



Math Unit | Grades 9-12 | Lesson 4: Silver Dollar City's Swinging Bridge

Lesson Description

Based on the amount of rain Silver Dollar City gets each year, the amount of space that separates the Swinging Bridge and the creek below varies. Big Jack decided that he was going to do a little math to see how far down the bridge would hang based on length and weight. That way he could always keep the bridge out of the water. Help Big Jack by solving the problems below. Then walk across the swinging bridge and be sure to look down at how far you are from the ground!

Concepts

Solving equations
Order of operations

Grouping symbols in an expression

Objectives

Students will:

- Evaluate expressions by substituting values for variables.
- Simplify expressions using correct order of operations.

Content Standards

National Standards in Mathematics

- **Standard 1:** Uses a variety of strategies in the problem-solving process.
 - Benchmark 2, Grades 6-8: Uses a variety of strategies to understand problem-solving situations and processes (e.g., considers different strategies and approaches to a problem, restates problem from various perspectives).
 - Benchmark 1, Grades 9-12: Uses a variety of strategies (e.g., identify a pattern, use equivalent representations) to understand new mathematical content and to develop more efficient solution methods or problem extensions.
- **Standard 8:** Understands and applies basic and advanced properties of functions and algebra.



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- **Benchmark 2, Grades 9-12:** Uses expressions, equations, inequalities, and matrices to represent situations that involve variable quantities and translates among these representations.

Grade Level Expectations

Numbers and Operations

Understand meanings of operations and how they relate to one another.
Compute fluently and make reasonable estimates.

Algebraic Relationships

Represent and analyze mathematical situations and structures using algebraic symbols

Time Required

Varies by student

Materials

- Student Activity Sheet off the Kids-U-Cation website
 - Writing utensil
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Procedures

1. Print out the student activity sheet off the Kids-U-Cation website.
 2. Use facts given in the packet to solve the equations.
 3. Walk across the Swinging Bridge while at SDC to experience a real-life math scenario.
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Closure

Review the key points of this lesson by discussing the following:

- Why is important to know how far the bridge would hang down based on length and weight?
 - Go over the order of operations to make sure students did the equations correctly.
 - Discuss why accurate math figures are imperative for the safety and enjoyment of the bridge.
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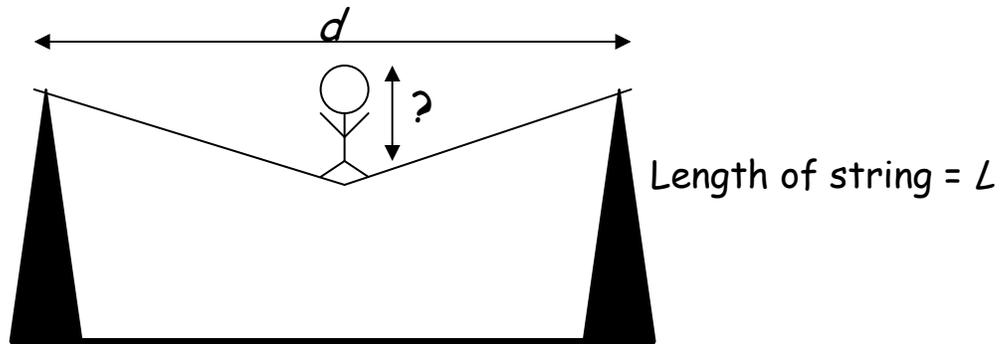
Assessment/Independent Practice

Give an assignment or test of your choosing.

Silver Dollar City's Swinging Bridge

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In the diagram below, a weight (person) is placed in the center of a string of length L which is stretched between two points separated by distance d .



The weight will hang down by a distance that is given by this expression:

$$\sqrt{\left[\frac{L+d}{2}\right] \left[\frac{L-d}{2}\right]}$$

- Put these operations in the order in which they should be done according to the above expression:

_____ Divide by 2

_____ Add or subtract L and d

_____ Take the square root

_____ Multiply

- Compute the value of the expression above for the given values of L and d .

(Use the back of this sheet to work out the problems)

L	d	How far down will the bridge hang?
80 ft	60 ft	
121 ft	86 ft	
168 ft	156 ft	
200 feet	195 feet	
1.2×10^3 m	9.8×10^2 m	