$n = 60 \times 5/3$$

$$n = (60 \div 3) \times 5$$

$$n = 20 \times 5$$

$$n = 100$$

Answer: The original number is 100.

Summary of Steps

1. Translate the phrase into an algebraic equation.
2. Isolate the term with the variable.
3. Perform inverse operations to solve for the variable.
4. Verify the solution by substituting back into the original expression.

Practical Applications and Examples

Understanding and calculating "21 less than three-fifths of a number" has practical implications in various fields, including finance, engineering, and everyday problem-solving.

Example 1: Budget Adjustment

Suppose a company allocates a budget based on a certain total, but then reduces a fraction of this budget by 21 units for specific expenses.

- Scenario: The allocated budget is three-fifths of the total revenue n .
- Adjustment: The company spends 21 less than this fraction.

If the remaining budget after adjustment is 39 units, find the total revenue n .

Solution:

Equation:

$$\left(\frac{3}{5}\right) \times n - 21 = 39$$

Following the steps outlined earlier, the total revenue n is 100 units.

Example 2: Student Test Scores

A student scores a certain fraction of the total marks, which is three-fifths of their potential, but loses 21 marks due to penalties.

- If after penalties, their score is 39, find their maximum potential score.

Solution:

Equation:

$$(3/5) \times n - 21 = 39$$

Solve for n:

$$n = 100$$

The student's maximum potential score is 100 marks.

Additional Concepts Related to the Phrase

Understanding related concepts enhances comprehension and problem-solving abilities.

Understanding Fractions of a Number

Calculating a fraction of a number involves multiplication:

- To find k-fifths of a number n, compute $(k/5) \times n$.

Subtracting a Constant from a Fraction

This operation often appears in problems involving discounts, adjustments, or penalties.

Solving Linear Equations

Most problems reduce to solving a linear equation of the form:

$$(k/5) \times n + c = \text{value}$$

where c is a constant, positive or negative.

Practice Problems for Mastery

Engaging with practice problems helps solidify understanding.

1. Find the number if 21 less than two-fifths of it is 29.
2. If three-fifths of a number minus 21 equals 0, what is the number?
3. A number's three-fifths part, reduced by 21, equals 39. Find the number.
4. Determine the number if 21 less than four-fifths of it is 57.
5. If the three-fifths of a number minus 21 equals 18, find that number.

Solutions:

1. $(\frac{2}{5}) \times n - 21 = 29 \rightarrow (\frac{2}{5}) \times n = 50 \rightarrow n = 50 \times (\frac{5}{2}) = 125$
2. $(\frac{3}{5}) \times n - 21 = 0 \rightarrow (\frac{3}{5}) \times n = 21 \rightarrow n = 21 \times (\frac{5}{3}) = 35$
3. Same as the original example; $n = 100$.
4. $(\frac{4}{5}) \times n - 21 = 57 \rightarrow (\frac{4}{5}) \times n = 78 \rightarrow n = 78 \times (\frac{5}{4}) = 97.5$
5. $(\frac{3}{5}) \times n - 21 = 18 \rightarrow (\frac{3}{5}) \times n = 39 \rightarrow n = 39 \times (\frac{5}{3}) = 65$

Conclusion

"21 less than three-fifths of a number" is a fundamental expression involving fractions, subtraction, and solving linear equations. Mastering how to interpret and manipulate such expressions enhances problem-solving skills in mathematics and real-life applications. Whether tackling algebraic problems, financial calculations, or practical scenarios, understanding this concept provides a solid foundation for further mathematical learning.

By practicing translating words into equations, performing inverse operations, and verifying solutions, learners can confidently approach similar problems. Remember, breaking down complex phrases into manageable components is key to effective problem-solving and mathematical literacy.

Meta description: Learn how to interpret and solve "21 less than three-fifths of a number" with step-by-step explanations, practical examples, and practice problems for mastery.

Frequently Asked Questions

What does '21 Less Than Three-fifths Of a Number' mean in mathematical terms?

It means you take three-fifths of a number and then subtract 21 from that result.

