



Academic Year 2018-2019

College of Education, Engineering, and Professional Studies

**25th Annual
Engineering, Science, and Technology
Design Contest**

Competition Rules



<http://ceeps.csupueblo.edu/designcontest/>

Colorado State University – Pueblo

College of Education, Engineering, and Professional Studies

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Engineering, Science, and Technology Design Contest

The ***purpose*** of the design contest is:

- To encourage teamwork.
- To encourage parent and teacher involvement in student activities.
- To develop interpersonal and group skills.
- To encourage honesty and fair play in life situations through competition.
- To develop responsibility and integrity.

CSU-Pueblo reserves the right to:

- Disqualify any team for breaking the general rules or individual competition rules.
- Remove or disqualify any team or team members for inappropriate behavior while participating at the competition.
- Allow competition representatives from each individual event to make final judgment on any decisions regarding the conduct or scoring of their event.
- Limit the number of teams competing at the final competition, should the need arise, due to time and space constraints.

Note: *The design competition continues to grow each year. For this reason, the committee may need to limit the number of teams participating at the final competitions. Therefore, we encourage schools/participants to have uniform distribution in all events of the competition.*

In the spirit of fair play and to prevent misconduct, all participants and sponsors are charged with maintaining and following the rules listed herein.

Competition Rules

General Rules:

1. All sponsors and team members must abide by the competition rules and the rules for each individual event.
2. Adult supervision must be provided for each team by a sponsor/coach who will be present and responsible for the team members. Sponsors may supervise more than one team.

Team Membership:

3. The competition is a **team event** with teams consisting of three (3) team members. For the final competition, at least two (2) team members **MUST** be present. Note that the Say It, Do It event requires a two-member team, and both team members must be present to participate. Substitutions for team members are not allowed. Identification/verification of team members must be provided.
4. Two of the competitions (Key Punch and Say It, Do It competitions) are impromptu strategy events. **Either one of these competitions may be entered as a second event for any given student without paying an additional entry fee; although an additional entry form must be submitted with pre-registration.** Students who enter an impromptu strategy event as their sole entry must also pay an entry fee. No prior preparation is required for the impromptu strategy contests and students may create new teams using different combinations of students from the same school. However, no student may enter more than two events in total, with one being a design event (Mousetrap Vehicle, Mousetrap Catapult, On-site Construction, Bridge Construction, and Concrete Barge) and the other being an impromptu strategy event (Key Punch or Say It, Do It).

Competition Information:

5. There will be two *levels* of competition – middle school and high school. Teams may have members from any grade within their level. If a team has both middle school and high school team members, it will compete at the high school level.
6. There are two *types* of events. These include **design events**, which are the Mousetrap Vehicle, Mousetrap Catapult, On-site Construction, Bridge Construction, and Concrete Barge and **impromptu strategy events**, which are the Key Punch and the Say It, Do It competitions.
7. For each event, the top three teams for both middle-school and high-school levels will be recognized. Some events have mechanisms to break ties while others allow for ties. If there is more than one team placing in 1st or 2nd place, the subsequent place will be dropped out. For example, if there is a tie for 1st, the 2nd place will be dropped out and the following team will receive the 3rd place (1st, 1st, 3rd). If there is a tie for 2nd place, there will not be a 3rd place (1st, 2nd, 2nd). Therefore, in all cases, only three teams will receive special recognition and points towards the school score. The winning team members must sign for their prizes.
8. Overall awards will be given to the middle school and high school that compiles the most points from all seven (7) events. Schools having numerous teams in one event will receive the points of their highest ranked (placed) team only. Points are given to the school whose teams place in the individual events as follows:

- 1st place – 3 points
- 2nd place – 2 points
- 3rd place – 1 point

Example: School Z places 1st and 3rd in an event. School Z accumulates only 3 points toward team competition. No school will receive points for the 3rd place.

9. School sponsors must submit an electronic registration form for EACH team. The registration of all team members for each event must **be completed and submitted by the team sponsor**.
10. Sponsors must register all teams in the competition by e-mail no later than ***Tuesday, March 26, 2019***. Each registration form must be saved with a different name (e.g. StGeorgeHSRegMousetrapVeh1.doc) and ***all registration forms should be sent as attachments to the same email to design.contest@csupueblo.edu***.
11. Each **team** will be invoiced and must pay a \$7.50 nonrefundable registration fee for the first design event entered. (e.g. a school enters 10 design-event teams, as well as 4 additional impromptu strategy teams made up from the same students, the registration fee is \$75) by check or money order payable to the CSU–Pueblo Foundation due upon registration.
12. A school may enter any number of teams per event. However, sponsors are asked to encourage participation in all seven events, rather than have many teams from one school registered in only a few events. This “balance” of participation will help eliminate school teams competing against themselves and will also allow for the possibility to acquire more points for the team competition.

