

## HANDS-ON PROBLEM: The Strongest Link

A. *When the team members enter the room, tell them this is a hands-on problem. They have one minute to select the team members who will solve the problem.*

**B. JUDGE READS TO TEAMS:** (Do not read the material in parentheses)

1. In Part I, you will be given 6 minutes to discuss the problem and make your solution. You will then have 2 minutes to test your solution in Part II.

2. You may talk or ask questions at any time; however time will continue.

3. The problem is:

Your team is to build a chain and then support weight on the chain you have built.

During Part I you are to use the materials given to make a chain. This chain must be made of links that your team creates. Each link must be linked to another link to form a chain. Each link may only be connected to two other links, except the starting and ending links, which will each be connected to one other link.

During Part II you will be given a cup and some items of differing weights. During Part II you will add these weights to the chain, one at a time.

4. You may use only the materials given to make your links in Part I.

5. Your chain may be of any length you choose. At the end of 6 minutes the team will be asked to stop, two team members will be asked to hold the first and last links. The two team members may touch only the first and last links, and thereby support the chain so that no other links touch the floor or any other surface, including any body parts of any team member. The team will then receive score for the chain before beginning Part II. If your team decides it is ready for the chain to be scored before the end of 6 minutes, two team members will hold the chain, one at each end and say "Finished. Please score the chain." For each link in the chain, the team will receive 2 points.

6. Once the judges have counted the number of links, you may not make any changes to the chain. At the end of Part I, once the chain is scored, the two team members holding the chain should take positions for Part II and may not move their positions during Part II. They must be holding the first and last links of the chain. The chain may not touch the floor or any other surface or there will be no score for Part II.

7. For Part II, the team has two minutes. The 2 minutes begins when the team members who are not holding the chain are given a small paper cup (*or plastic cup ... officials should read this description according to what the team will be given*) with a hook, and some other items. (*Judges, begin the two minutes for Part II when the team is handed the cup and the items.*) The chain may not touch any surface, but must only be held by the two team members, who may not change position during Part II, and may only be held by the first and last links on the chain.

8. One team member is to hang the cup from any ONE link on the chain that the team chooses. If the chain supports the cup and does not break in 3 seconds, then the team receives 5 additional points.

9. If the chain does not break, the two team members holding the chain should continue to hold the first and last links with the chain not touching any surface and the cup suspended by the chain. The other team members may then add the following items one at a time for additional score. In order to count for score, the chain must support their weight without breaking or touching the floor or other surface for 3 seconds. The items must be added one at a time, with 5 seconds between additions. You have a total of two minutes to place the cup and the additional items. The items you may choose to add and the score if they are held for at least 3 seconds are:

2 Ping Pong balls	4 points each
8 Metal Washers	6 points each
4 Nail (large)	8 points each
1 Golf Ball	16 points

10. Time ends when the chain breaks, when the chain touches the floor, or when 2 minutes has ended.

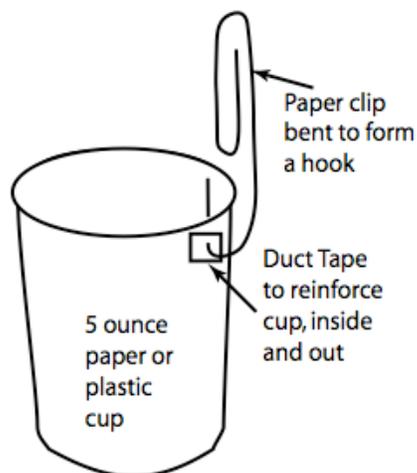
*(JUDGE: Repeat #3, "Your Problem Is ..." and then begin 6 minutes for Part I.)*

### C. FOR JUDGES (AND COACHES) ONLY

1. Give each team the following materials in Part I:

- 1 legal-sized envelope
- 2 rubber bands
- 1 6" length of string
- 3 sticky labels (or 6" of masking tape)
- 1 3x5" index card
- 2 paper clips

2. For Part II, each team should receive a 5 ounce paper or plastic cup with a "hook" fashioned from a paper clip, as illustrated. Be sure to reinforce the area with the hole for the paper clip, both inside the cup and outside, with duct tape. (The failure of the chain to hold weight should not be because the paper clip pulls loose from the cup!)



3. If one of the team members holding the chain for Part II moves, stop weight placement and give him/her a reminder to stand in place. Time continues.

4. Teams may hang the cup any place along the length of the chain they wish. Do not tell them this unless they ask.
5. Teams may incorporate as many materials in each single link as they wish. Do not tell them this unless they ask.