**Gold Mining Challenge: Materials and Instructions**

**Materials Needed (per person)**

1. 2 Cardboard Tubes
2. 3 Straws
3. 2 Index Cards
4. 4 Marbles
5. 15” of String
6. Washi Tape
7. Empty Spool
8. 1 Paper Cup

**Instructions**

The objective of this workshop is to allow the students to be creative with designing their pully system. However, the following steps outline a suggested design for students who might need some extra help.

1. Tape the two tolls to the index cards.
2. Put the rope on the empty spool and tape two straws in place.
3. Cut two slots in each roll and place the spool and straws in these slots.
4. Attach the paper cup to the string and put the marbles into the cup.

So how does it work? It’s all about distributing the force of the marbles evenly. As the marbles are loaded into the cup, their weights get concentrated to the center of the cup. Creating a system with a wide foundation allows the force to get distributed across the base, weakening the force experienced in the cup. Different designs of the foundation will remove more or less stress from the center of the cup. In a real mine pully system, large machinery is used to distribute the force, however, they also have to consider the force of the metal structure.

**Summary**

Students will learn about forces as they design their pully systems. Explain that the main problem is to determine how to distribute the forces across the system. Explain how in their design that they have to consider the weight as a factor. Explain how there are multiple ways to approach this problem and that there is not only one right answer.