Revisions to Rules:

13. Although rules will not be changed, some clarifications may be made and announced up to and on the day of the final competition. All clarifications made prior to the day of the competition will be available on the website or by contacting the individual competition representatives.

**The competition will be held on Saturday,
April 6, 2019, on the campus of
Colorado State University–Pueblo**

Registration

The registration deadline is **Tuesday, March 26, 2019, 11:59 pm MDT.**

- All team and team members must be finalized and submitted by e-mail by the team sponsor.
- **Each team** must pay a \$7.50 registration fee (non-refundable) by check or money order payable to CSU-Pueblo Foundation. This is a one-time team fee; therefore, students competing in a second impromptu strategy event do not pay a second registration fee.
- No new registrations or registration changes will be accepted after the deadline.

COMPETITION DATE AND LOCATION

Competition at Colorado State University - Pueblo:

Saturday, April 06, 2019: 9:00 a.m. - 3:00 pm

Schedule of Events:

An event schedule will be distributed to all sponsors prior to the final competition. All participants are required to register at their appropriate times listed for each event. All events will have a scheduled competition time and will start as scheduled.

**It is the team's responsibility to be aware of the schedule of events and to arrive and report at events on time with the necessary materials for the competition.*

Team Recognition:

Announcement of team standings and winners will be made at the conclusion of each event. In addition, **team standings and overall school awards will be announced by e-mail to participating team sponsors and published in the Pueblo Chieftain**

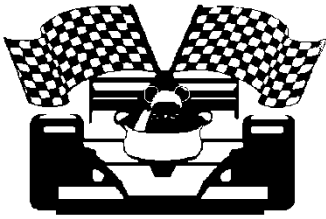
Team Recognition Mementos:

Overall team plaques will be given to the 1st-, 2nd-, and 3rd-place schools in both high-school and middle-school divisions. In addition, traveling trophies will be awarded for the 1st-place schools at both the high-school and middle-school levels. The current holders of the traveling trophies are requested to return the trophies on the day of the event or sooner if they will not be participating in the upcoming competitions.

COMPETITION REPRESENTATIVES

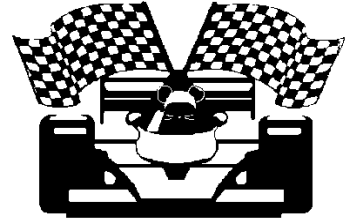
For additional information, contact the appropriate representative(s) listed below

| <u>Individual Events:</u> | <u>Event Representative</u> | <u>Telephone Number</u> |
|-----------------------------------|-----------------------------|----------------------------------|
| Mousetrap Vehicle: | Jude DePalma | (719) 549-2892 |
| Mousetrap Catapult: | Leonardo Bedoya-Valencia | (719) 549-2788 |
| Bridge Construction: | Michael A. Mincic | (719) 549-2890 |
| On-Site Construction: | Bahaa Ansaf | (719) 549-2889 |
| Concrete Barge: | Kevin Sparks | (719) 549-2405 |
| Key Punch Game: | Steven McClaran | (719) 549-2833 |
| Say It, Do It Competition: | Lynn Knight Ruth DePalma | (719) 549-2872 (719) 549-2422 |
| Competition Chair: | George Dallam | (719) 549-2619 |
| General Rules: | Sylvester A. Kalevela | (719) 549-2696 |



MOUSETRAP VEHICLE

SPONSORED BY



**CSU - Pueblo Society of Automotive Engineers
and the
Institute of Electrical and Electronics Engineers**

Description

The contestants will construct and bring to the event a "vehicle" which uses a standard one-spring mousetrap as its sole means of propulsion. The contestants will be permitted to make two runs. The vehicle will be placed on the starting line, where it will remain unattended until the judge signals the contestant to activate the spring of the mousetrap.

The objective of the contest is to design and build a vehicle that will travel as close as possible to 20 feet. The vehicles will be evaluated by determining which vehicle stops closest to the 20 foot mark within the confines of the track. If the vehicle leaves the track (passes over the side boundaries) it is not a valid run and will not be counted.

Event Rules

1. Only one standard unmodified mousetrap may be used.
2. Although other components may be attached to the mousetrap, the trap itself must remain intact.
3. Neither the spring nor the release mechanism can be modified or moved on the mousetrap base.
4. Wood cannot be cut or removed from the base except at points of attachment.
5. All parts of the vehicle, placed at the starting line, must move forward as a whole.
6. Components may be attached to the base of the mousetrap and to the arm to increase the velocity and acceleration.
7. All energy available to the vehicle at the start of the run must be stored in the mousetrap spring.

8. Conversion of the spring energy into other energy forms is permissible. For example, a rubber band could be used in the device, but the rubber band must start the run at its lowest energy state.
9. The vehicle wheelbase must not be longer than 20 inches.
10. In the event that a vehicle is damaged during its initial run, the team will only have five minutes to repair the damage sustained by the vehicle for a second run.
11. A new vehicle may not be substituted for the damaged one.

