

CNY Catapult Challenge Manual & Instructions

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A. Introduction to the Challenge

The CNY Catapult Challenge is an annual competition open to Junior Level (Grades 4-8) and Senior Level (Grades 9-12) teams in constructing and testing free-standing model catapults. Teams of 1-4 students can register for the competition to receive a free Catapult Kit, which they should build in collaboration with their team leader - e.g. teacher, coach, or parent. Teams then bring their assembled catapult to the event, where it will be evaluated on three metrics: distance, accuracy, and student presentation/comprehension. All catapults must pass inspection on the day of the event to qualify for competition. Please refer to [Section D](#) for inspection and construction details, and to [Section E](#) for more about catapult testing and evaluation.

B. Getting Started

Registration and Kit Collection: Register your team to request a free catapult kit and schedule your pick-up by reaching out to the event coordinator at eventcoordinator@most.org.

Design and Assembly: Start by exploring basic catapult mechanics and design principles. Refer to the “Resources and Information” section for helpful links and guidance on catapult construction. Sketch your design on paper before assembly, ensuring compliance with the event’s specifications and use of only **APPROVED MATERIALS** from the kit.

C. Catapult Kit Contents

Each registered team can request a free catapult kit containing the following materials:

- **20x** Small Craft sticks
- **10x** Large Craft sticks
- **10x** Rubber Bands
- **2x** Plastic Spoons
- **2x** Clothespins
- **1x** Bottle of Glue (Wood glue/school glue)
- **1x** Wooden dowel rod

Teams may supplement their kits with additional quantities of these approved materials, but the use of any unlisted materials is strictly prohibited.

D. Catapult Specifications and Construction

Note: Catapults that do not follow these specifications can still be tested but are not eligible for awards.

D1. Approved Materials

- Popsicle/craft sticks (any size)
- Rubber Bands
- Plastic Spoons
- Clothespins
- Wooden dowel rod
- School or wood glue (no hot glue)
- Ping pong ball (as projectile)

D2. Design Constraints

Ensure your catapult's dimensions do not exceed **8 inches in width AND 10 inches in length**.

Your catapult must be a **freestanding device on a tabletop** and may not be hand-held or airborne during operation. Participants may use their hands to operate and stabilize the catapult on the table, but it must stand on its own without being physically held aloft. Additionally, **no counterweights are allowed** to assist in the launch mechanism.

D3. Material Modifications

You may modify the provided materials (e.g., notching or cutting craft sticks or dowels) within the confines of the approved list. Lamination (e.g. gluing two popsicle sticks together) **is** permitted.

E. Testing and Evaluation Procedures

E1. Inspection for Compliance

All catapults must pass inspection before testing. If a catapult does not meet the above criteria (D1-D3), it will need adjustments before testing to qualify for the competition. A repair/supply station will be available during the event.

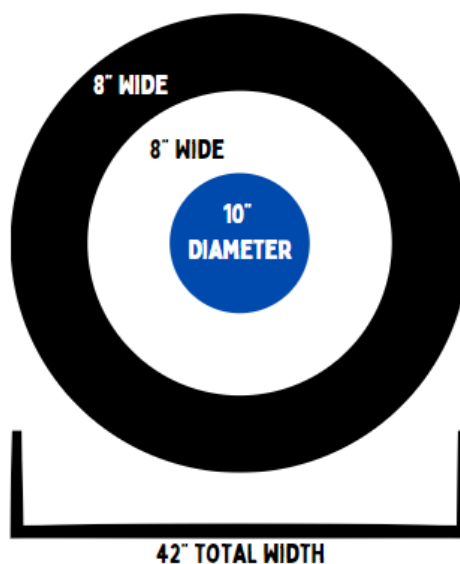
E2. Distance/Performance Testing

In the distance test, teams will launch a Velcro-covered ping-pong ball from their catapult, set on a tabletop 29" (~73cm) high, aiming for maximum distance. One student should be designated to operate the catapult, and may use one hand to hold down the catapult and one hand to pull back and launch. Catapults must remain flat on the tabletop launchpad at all times. After each launch, officials will use a measuring tape to record the distance the ball traveled from the launchpad to the point of its first impact. *The **farthest distance** out of all three trials will be used in calculating the team's final overall score.*

No modifications or repairs may be made to catapults between the distance and accuracy tests. The same catapult configuration must be used for both types of testing.

E3. Accuracy Testing

In the accuracy test, teams will receive a Velcro-covered ping-pong ball to launch, and will place their catapult on a tabletop 29" (~73cm) high and 50" (~1.25m) away from the center of a round bullseye target lying flat on the ground. The target's center has a diameter of 10" (~.25m), with two concentric rings each of 8" (~.2m) around it. (See diagram below.) One student should be designated to operate the catapult, and may use one hand to hold down the catapult and one hand to pull back and launch. Catapults must remain flat on the tabletop launchpad at all times. Scores will be based on the ball's proximity to the center of the target. *The number of points earned in each of three accuracy attempts will be **totaled** and used to calculate the team's final score.*



E4. Subjective Judging Interview

In the **subjective judging interview**, teams will spend 3-4 minutes discussing their catapult's design with our community judges. Teams will be scored on their knowledge of the engineering design process and relevant physics principles, teamwork, creativity, and design elements.

F. Awards and Recognition

F1. Evaluation Criteria

Teams will be evaluated based on the following criteria:

1. **Subjective Judging Interview:** Judges will conduct brief interviews, asking students to demonstrate their understanding of the parts of a catapult, Newton's Laws of Motion, knowledge of the DIY process, and the Engineering Design Process.
2. **Distance:** farthest out of three launches
3. **Accuracy:** total points of three launches

F2. Awards

The following prizes will be awarded at the conclusion of the event:

- Top Overall Score, 1st – 4th Place (Senior Division)
- Top Overall Score, 1st – 4th Place (Junior Division)
- Best Team Name (Senior Division)
- Best Team Name (Junior Division)
- Team Spirit

G. Resources and Information

Disclaimer: Please note that some of the links provided may showcase projects using materials not listed in our [Approved Materials section \(Section D1\)](#). It is crucial to adhere strictly to the approved materials for your catapult designs; failure to do so will result in disqualification from qualifying for awards, despite examples you might see in these resources.

<https://www.britannica.com/technology/catapult-military-weaponry>

<https://science.howstuffworks.com/transport/engines-equipment/question127.htm>

<https://www.sciencebuddies.org/stem-activities/popsicle-stick-catapult>

<https://www.sciencebuddies.org/science-fair-projects/project-ideas/experiment-with-catapults>

<https://www.instructables.com/Mini-Siege-Engines/>

H. Related NYGSS Standards:

- NGSS (Motion and Stability):
<https://www.nextgenscience.org/pe/k-ps2-1-motion-and-stability-forces-and-interactions>
- NGSS (HS Forces and Interactions):
<https://www.nextgenscience.org/topic-arrangement/hsforces-and-interactions>