A Bridge Costs 94,500 To Repair. If The State Pays Twice As Much As The City, How Much Did Each Pay?

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When it comes to infrastructure repairs, understanding funding distribution is crucial for budgeting and planning. In this scenario, a bridge repair costs a total of $94,500, and the question arises: if the state contributes twice as much money as the city, how much did each entity pay? This problem not only involves basic algebra but also highlights the importance of clear financial arrangements between different levels of government. In this comprehensive article, we will explore the step-by-step process to determine each party's contribution, discuss related concepts, and understand the broader implications of such funding agreements.

Understanding the Problem: Breaking Down the Cost and Contributions

Before diving into calculations, it’s essential to analyze the problem carefully. The key points are:

- Total repair cost of the bridge: $94,500
- The state pays twice as much as the city
- Find out how much each one pays

This type of problem is common in public finance, where multiple entities share expenses based on predetermined ratios.

Setting Up the Mathematical Model

To solve this problem systematically, we use algebraic expressions. Let’s denote:

- C as the amount the city pays
- S as the amount the state pays

Given the problem statement:

- The total cost is $94,500, so:

C + S = 94,500 (Equation 1)

- The state pays twice as much as the city:

S = 2 × C (Equation 2)

Using these two equations, we can find the values of C and S.

Solving the Equations Step-by-Step

Step 1: Substitute Equation 2 into Equation 1

Replace S with 2 × C in Equation 1:

C + 2 × C = 94,500

Step 2: Combine like terms

C + 2C = 3C

So, the equation becomes:

3C = 94,500

Step 3: Solve for C

Divide both sides by 3:

C = 94,500 / 3

C = 31,500

Step 4: Find S

Using Equation 2:

S = 2 × C = 2 × 31,500 = 63,000

Final Contributions: How Much Did Each Pay?

Based on the calculations:

- The city paid $31,500
- The state paid $63,000

These figures sum up correctly to the total cost:

$31,500 + $63,000 = $94,500

which confirms the accuracy of our solution.

Implications of Cost-Sharing Agreements in Infrastructure Projects

Understanding how costs are divided helps in planning and policy-making. When the state pays twice as much as the city, it reflects certain assumptions or agreements about responsibility, resource allocation, and priority.

Key Points About Cost-Sharing in Infrastructure:

- Equity: Ensuring that each party's contribution aligns with their capacity or benefit.
- Legal Agreements: Formal contracts specify the ratios and responsibilities.
- Budget Planning: Accurate calculations help prevent overspending or underfunding.
- Public Accountability: Transparent calculations foster trust among residents.

Related Concepts in Cost Distribution

While the exact scenario involves a straightforward ratio, similar problems often involve more complex distributions.

Examples include:

- Proportional sharing based on income or usage
- Fixed contributions regardless of actual costs
- Tiered contributions depending on different cost segments

Common formulas used:

- Weighted ratios: when contributions depend on multiple factors
- Percentage splits: dividing costs based on percentage allocations
- Fixed vs. variable costs: understanding which costs are shared proportionally

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Practical Applications of This Problem

Understanding how to determine each party’s contribution has real-world significance:

- Municipal Planning: Cities and states plan budgets based on their expected shares.
- Funding Negotiations: Clear calculations facilitate negotiations and agreements.
- Public Projects: Ensuring fair distribution encourages cooperation.

Examples of similar problems:

- Sharing costs for school renovations
- Dividing maintenance expenses for highways
- Funding for public parks or community centers

Additional Tips for Solving Similar Problems

When faced with similar questions, keep these tips in mind:

1. Identify the total amount and the ratios involved.
2. Define variables for unknown contributions.
3. Translate the problem into equations based on the ratios.
4. Solve the equations step-by-step, verifying your results.
5. Check your work by summing contributions and comparing them to the total.

Conclusion: Summary of Contributions and Key Takeaways

In conclusion, when a repair project costs $94,500, and the state contributes

twice as much as the city, each pays:

- City’s contribution: $31,500
- State’s contribution: $63,000

This example illustrates how algebra can be used to solve real-world financial problems involving proportional sharing. Understanding these concepts is vital for effective budgeting, transparent funding arrangements, and fostering cooperation among government entities.

By mastering these basic principles, planners and decision-makers can ensure fair, efficient, and accountable distribution of costs in public infrastructure projects, ultimately benefiting communities and enhancing the sustainability of essential services.

Keywords for SEO Optimization: bridge repair costs, funding distribution, state vs. city contributions, algebra problem solving, cost sharing in public projects, how much does each pay, infrastructure funding, financial calculations, public infrastructure costs, ratio-based contributions

Frequently Asked Questions

A bridge costs $94,500 to repair. If the state pays twice as much as the city, how much did each pay?

The city paid $31,500 and the state paid $63,000.

How do you determine the amount paid by the city and the state for repairing the bridge?

Let the amount paid by the city be x. Since the state pays twice as much, the state pays 2x. The total cost is x + 2x = 94,500. Solving for x gives the city’s payment, and multiplying by 2 gives the state's payment.