The Competition

The competition area will be marked off on a smooth surface, approximately four feet wide. It is the team's responsibility to design a vehicle that will stay on the track. Each team will check in with the judge prior to competition to have the vehicle inspected and to be assigned a team number. Order of competition will be by the team number as assigned at registration. When it is a team's turn, they will place the spring-energy-loaded vehicle at the starting line. The team may be asked to pick up the vehicle and set it down at the starting line a second time to assure that no additional energy is stored in other components of the vehicle. The vehicle must be set in motion by pressing the normal release lever using a pencil or dowel stick to insure the safety of the participants.

Each team will be given two runs, with the distance being measured in both runs. Teams will be given a total of five minutes to set the mousetrap, position the vehicle at the starting position, get the signal from the judge and complete the run. If the vehicle completely crosses the starting line, it will be considered a run. If the vehicle passes over the side boundaries of the track it is not considered a valid run and counts against one of the two allowed runs. If both runs are considered not valid the team will not have a score.

Scoring

The point of measurement will be determined by the part of the body of the vehicle which first crosses the starting line. The distance from the 20 foot mark will be measured and recorded to the nearest 1/8th of an inch. Place will be determined by the shortest distance from the 20 foot mark for those vehicles that don't leave the track (pass over side boundaries). A vehicle that stays within the side boundaries of the track but passes the 20 foot mark is a valid run. For this instance the distance back to the twenty foot mark will be measured. The score will be the average of the distance of the valid runs

CONCRETE BARGE

SPONSORED BY
The CSU-Pueblo Student Chapters of the
American Society of Civil Engineers & Associated General Contractors of America

For centuries concrete has and continues to be an inexpensive and versatile building material. Mortar mixes have been around for thousands of years, however, the first recorded use of concrete was in 330 B.C. when the Romans used concrete mixtures to build the Apian Way. The advantages of concrete are that it can be shaped into an infinite number of shapes to fit the builder's need, durability, and it is great in carrying compressive loads. The drawbacks are that concrete tends to be heavy and does not work well in tension.

Because of its density, concrete has been relegated to a "support" roll, serving as bases for buildings, homes, bridges, highways, etc. Steel has been the primary material for the shapes of automobiles, buildings, etc. Yet when steel became scarce in World War I and II, some ships and barges were made of concrete. Below is a photo of one of 24 concrete ships built in WWII.



The S.S. Arthur Talbot: A WWII Concrete Ship (courtesy Concrete Ships.Org)

Today floating docks are being constructed for use in marinas. Hence, we come to the problem facing your team.

Since construction costs for cargo barges used in rivers and lakes are high, and large amounts of steel and energy are needed for their construction, material alternatives need to be considered. As an alternative, you are asked to design a concrete barge that will transport packages of ore. In this case, the lighter the structure, the cheaper it is in material costs.

In order to do this, you need to experiment with cement and different aggregates that will put the density of your barge as low as possible. Your teacher will go over the factors that affect your design from concrete construction to Archimedes principle. If you follow scientific principles you may be able to build the barge of the future.

Your objective is to construct the lightest concrete barge that will carry the most weight within given design specifications. To accomplish this, the rules, requirements, procedures, and scoring are given below. If you have any questions, please contact Kevin Sparks by e-mail at kevin.sparks@csupueblo.edu or by telephone at (719) 549-2405.

Rules:

1. The barge must be cast as ONE PIECE.
2. The barge may not be painted.
3. NO additives will be allowed (unless manufacturer added to the cement, such as Types I, Type IA, Type II, Type IIA, etc.).

4. The internal form (reinforcement), if used, can ONLY be constructed of chicken steel wire no plastic or other type of mesh will be permitted.
5. The design must not exceed dimensions of 12 inches in width, 16 inches in length, and 10 inches in depth.
6. The barge concrete can only be constructed of Portland cement, water and aggregate(s).
 - a. Portland Cement - hydraulic cements composed primarily of hydraulic calcium cements
 - b. Aggregate - any inert material used for mixing with a cementing material to form concrete.

Competition Requirements:

1. Student teams must submit entries according to the overall competition rules.
2. The student team must produce a concrete barge at check-in which will be held until competition begins.
3. The student team will provide the judges with a description of their concrete mixture.

