

# JUNK BOX WARS

## The Weakest Link

Build the longest chain that will hold the most weight!

### Competition Rules:

Each team will be provided with a junk box filled with materials to build a chain. Each team will receive only one set of materials! Teams may use all or part of the materials provided and are not allowed to share materials with other teams. Scissors will be provided.

Teams will be allowed time to build and test their chain. Competitors are allowed to bring diagrams to help them build the chains. After the time is up, all structures will be impounded and no changes will be allowed!

### Junk Box Possible Supplies

Straws  
Wooden Craft Sticks  
Index Cards  
Paper  
Pipe Cleaners  
String  
Rubber Bands  
Masking Tape  
CDs

### Requirements:

Teams must hold onto each end of the chain during testing and cannot provide additional support to any other part of the chain. The ends of the chains must be located at a height of 1 meter from the floor.

Teams will be required to select anchor points for each of the weights prior to the testing process. Anchor points cannot be located on the links at each end of the chain and cannot be adjusted during the testing process after the first weight is attached.

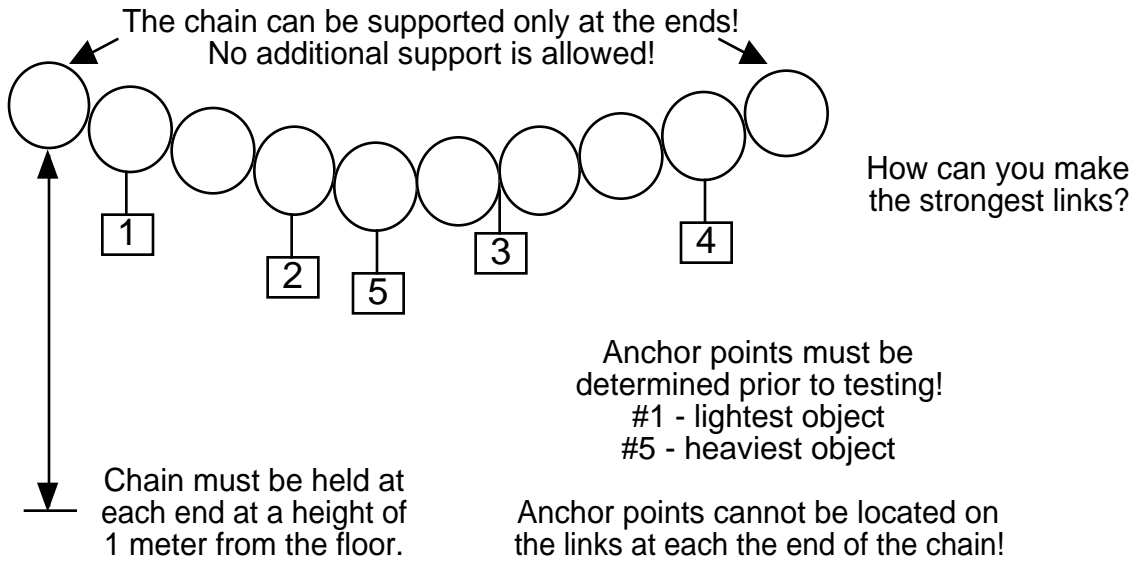
### Testing Procedure:

At testing time, team members will be asked to identify the five anchor points for each of the five testing weights. Testing will begin with the lightest object. If that object is held successfully, the remaining objects will be added following the same procedure - lightest to heaviest. Teams will be required to wait 30 seconds before adding another weight.

Testing will be done when the chain or testing weight touches the floor, the chain breaks apart, or the chain holds all the weights. Points will be awarded for length as well as each weight that is held successfully. The chain that earns the most points will be declared the winner! In case of a tie, the lightest chain will be the winner.