What is the mathematical equation to find out how much each party paid for the bridge repair?

x + 2x = 94,500, where x is the amount paid by the city. Simplify to 3x = 94,500, then solve for x: x = 94,500 / 3.

If the total repair cost is $94,500 and the state pays twice as much as the city, how much does the

city pay?

The city pays $31,500.

How much does the state pay for the bridge repair if the total cost is $94,500 and the state pays twice as much as the city?

The state pays $63,000.

Can you explain the steps to find the individual contributions of the city and the state for the bridge repair?

Yes. First, assign the city's contribution as x. The state's contribution is 2x. Set up the equation x + 2x = 94,500, combine like terms (3x = 94,500), then divide both sides by 3 to find x. Finally, multiply x by 2 to find the state's share.

What is the ratio of the amounts paid by the city to the state?

The ratio of the city's payment to the state's payment is 1:2.

Why is it important to understand how to split costs proportionally in situations like bridge repairs?

Understanding proportional cost-sharing ensures fair distribution of expenses based on each party's capacity or agreement, preventing disputes and promoting transparency.

Additional Resources

A Bridge Costs 94,500 To Repair. If The State Pays Twice As Much As The City, How Much Did Each Pay? This problem is a classic example of applying basic algebra to real-world scenarios, blending financial calculations with logical reasoning. Understanding the distribution of costs between different entities, such as a city and a state, can be crucial for budgeting, policy planning, and public transparency. In this article, we'll explore how to determine the individual contributions of the city and the state when given the total repair cost and a specific ratio of payments.

Understanding the Scenario

Before diving into the calculations, let's clarify the core details of the problem:

- The total cost to repair the bridge is $94,500.
- The state pays twice as much as the city.

Our goal: Find out how much each paid.

This type of problem involves setting up equations based on the information provided and solving for the unknowns—namely, the amounts paid by the city and the state.

Breaking Down the Problem

Key Concepts:
- Total Cost: The combined amount paid by both entities.
- Ratio of Payments: The relationship between the amounts paid by the state and the city.
- Unknowns: The specific dollar amounts paid by the city and the state.

Variables:
Let's define:
- C = amount paid by the city
- S = amount paid by the state

Given:
- Total cost: C + S = 94,500
- Relationship: S = 2 C

Step-by-Step Solution

Step 1: Set Up the Equations

Based on the information:
- Equation 1: C + S = 94,500
- Equation 2: S = 2 C

Step 2: Substitute to Find One Variable

Using Equation 2, substitute S into Equation 1:
- C + 2 C = 94,500
- 3 C = 94,500

Step 3: Solve for C

Divide both sides by 3:
- C = 94,500 / 3

- C = 31,500

Step 4: Find S

Using Equation 2:
- S = 2 C = 2 31,500 = 63,000

Final Answer

- The city paid $31,500
- The state paid $63,000

Total:
- $31,500 (city) + $63,000 (state) = $94,500

Deep Dive: Why This Approach Works

This problem is a straightforward application of algebra, specifically systems of equations. By expressing one variable in terms of another, we simplify the problem to a single-variable equation. This method is widely applicable in various real-world contexts, such as budgeting, resource allocation, and financial planning.

Additional Considerations

Verifying the Solution
Always verify your solutions by plugging the values back into the original conditions:
- Check if the sum matches the total cost:
- 31,500 + 63,000 = 94,500 ✓
- Check the ratio:
- Is the state's contribution twice the city's?
- 63,000 / 31,500 = 2 ✓

Practical Implications
Understanding how costs are divided can influence negotiations, funding allocations, and public transparency. When communicating these figures to stakeholders or the public, clarity and accuracy are paramount.

Common Variations of the Problem

1. Different Ratios: If the state paid three times as much, how would the amounts change?

2. Fixed Amounts: If the city paid a certain amount, what did the state pay?
3. Multiple Entities: What if more than two entities contributed?

Example: Different Ratio
Suppose the state pays three times as much as the city:
- S = 3 C
- Total: C + 3 C = 94,500
- 4 C = 94,500
- C = 94,500 / 4 = 23,625
- S = 3 23,625 = 70,875

Visual Representation

Including a simple diagram or table can aid understanding:

Entity	Amount Paid	Explanation
City	$31,500	Calculated by dividing total by 3
State	$63,000	Twice the city’s contribution
Total	$94,500	Sum of both contributions

Final Thoughts

Understanding how to allocate costs based on ratios and totals is an essential skill in both academic and real-world financial situations. Whether managing public funds or personal budgets, applying algebra to these problems offers clarity and precision. For the problem at hand, the city paid $31,500, and the state paid $63,000—a straightforward yet powerful demonstration of algebraic reasoning.

Summary

- Total repair cost: $94,500
- Ratio of payments: State pays twice as much as the city
- Solution:
- City pays $31,500
- State pays $63,000

By following a systematic approach—defining variables, setting up equations, solving, and verifying—you can confidently tackle similar problems involving ratios and totals in various contexts.

Remember: The key to solving these types of problems is to translate words

into mathematical expressions carefully, then methodically solve the equations!

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