Competition Procedures:

1. Students will place the design in the test pond filled with tap water.
2. Students will add cargo supplied for testing. The cargo will consist of pre-packaged Ziploc® bags filled with sand in increments of 0.25, 0.50, 1.0, 2.5, and 5.0 pounds
3. Students will add cargo supplied for testing. The cargo will consist of pre-packaged Ziploc® bags filled with sand in increments of 0.25, 0.50, 1.0, 2.5, and 5.0 pounds.
4. The students may only touch the barge while loading. Continuous touch is not allowed.
5. Cargo will be added until
 - a. The students stop adding cargo, or
 - b. The barge tips cargo off, or
 - c. Any of the cargo touches water.
5. The students have 5 minutes to load their barge. Time will begin after the barge is placed in the test pond.
 - a) The team can conclude the test prior to the 5 minutes by indicating thus to the judges.
 - b) The team will be notified when 30 seconds are remaining.
 - c) The team will be notified when time has expired.
6. The last weight released onto the barge and is within the time limit that does not violate rule 4 will be the total weight used in the calculation for efficiency.
7. The barge contents must remain above water and/or not tip for thirty (30) seconds after the last weight is added to prove the barge is stable.

Scoring Evaluation:

1. The design must fit within a 16 inch long by 12 inch wide by 10 inch deep box (inside dimensions).
2. The weight of the barge before being immersed will be taken.
3. The total weight the barge held before tipping or sinking will be recorded.
4. The efficiency of the barge will be calculated using the following equation

$$\text{Efficiency} = \frac{\text{Cargo Weight}}{\text{Barge Weight}} \times 100$$

5. The team with the greatest efficiency will win the competition.
6. In the event of a tie, the lightest barge will be declared the winner.
7. Before awarding the final standings, all barges will be destructively tested to ensure that the barge adheres to the design guidelines.

2018/2019

BRIDGE BUILDING CONTEST

SPONSORED BY

The CSU-Pueblo Student Chapters of the
American Society of Civil Engineers & Associated General Contractors of America

1. INTRODUCTION

What would a world without bridges be like? Imagine Pueblo, Colorado Springs, or Denver without bridges. Visualize I-25 without bridges! Bridges across rivers and land forms have made the development of cities possible. People have always been interested in traveling and transporting goods from one place to another. Bridges are an important part of the transportation infrastructure in the United States and elsewhere in the world.



Figure 1: *The Charles Yager Bridge located on the West Virginia Turnpike.*

There are many types of bridges. These include beam, arch suspension, and truss bridges. Each type has its advantages and limitations. This is where you, the student, get to make the call. You are like the engineer conceiving, planning, designing, and constructing a project from start to finish. You can make your bridge traditional or you can be futuristic. Be creative! Besides being interesting, bridge design will introduce you to structural design in general.

For this contest, bridge efficiency (B.E.) will be evaluated using the following equation:

$$B.E. = \frac{\text{Maximum Applied Load at Bridge Failure}}{\text{Weight of the Bridge}}$$

Bridges will be ranked on the basis of their efficiency values. The best bridge will have the highest bridge efficiency value.

2. CONTEST RULES

You must design and construct a bridge that will meet the specifications listed below and employ the materials specified. As with any contract, you must adhere to the instructions given herein or face disqualification. The following are the rules and limitations that apply to the construction and testing.

3. MATERIALS: The bridge materials are given below.

- (a) Commercially available wooden craft sticks (nominal size 113 mm x 10 mm x 2 mm) in natural color
- (b) Regular wood glue or hot glue
- (c) Nylon sewing thread where tension members are required

4. CONSTRUCTION METHOD

- (a) Popsicle sticks can be formed into a laminate (layers glued together).
- (b) Popsicle sticks may be altered in shape.
- (c) Nylon thread can be used only as a tension member but **not** for splicing wooden craft sticks or wrapping around laminated wooden craft sticks.
- (d) Unacceptable construction is that of soaking or altering the material properties of the wood in any fashion. Glue can be used for joining or laminating but not for coating craft sticks.

5. SPECIFICATIONS

- (a) The bridge shall be constructed with an unobstructed area above the bridge deck at mid-span to allow for vertical loading on the deck from above with a 70 mm x 70 mm loading device shown in Figure 2.
- (b) The bridge shall have guardrails along its sides for safety.
- (c) The height of the bridge, including all components, shall not exceed 120 mm above the top surface of the bridge deck and the height of guardrail shall be at least 20 mm.
- (d) The bridge length shall be at least 350 mm and shall not exceed 450 mm.
- (e) When the bridge is placed on the testing apparatus, no part of the bridge deck will be higher than 50 mm above the bridge supports.
- (f) No part of the bridge will be allowed to touch any vertical face of the bridge support structure as shown in Figures 2 and 3.
- (g) The width of the bridge deck (inside dimension between guardrails) shall be at least 72 mm.
- (h) The ends of the bridge deck shall lie flat on the testing supports that are 300 mm apart.
- (i) The bridge deck must allow a tennis ball to roll end to end without falling off.
- (j) The total mass of the bridge shall not exceed 150 grams.