## Chain Requirements



## Sample Score Sheet



### The Weakest Link

Team Name: \_\_\_\_\_

Team Members : \_\_\_\_\_

Mass of Chain = \_\_\_\_\_ g

Length of Chain = \_\_\_\_\_ cm (1 cm = 1 point)

Weights

#1 - 40 points

#4 - 160 points

#2 - 80 points

#5 - 200 points

#3 - 120 points

### Final Score

Length = \_\_\_\_\_

Weight Points = \_\_\_\_\_

Total Points = \_\_\_\_\_

## Event Score Sheets



### The Weakest Link

Team Name: \_\_\_\_\_

Team Members :

Mass of Chain = \_\_\_\_\_ g

Length of Chain = \_\_\_\_\_ cm (1 cm = 1 point)

Weights

#1 - 40 points

#4 - 160 points

#2 - 80 points

#5 - 200 points

#3 - 120 points

### Final Score

Length = \_\_\_\_\_

Weight Points = \_\_\_\_\_

Total Points = \_\_\_\_\_



### The Weakest Link

Team Name: \_\_\_\_\_

Team Members :

Mass of Chain = \_\_\_\_\_ g

Length of Chain = \_\_\_\_\_ cm (1 cm = 1 point)

Weights

#1 - 40 points

#4 - 160 points

#2 - 80 points

#5 - 200 points

#3 - 120 points

### Final Score

Length = \_\_\_\_\_

Weight Points = \_\_\_\_\_

Total Points = \_\_\_\_\_



### The Weakest Link

Team Name: \_\_\_\_\_

Team Members :

Mass of Chain = \_\_\_\_\_ g

Length of Chain = \_\_\_\_\_ cm (1 cm = 1 point)

Weights

#1 - 40 points

#4 - 160 points

#2 - 80 points

#5 - 200 points

#3 - 120 points

### Final Score

Length = \_\_\_\_\_

Weight Points = \_\_\_\_\_

Total Points = \_\_\_\_\_



# The Weakest Link

## Teacher Notes

### Recommended Supply List:

- 10 Straws
- 10 Wooden Craft Sticks
- 20 Index Cards (3 x 5)
- 10 Pieces of Paper (8 1/2" x 11")
- 200 cm of String or Thread
- 200 cm of Masking Tape
- 10 Pipe Cleaners
- 10 Rubber Bands
- 2 CDs

### Testing Materials:

- 5 Testing Weights (See #3 below)
- Safety Goggles\*
- Metric tape measure or meterstick

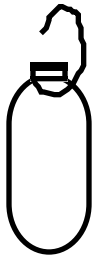
\*Safety Note: I require students to wear goggles during testing to protect their eyes from flying debris!

### Notes:

(1) Students may use all or part of the materials in the junk box. I allow the students to use any material inside the box, but not the box itself. For example, if any of the materials come in wrappers or boxes, teams may use those for the device. The materials may be modified with the understanding that if a goof is made they will not receive new materials.

(2) Inform the teams that the chain can only be held at each end and cannot be supported at other locations along the length of the chain. The ends of the chain must remain at a height of 1 meter from the floor throughout the testing process. The chain or testing weights cannot touch the floor at any time during the testing process.

(3) Before the event, create testing weights or find objects with masses of 200 g, 400 g, 600 g, 800 g, and 1000 g. I filled five bottles (such as small water bottles and 1-liter pop bottles) with various amounts of water to obtain masses ranging from 200 g to 1000 g. The bottles were labeled using the numbers 1 (lightest object) through 5 (heaviest object). Teams may borrow the weights during the construction time to check the strength of their chain and make adjustments. If the chain is damaged during practice trials, they cannot receive replacements and must make repairs with the materials they have left.



(4) Record the mass of the chain on the score sheet and determine the length of the chain before testing. To measure the length, have the team members position the chain in "testing position" or the length the chain will be when they begin to add the weights. They will want to stand far enough apart to get the best length possible without stretching the chain too far to cause it to break before they get a chance to test it. Once the length has been recorded, team members must be careful not to move the ends of the chain.

(5) Have the teams identify the anchor points for each of the five testing weights before the first weight or object is added. The anchor points must be marked on the chain using the numbers 1 through 5. No changes to the anchor points are allowed after the first weight has been added to the chain. The weights must be added one at a time from lightest (#1) to heaviest (#5). Teams must wait at least 30 seconds before adding another weight.

(6) After testing is completed (chain touches the floor, breaks apart, or has held all the weights), calculate the final score using the points outlined on the score sheet.