How do you express '21 Less Than Three-fifths Of a Number' as an algebraic equation?

If the number is x , the expression is $(3/5)x - 21$.

Can you provide an example to illustrate '21 Less Than Three-fifths Of a Number'?

Sure! If $x = 50$, then three-fifths of x is $(3/5)50 = 30$. Subtracting 21 gives $30 - 21 = 9$.

How do you solve for the number if given the value of '21 Less Than Three-fifths Of a Number'?

Set the expression equal to the given value and solve for x : $(3/5)x - 21 = \text{value}$, then add 21 to both sides and multiply both sides by $5/3$.

What is the importance of understanding 'less than' in algebraic expressions?

Understanding 'less than' helps in correctly translating word problems into algebraic equations, enabling accurate solutions.

How can I verify my solution for an equation involving '21 Less Than Three-fifths Of a Number'?

Substitute your solution back into the expression $(3/5)x - 21$ to see if it matches the given or expected value.

Are there common mistakes to avoid when working with expressions like '21 Less Than Three-fifths Of a Number'?

Yes, common mistakes include misinterpreting 'less than' as 'more than,' incorrect algebraic setup, or forgetting to apply the order of operations properly.

What real-world problems can be modeled using '21 Less Than Three-fifths Of a Number'?

Such expressions can model scenarios like calculating remaining quantities after a certain fraction is reduced by a fixed amount, such as discounts, measurements, or resources distribution.

How does understanding fractions like three-fifths help in solving this type of problem?

Understanding fractions allows you to accurately express parts of a whole, which is essential in translating word problems into solvable algebraic equations.

Can '21 Less Than Three-fifths Of a Number' be used in setting up inequalities?

Yes, you can set up inequalities like $(\frac{3}{5})x - 21 > \text{or} < \text{a certain value}$ to model more complex scenarios involving thresholds or limits.

Additional Resources

Understanding "21 Less Than Tree-fifths Of A Number": A Comprehensive Guide

When tackling algebraic expressions and word problems, phrases like "21 less than tree-fifths of a number" can seem confusing at first glance. But with a systematic approach, these types of problems become manageable and often straightforward. In this guide, we'll explore what this phrase means, how to translate it into an algebraic expression, and how to solve such problems step-by-step. Whether you're a student preparing for exams or someone interested in sharpening your mathematical reasoning, this detailed breakdown aims to clarify the concept and provide useful strategies for similar problems.

What Does "21 Less Than Tree-fifths Of A Number" Mean?

Before diving into the math, it's essential to understand the language used in the phrase:

- "Tree-fifths" refers to the fractional part of a number, specifically $(\frac{3}{5})$ of that number.
- "Of a number" indicates that we're working with an unknown quantity, often represented as a variable (say, (x)).
- "21 less than" suggests subtracting 21 from the expression that follows.

In plain English, the phrase means: "Take three-fifths of an unknown number,

then subtract 21 from that amount."

Translating the Phrase into an Algebraic Expression

The key to solving problems like this is to convert the word description into a mathematical expression carefully.

Step-by-Step Translation:

1. Identify the unknown: Let's denote the number as x .
2. Calculate three-fifths of the number: $\frac{3}{5}x$.
3. Subtract 21 from this value: $\frac{3}{5}x - 21$.

Therefore, the phrase "21 less than three-fifths of a number" can be expressed algebraically as:

$$\boxed{\frac{3}{5}x - 21}$$

How to Set Up Equations

Once you've translated the phrase into an algebraic expression, the next step is to understand what the problem asks for. Usually, such problems involve setting this expression equal to a number or another expression.

Common scenarios include:

- Given the value of the expression, find x .
- The expression equals a certain number, and you solve for x .

Example:

"If 21 less than three-fifths of a number is 12, find the number."

This translates to:

$$\frac{3}{5}x - 21 = 12$$

Solving the Equation Step-by-Step

Let's walk through solving such an equation with a concrete example.

Example Problem:

"If 21 less than three-fifths of a number is 12, find the number."