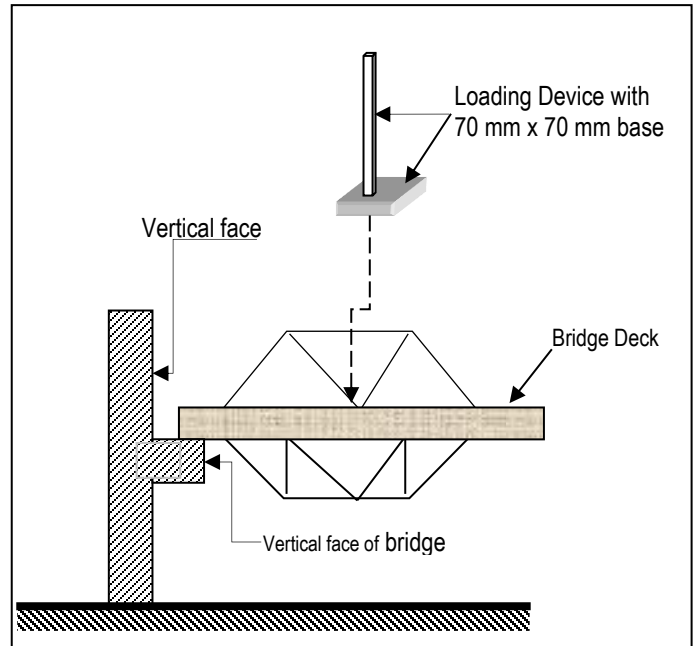


Figure 2: Configuration of Bridge Loading Device

6. SUBMITTALS

- (a) Assembled bridge in one piece, and
- (b) A list of materials used stated in common and brand names.

7. TESTING PROCEDURES

- (a) The bridge mass will be determined.
- (b) A tennis ball will be rolled across the bridge from end to end.
- (c) The bridge will be placed in the test apparatus (see Figures 2 & 3) with both ends of the bridge resting on the horizontal metal supports.
- (d) A flat metal plate (70 mm x 70 mm) will be placed at mid-span of the bridge deck to apply the test load.
- (e) The test load will be increased gradually until the bridge fails.
- (f) The maximum load reached at bridge failure will be recorded for use in computing bridge efficiency.
- (g) The bridge will be considered to have failed when any part of the bridge structure fractures under the test load or when the top surface of the bridge deck deflects to a horizontal line parallel to the bottom of the surfaces of the horizontal bridge supports.
- (h) A bridge that does not fracture during the test will be cut to inspect construction materials and techniques.

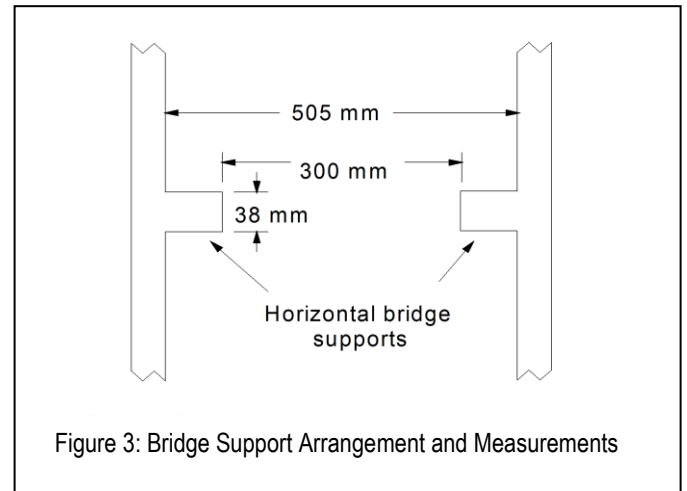
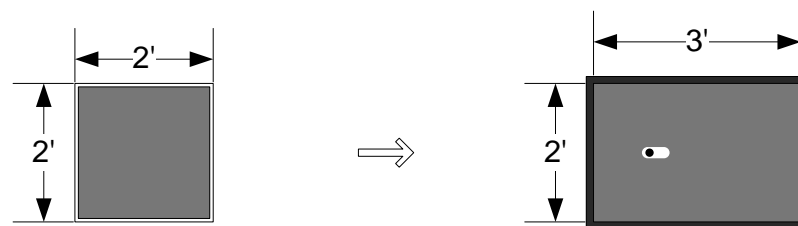
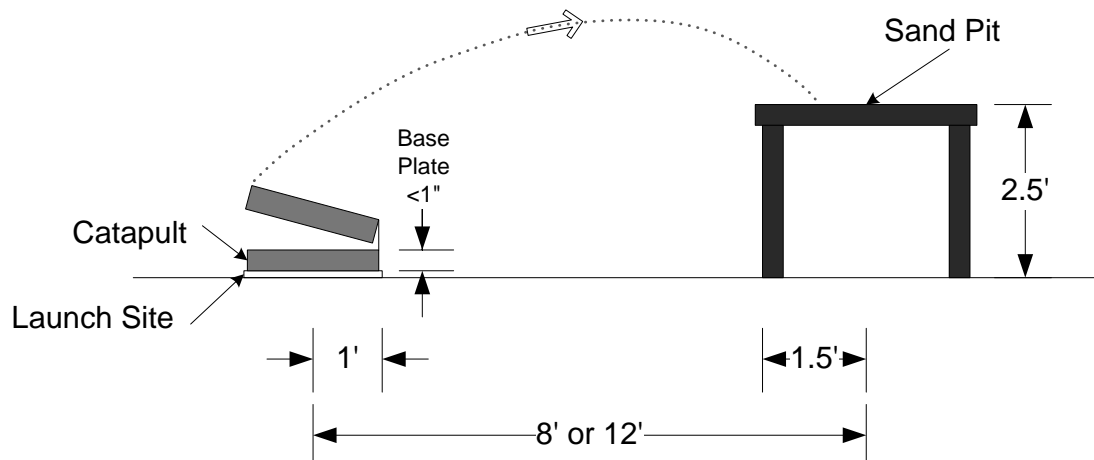


