

Cardboard Boat Race

Project Description:

Using only cardboard, duct tape, and their knowledge of physics concepts, teams are required to design and construct a boat that can be paddled in a 2-lap race in the Lincoln Pool.

Criteria:

- Projects must not damage school property or participants at any time.
- Teams will consist of three physics students.
- Minimum of two members per team will compete in the actual race.
- Each participant must wear a life jacket.
- Each team's boat must be propelled only by approved paddles. (made of orange juice cartons)
- Paddling is the only accepted means of propulsion.
- Boats are to be constructed out of approved materials only.
- Each boat must be given a name that is to be clearly displayed using permanent marker or insoluble paint.
- Projects must be available for inspection before the competition.

Only the following materials may be used:

- Only coated cardboard maybe used. Ex. Milk carton, orange juice carton
- There is no limit on the amount of milk cartons or duct tape that can be used.
- Duct tape must be used for attachment purposes only!
- No glue, epoxy, rubber cement, or tape other than duct tape may be used!

The race:

- The race will start with all boats sitting on the pool deck.
- When the whistle is blown, crew members will place their boats in the water, climb in, and start paddling.
- The distance covered in the race will be 2 pool-lengths. The boats do not need to be turned around at the end of each length, but the same crew member must touch the wall at both ends.
- Crews are not allowed to interfere with the progress of other teams. Any team interfering with the progress of other teams will be disqualified.
- A team's boat will be considered "sunk" when the life jacket of one of the crew members is in contact with the water for 5 consecutive seconds.
- In the event that no one finishes the race, the winner will be the team with the largest distance covered.

Evaluation:

This project is worth 140 points and will be graded on the following criteria:

- Peer and self evaluation. Boats will be evaluated based on quality, performance, and originality.

(10 pts.)

- Documentation. Students must provide documentation including sketches, modifications, design principles, and calculations. Photographic evidence of completed boat needs to be submitted by 5/27/13 (50 pts.)

- Design quality. Instructor will award points based on quality of design. (20 pts.)

- Performance (60 pts.)

Each team will earn 30 pts. for a boat that floats with passengers aboard.

Other points will be distributed as follows:

Winners: 30 pts.

2nd place: 29 pts.

3rd place: 28 pts.

4th place: 27 pts.

5th place: 26 pts.

6th place: 25 pts.

7th place: 24 pts.

8th place: 23 pts.

9th place: 22 pts.

10th place: 21 pts.

Extra Credit:

Extra credit will be awarded in the following categories:

- Best costumes or best theme

- Best use of engineering principles

Timeline:

5/16/13: Calculation of minimum boat volume needed to support crew

5/20/13: Submit scale model of proposed boat and appropriate calculations

5/24/13: Paddles must be submitted to room 42

5/27/13: Evidence of completed boat must be submitted (picture, video, etc.)

5/28/13: Final to scale drawing is due before start of the race

5/28/13: Boats must be delivered to Room 42 before school on the day of the race

5/28/13: Regatta begins immediately after school.

Minimum Volume Calculation:

Teams must calculate the minimum volume of water a boat must displace in order to float with all desired racers aboard.

Preliminary Scale Model:

Teams must construct and sketch a scale model of their proposed boat. (scale must be

indicated)

- Must be done on some form of technical paper (graph, engineering, etc).
- Defense of design principles must be included.

Final Scale Model:

- Same criteria as preliminary model must be met.

Paddles:

- Paddles must be brought in to the classroom on or before 5/24/13
- Only approved paddles may be used in the competition!

Regatta:

- Boats must be delivered to Room 42 by the beginning of school on 5/28/13
- Teams delivering boats later than 7:40 a.m. will be penalized.
- At least one team member must accompany the boat when it is delivered.
- Teams must be ready to compete by 7th period.

*Project subject to changes