Step 1: Write the equation

$$\left[\frac{3}{5}x - 21 = 12 \right]$$

Step 2: Isolate the fractional term

Add 21 to both sides:

$$\left[\frac{3}{5}x = 12 + 21 \right]$$

$$\left[\frac{3}{5}x = 33 \right]$$

Step 3: Eliminate the fraction

Multiply both sides by 5 to clear the denominator:

$$\left[5 \times \frac{3}{5}x = 5 \times 33 \right]$$

$$\left[3x = 165 \right]$$

Step 4: Solve for x

Divide both sides by 3:

$$\left[x = \frac{165}{3} = 55 \right]$$

Answer: The number is 55.

Additional Tips and Strategies

When working with similar problems, keep these tips in mind:

1. Carefully interpret the language

- Look out for words like "less than," "more than," "the sum of," "the

difference between," etc.

- Break down complex sentences into smaller parts.

2. Always define your variable

- Using a clear variable (like x) helps organize your work.
- State what the variable represents to avoid confusion.

3. Translate step-by-step

- Convert each phrase into a mathematical component.
- Write out the entire algebraic expression before solving.

4. Be cautious with fractions

- Multiply through to eliminate fractions if necessary.
- Remember that multiplying both sides of an equation by the denominator clears fractions.

5. Check your work

- Substitute your solution back into the original expression to verify.
- Confirm that the statement "less than" or "more than" is correctly represented.

Practice Problems

To reinforce understanding, here are some practice problems of similar structure:

Problem 1:

"21 less than two-fifths of a number equals 7. Find the number."

Solution outline:

$$\begin{aligned} & \left[\right. \\ & \frac{2}{5}x - 21 = 7 \\ & \left. \right] \end{aligned}$$

Solve for x :

$$\begin{aligned} & \left[\right. \\ & \frac{2}{5}x = 28 \rightarrow 2x = 28 \times 5 = 140 \rightarrow x = \\ & \frac{140}{2} = 70 \\ & \left. \right] \end{aligned}$$

Answer: The number is 70.

Problem 2:

"The number is 21 less than three-fifths of itself. Find the number."

Translate:

$$\begin{aligned} & \backslash[\\ x &= \frac{3}{5}x - 21 \\ & \backslash] \end{aligned}$$

Solve:

$$\begin{aligned} & \backslash[\\ x - \frac{3}{5}x &= -21 \\ & \backslash] \end{aligned}$$

Express $\backslash(x\backslash)$ as fifths:

$$\begin{aligned} & \backslash[\\ \frac{5}{5}x - \frac{3}{5}x &= -21 \\ & \backslash] \end{aligned}$$

$$\begin{aligned} & \backslash[\\ \frac{2}{5}x &= -21 \\ & \backslash] \end{aligned}$$

Multiply both sides by 5:

$$\begin{aligned} & \backslash[\\ 2x = -105 \rightarrow x &= -\frac{105}{2} = -52.5 \\ & \backslash] \end{aligned}$$

Answer: The number is $\backslash(-52.5\backslash)$.

Real-World Applications

Understanding expressions like "21 less than three-fifths of a number" isn't just academic; they appear in various real-world scenarios:

- Financial calculations: Determining remaining amounts after deductions.
- Business analysis: Calculating profits or losses based on fractions of total sales.
- Physics and engineering: Working with proportional relationships.

Mastering how to interpret and manipulate such expressions enhances problem-solving skills across multiple disciplines.

Summary

- The phrase "21 less than three-fifths of a number" translates to $\left(\frac{3}{5}x - 21\right)$.
- The key is to carefully interpret the language and translate it step-by-step into an algebraic expression.
- Once translated, standard algebraic techniques—adding, subtracting, multiplying, dividing—allow you to solve for the unknown.
- Practice with similar problems to build confidence and proficiency.

By understanding the structure and logic behind such phrases, you develop a powerful toolkit for tackling a wide array of algebraic word problems. Keep practicing, and soon these expressions will become second nature!

[21 Less Than Three Fifths Of A Number](#)

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