Figure 3: Bridge Support Arrangement and Measurements

MOUSETRAP CATAPULT DESIGN COMPETITION
 SPONSORED BY
 The CSU-Pueblo Student Chapter of the
 Institute of Industrial and Systems Engineers (IISE)

Background: This competition is based on the medieval catapult: a device that was used to hurl large “rocks” into an opposing force’s castle. The catapult was designed to be adjustable to meet varied conditions such as the distance from which the rocks were hurled at the castle and the elevation between the catapult and the castle.

The objective of the competition is to design and construct a catapult that shoots Ping-Pong balls using inexpensive and readily available materials.



Rules Regarding Materials to be Used:

1. A standard, commercially available mousetrap (*i.e. not a rat-trap*) will be used as a catapult to throw ordinary Ping-Pong balls into a sandpit target.
2. The competitors are allowed to use any inexpensive and readily available materials to build the catapult. Commonly used items such as plastic spoons, string, glue, Popsicle sticks, wooden dowels, rubber bands, etc. are common materials that may be used. In other words, *no titanium shafts, no rocket launchers, no explosives, etc. are to be used.* If competitors have a question about the use of a particular material, they are asked to contact the competition's sponsor to obtain a ruling.

Rules Regarding the Design:

1. The swinging arm of the mousetrap may not be assisted in the direction of throw (acceleration) by anything attached to the main body of the structure or launching surface. Simply stated, don't use rubber bands (or anything else) to boost the power of the mousetrap spring.
2. The length of the mousetrap arm may be extended. The swing of the mousetrap arm and any extension shall not be assisted by anything attached to the main body or launching surface. The throwing action must be the free action of the mousetrap.
3. The catapult may be attached to a wood or cardboard base plate no more than 1" thick. The base plate can have any width or length, as long as it fits within the launching site (2' x 2'). The plate must sit firmly on the launch surface. It cannot be used to adjust the height of the toss although it may be pivoted (rotated) for aiming in the proper direction.
4. There is no restriction on the orientation of the mousetrap. The catapult can throw the Ping-Pong balls overhand, side arm, or underhand; however, the Ping-Pong ball must, at some point from the initial firing position to the time it is released, pass within 3 inches of the base plate. Bottom line - long legs can't be used to artificially raise the height of the catapult.

The Competition:

1. Each team will bring their catapult to the competition site fully assembled and ready to compete.
2. The competitor's device will be placed within the launching site on the floor. No part of the device may extend outside the launching site before a shot.
3. The target is a sandpit with inside dimensions of 2' x 3' and it is 2.5' high. The 2' side of the pit will be parallel to the leading edge of the launching site. The distance from the center of the launching site and the center of the pit will vary ranging anywhere from 8' to 12' (see drawing).
4. The catapult may be manually held in place on the floor to steady it; however, the participants must be completely clear of the launching arm.
5. The launching arm must be set in motion by pressing the normal mousetrap release lever using a pencil or dowel stick to insure the safety of the participants.
6. Each team will be given **5 minutes to setup** the catapult in the launch site **and complete ten shots** at the target. Then, the target will be moved to a new position and the process repeated. No practice shots will be allowed; however, adjustments may be made to the device between shots. (Teams are encouraged to develop and use some method to determine the best launch parameters to use during the event. Room ceiling height may be a factor.)

Scoring:

1. Any hit within the sandpit will count equally. However, the shot must land inside of the pit and create an impression in the sand in order to count as a hit. A shot that strikes the edge of the sand pit will not count as a hit. However, if after hitting the edge, the ball lands in the sand pit creating an impression in the sand; it does count as a hit. **The team with the most hits out of twenty shots is the winner.**
2. Ties will be broken by a one shot "shoot-off" for distance. The team that can make the necessary adjustments to their catapult and get the most distance will be declared the winner.

