Applied Science Solutions Program

Design Challenge 2023

The world leader in serving science
Design Challenge

Challenge Description:

Teams must build a mechanical structure that moves a ping pong ball 3 feet, initiating the movement with a one touch start.

- **Specifications:**
  - The *ping pong ball* must travel a *minimum* distance of 36" and *maximum* of 42" staying within the allotted space of 2’ x 6’ either on the tabletop or the floor.
  
  - The path may travel vertical or horizontal

<table>
<thead>
<tr>
<th>Distance</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 36”</td>
<td>0 points</td>
</tr>
<tr>
<td>36” - 36.9”</td>
<td>5 points</td>
</tr>
<tr>
<td>37” - 37.9”</td>
<td>4 points</td>
</tr>
<tr>
<td>38” - 38.9”</td>
<td>3 points</td>
</tr>
<tr>
<td>39” - 39.9”</td>
<td>2 points</td>
</tr>
<tr>
<td>40 - 42</td>
<td>1 points</td>
</tr>
<tr>
<td>&gt; 42”</td>
<td>0 points</td>
</tr>
</tbody>
</table>
Design Challenge (cont.)

- Students must show judges their intended measured distance regardless of path travel, e.g., vertical, horizontal, or angled.
- Transport of the ping pong ball is to be controlled by the apparatus (launching the ball is not permitted)
- Time starts when the ball starts moving with either a one touch initiation after pre-load activity, e.g., winding up string/rubber bands or moving apparatus to start position.

- Points received for timing of transport:
  - <10 seconds = 0 points
  - 10 seconds = 5 points
  - 11 seconds = 4 points
  - 12 seconds = 3 points
  - 13 seconds = 2 points
  - 14 seconds = 1 point
  - > 15 seconds = 0 points

- **Note:** standard rounding rules will apply to the nearest second.
  
  example: 9.5 seconds = 10 seconds
Teams are allowed up to three attempts to demonstrate that their project comes to rest within the given distance and timing specifications.

• 6 Points for making in your first attempt
• 4 Points for making in the second attempt
• 2 Points for making in the third attempt

These points are in addition to the rubric judging sheet provided at the end of this document.

• If either the distance or the time goal is not met, you are allowed a second or third attempt, if necessary.
Challenge Time:

Teams will have 60 minutes to build their structure. Upon completion of the building time, teams will have 5 - 7 minutes to verbally present their project and poster board to the judging panel and 2 minutes for Q&A.

A PowerPoint can be displayed on an iPad or laptop for guests to view, but the team will not be judged on this. Power will NOT be provided.

Suggestions on what to be displayed:

- How did they decide on their project
- Testing activities
- Challenges overcome while designing or building
- Provide drawings or blueprints, can be displayed in a separate binder or electronically

All team members are to present during the Q&A section.
Design Challenge (cont.)

Materials:

Teams must bring the following materials to the challenge: entire K’Nex kit, ping pong ball, poster board that showcases the teams work including the blueprint, electronic device (optional).

The following tools will be permitted to use during the challenge:

• Scissors
• Ruler
• Stopwatch
• Pen/pencil
• Only two rubber bands included with the kit are to be used in the project
  • Additional rubber bands are provided, in the event they are broke during practice
• Batteries

• It is allowed to pre-sort the K’Nex pieces into sections of the project into Ziploc bags (not provided)

Note: Additional K’Nex parts should not be added to the kit provided. If judges notice item(s) that are not included as part of the kit, or listed above, final points received for the full competition will be reduced by half.
Design Challenge Competition

The Competition:

The teams will receive instructions from the event leader who will then start the timer for the building phase of the competition. Teams will have 60 minutes to build their design. If a team finishes early, they may be judged before the time expires.

Competition Guidelines:

- Once the teams enter the competition event area they are not permitted to leave or receive any outside assistance, materials or communication until the competition time expires.
- The project must be free standing and are not permitted to be attached to a table, floor or any other support
- Team members must build their project onsite
- Teams must not modify their project after the building time has expired

Judging:

- Each Team will demonstrate their project twice (two separate judging teams)
- Scoring of the project demonstration will be based on distance and timing of the project
- Teams will also be judged using the rubric judging sheet (next slide)
# STEM Design Challenge

## Judging Rubric

<table>
<thead>
<tr>
<th><strong>Team #</strong></th>
<th><strong>Grade Level</strong></th>
<th><strong>Judge #</strong></th>
<th><strong>Total Score</strong></th>
<th><strong>Score (1-4):</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong></td>
<td></td>
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</tbody>
</table>
Creative and thoughtful use of K'Nex pieces. Only K'Nex pieces used. Different pieces used in an interesting way. Project meets all parts of challenge. Obvious that a lot of time was spent designing the structure. | 
Different pieces used. Teams somewhat creative in using the pieces available to them. Obvious that time was spent designing the structure. Project meets all parts of challenge. | 
Teams somewhat creative in using the pieces available to them. Obvious that the team did not spend much time planning and designing. Project only meets part of the challenge. | 
Project uses a lot of the same pieces, not a creative use of the pieces available to them. Design is not successful in meeting the challenge. |

| **Narrative** | 
Narrative is well-written with no grammatical or spelling errors. All team members worked on the narrative. Outside resources were used and could include teachers, professionals, online or written information or kits. | 
Narrative is well-written with no grammatical or spelling errors. Very few or no outside resources were used in creating their project. No evidence of all team members contributing. Narrative contains some grammatical and/or spelling errors. | 
Narrative is lacking detail. Very few or no outside resources were used in creating their project. No evidence of all team members contributing. Narrative contains some grammatical and/or spelling errors. | 
Narrative contains grammatical and/or spelling errors. No outside resources used. No evidence of all team members contributing. |

| **Blueprint** | 
Blueprint is creative, detailed and well drawn. Clear picture of what students are building. Any text is free of spelling or grammatical errors. | 
Blueprint is detailed and well drawn but lacks creativity. Clear picture of what students are building. Text is free of spelling or grammatical errors. | 
Blueprint is lacking creativity or detail. Hard to tell from blueprint what structure teams are building. Text contains some spelling and/or grammatical errors. | 
Blueprint is not well drawn and lacks creativity. It does not convey what type of design students are building. Text contains spelling and/or grammatical errors. |

| **Teamwork** | 
Team works very well together. Ideas from all members listened to and respected. All team members participated in all aspects of the competition. | 
Team works well together. All team members are building the structure. It may seem that not all team members are always involved. | 
Some team members are not working on the structure or not doing as much work as others. Blueprint and narrative show a lack of teamwork. | 
Some team members are not working on the structure. Obvious that all team members did not participate in the design and preparation for the competition. |

| **Creativity** | 
Teams were creative in coming up with their project design. Time for building was used effectively. | 
Project design was somewhat creative. Students finish building before time is up which shows that more could have been added to the structure. | 
Some aspects of structure are creative but more work could have been done in planning and preparation. | 
Design lacks creativity. Teams used K'Nex models or kits to create their design. Time was not used effectively. |

| **Presentation** | 
The team’s presentation was well organized, creative and represented their final product. All team members participated in the presentation. | Team’s presentation was organized and represented their final product but was not very creative or interesting. | A presentation is given but lacks creativity and organization. More effort could have been given to the presentation. | Team’s presentation was unorganized and lacked focus. Not all team members participated. |
Thank you for participating.