Activity 3: Force Transfer Mechanisms

The concepts of Tension and Compression explain how forces transfer from the roadway to the cables to the towers and to the abutments in a suspension bridge.

Materials needed:
- 10 lb. weight (barbell weight)
- 5 lb. weight (barbell weight)
- 50’ rope

Procedures:
Step 1: Select two students to stand as towers in a suspension bridge.

Step 2: String the rope through the middle of the barbell weight

Step 3: The two students should face each other approximately 15’ feet apart and have the rope strung over their shoulders. This will represent the main cables of the bridge.

Step 4: Select two more students to sit behind each student and pull at each end of the rope trying to pull the weight up. Ask the students to try to pull the rope straight.

Why is there a big sag in the main cables of suspension bridges (i.e., requiring the least amount of force to carry the weight)?
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Department</th>
<th>Product Quantity / Price</th>
<th>Quantity Purchased</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 lb. weight</td>
<td>10 lb. plate</td>
<td>Sporting Goods / Fitness</td>
<td>1 plate / $5.72</td>
<td>2</td>
<td>$11.44</td>
</tr>
<tr>
<td>5 lb. weight</td>
<td>5 lb. plate</td>
<td>Sporting Goods / Fitness</td>
<td>1 plate / $2.86</td>
<td>2</td>
<td>$5.72</td>
</tr>
<tr>
<td>50’ rope</td>
<td>Coleman 50 ft. x 5/16 in. Utility Line (175 lbs. working load limit)</td>
<td>Sporting Goods / Fishing Supplies</td>
<td>1 / $3.37</td>
<td>2</td>
<td>$6.74</td>
</tr>
</tbody>
</table>

Subtotal: $23.90

Tax (7.75%): $1.85

TOTAL COST: $25.75

1 Supplies estimated for 20 participants.
2 Costs estimated on items purchased at WalMart.