ON-SITE CONSTRUCTION Construction Crane

Sponsored by
Society of Mexican American Engineers and Scientists



Background

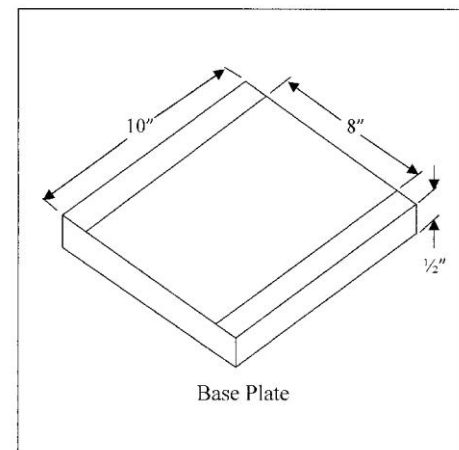
A construction crane is a machine that is used to lift, horizontally transport, and then lower materials into place. In construction, cranes are mainly used to lift heavy equipment and materials to the desired location for the construction process. With the large variety of cranes that are available, as seen in the pictures above, it is important that the proper crane be selected for each application to insure that it can safely handle the needed load while keeping costs down.

Description

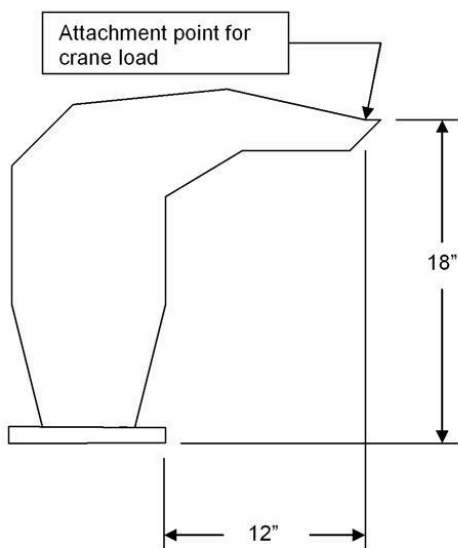
The contestants will construct a crane using craft (Popsicle) sticks and hot glue at the site of the competition. The goal is to build a crane that efficiently supports a 10 pound load from a mounting point a minimum of 18" above the table and 12" out from the base plate. Efficiency is defined as using the fewest number of craft sticks for the construction of the crane. The contestants should plan, build, and test model cranes prior to the competition so that they can perfect their design. A crane will then be built at the site of the competition using materials provided by the evaluators. The team will only be given 45 minutes to assemble their designs.

Details of the Construction

The crane structure may be constructed in any shape or form as long as it is only attached to a base plate within



the 8" x 10" area shown on the right. The structure should be glued to the base plate and within the 8"x10" area. It should rise from the base plate to meet the height and length requirements. The contestants will construct the crane using the least number of craft sticks possible and still be able to support a 10 pound weight from a point on their crane that is a minimum of 18" high and 12" beyond the base plate. The most efficient crane is the one using the least number of craft sticks for construction and still able to support the 10 pound load. It should also be noted that the structure may bend when loaded so going higher than 18" and further out than 12" is recommended to allow for flexing of the structure.



The materials cannot be fastened together in any way other than with hot glue. The craft sticks may not be cut, broken, drilled, or otherwise altered.

Materials Provided by Event Sponsors

One precut base plate (approximately 10" x 10" x 1/2") made from particle board, two hundred and fifty (250) standard craft sticks (approximate size 4 1/2" x 3/8" x 3/32"), and a yardstick for basic measurements will be provided at the site of the contest.

Materials Provided by Contestants

Detailed design plans for the crane, two hot glue guns, and glue sticks should be brought to the event by the contestants. They must be "checked in" with the judges at the beginning of the competition.

Evaluation



The construction cranes will be tested after a 15 minute cooling period. A team member will attach the unloaded frame seen in the picture to the left to the attachment point on their design. The hook pictured to the right is about the width of a craft stick, 3/8". After this is attached the device will be checked to insure that the bottom of the loading frame is not touching the table top and that the center point of the bottom of the loading frame is at least 12" away from the base plate. A team member will then be allowed to load the one pound disks at any rate desired by the team. After the last weight is placed on the crane, it will again be tested to insure that the loading frame is not touching the table. Note that the loading frame is exactly 18" in height and weighs approximately one pound. Each disk also weighs one pound so the combined weight of the loading frame and nine disks is 10 pounds.



The team that can build a crane that meets the specifications using the fewest craft sticks will be the winner of the event. The craft stick count will be based on the number of unused sticks remaining. Sticks that are attached then removed or broken will count as used materials.

Say it, Do it.
An Educational Challenge Game



Description

In *Say it, Do it* a team of two students attempts to reconstruct a Tinker Toy model using verbal instructions. This process involves the successful use of problem solving, observation, imagination, verbal communication skills, and teamwork.

Terms:

Speaker: The student who provides the verbal instructions based on their observation of the model to be constructed.

Builder: The student who builds the model based on the Speaker's verbal instructions and signals its completion by saying "our model is complete."

Model: A Tinker Toy construction. Several different models will be used; however, all will require the same number and type of pieces.

One student (the **Speaker**) is presented with a randomly selected Tinker Toy model. The Speaker then has 10 seconds to examine the model. He/she must then communicate a description of

the model through a screen barrier to his/her teammate (the **Builder**) who has been provided with the Tinker Toy pieces necessary to build the model. The second student proceeds to build a duplicate of the model based solely on the verbal instructions given by the Speaker.

Once the Builder believes the model has been completed successfully, he/she must say “Our model is complete” signifying the end of timing (see scoring below).

Teams hope to achieve a combination of completion of the model in the fastest time possible with placement of as many pieces in the correct position as possible. Students will be given 8 minutes to attempt to complete the model. Timing begins following the 30-second observation period by the Speaker. Timing ends when either 8 minutes is reached or the Builder declares, “Our model is complete.”

Rules

The following rules will be used during the Say it, Do it competition.

1. Teams consist of only two team members. Outside verbal assistance or communication from others is not allowed.
2. Team members may not communicate during the Builder observation period (30 seconds).
3. Teams may only communicate verbally during the timed building period. Team members may not pass pictures or diagrams across the screen barrier.
4. Once a model has been declared complete or the final time (8 minutes) has been reached, neither team members nor spectators may touch the model until the scoring process has occurred.
5. Only the Builder on a team can signal the end of the timing period by saying “our model is complete.”

Scoring

Scoring is based on two levels:

1st Level – Time to successful completion of the entire model with all pieces in the correct position. This will differentiate all teams who successfully recreate the entire model and will result in the highest finishing positions in the competition.

2nd Level – The number of pieces placed in the model in the correct place. This scoring level will differentiate the remaining teams who complete only a portion of the model successfully. Teams that do not complete the model and teams that complete the model but do not have all the pieces in the correct position will be scored in this level, making up the remaining finishing positions (below the 1st level) in the competition.

Key Punch A Fitness Adventure Game

Sponsored by the Department of Exercise Science, Health Promotion and Recreation



Contest Format

The Key Punch competition will be conducted in a tournament format with teams paired in head to head competition. Depending on the number of entries, either a double elimination or round robin tournament format will be used to maximize the number of times any team can compete. All teams will arrive at the competition start time and then continue to participate in the tournaments brackets as long as possible depending on tournament format selected. In a round robin format each team competes against every other team and the final placing are based on win loss record. In a double elimination format two losses are required to remove a team form the tournament bracket. The final placing is based on the amount of matches a team remains in the tournament.

Description

The Key Punch team competition emphasizes problem solving, group communication, rapid decision-making and physical agility. Two three-member teams of contestants will simultaneously enter two side by side 500 square foot marked areas, referred to as the “computer keyboards”.

Numbered disks, referred to as the “computer keys”, will be arranged randomly on the floor as illustrated in the picture above. The sequence will change for each new pair of teams. The purpose of the activity is to “punch” the 24 computer keys in sequential order (1-24) so as to debug the computer as rapidly as possible.

The teams will begin each attempt in a planning area, approximately thirty feet away from the computer screen. Once the strategy is formulated, the timing begins as all team members exit the planning area to advance to the computer screen.

Punching each “key” is accomplished by touching each disk in sequence from 1-24 with either hand or foot. Members will enter the computer keyboard one at a time from any point outside the screen’s marked perimeter to debug the keys. There is no limit to how many keys a given team member may debug (touch in sequence); however, each member of the team must touch at least four disks in sequence the first time they enter the court. Only one team member may be on the keyboard at any one time.

Once the computer has been completely debugged (all keys successfully punched in sequence), the last team member will exit the computer keyboard to stop the timing for that team. Ten second penalties will be assessed teams that violate any of the rules listed below. A judge standing on the perimeter will evaluate this possibility.

Rules

1. Each of the three team members must enter the computer keyboard in sequence at least once.
2. The **first** time every team member enters the computer keyboard, they must touch a minimum of four keys in sequence.
3. Numbers must be touched only in the sequence 1-24, i.e. team member one touches 1-4, team member two touches 4-12, etc.
4. Team members may not enter the keyboard except during their turn and must wait until the preceding team member has exited with both feet.
5. Team members may not interfere in any manner with the competing team beside them.

Violation of any of the rules above results in a 10-second penalty.

Scoring

Each matched pair of groups will be allowed one attempt taken simultaneously to debug the computer in head to head competition. The groups will be competing on separate keyboards (courts) side by side. Each groups attempt will be timed, with the best time, following any penalty additions, used to determine the winner in each match. Timing for each individual attempt will begin when the first player leaves the planning area and end when the last player returns.