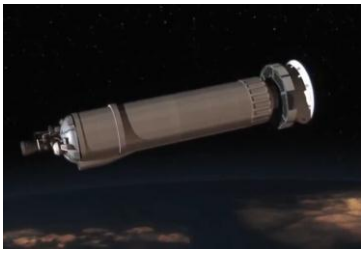


Centaur 50th Anniversary Engineering Design Challenge "Pushing the Limits"

Student Design Challenge Guide

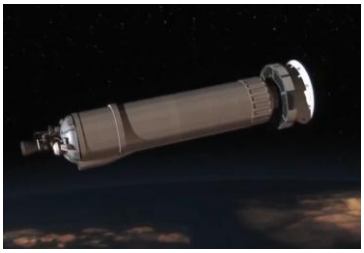
The Challenge:

Students will design and build a self-propelled vehicle that uses air pressure (propellant) contained in a common rubber balloon that can transport a single removable payload (25 gram weight) as it travels along the ground on a "Challenge Field Map" from a "Launch Site" to a " Mid-point Area", and then to a "Rendezvous Point". During the traveling process the self-propelled vehicle will be required to come to a complete stop in order to make a mid-course directional correction. After the vehicle has made its mid-course correction, it will need to restart and propel itself to the final Rendezvous point on the challenge field map**.**

- **Required Materials:** Various construction and or art supplies (no restrictions)
- Balloons (Any type or size allowed)
- 3-ounce Paper Cup (I.e. Dixie cup)
- Paper Clips
- Pencil
- Tape measure
- 5-foot by 12 -foot floor space
- Other various materials to construct the following rocket vehicle components
    - Wheels and Axles
    - Payload framing
    - Connector/attachment for propellant containers (balloons) onto vehicle
    - Starting and/or stopping mechanisms

Design Challenge Rules:

1. The vehicle must be able to self-propel itself with the use of a common rubber balloon/s.
2. The rubber balloon is to be used as a "propellant container" which can be any size, shape or length.
3. Rubber balloons are the **ONLY** type of containers that will be allowed for propellant storage and can only be filled with human or canned air.
4. No other types of propellant containers other than rubber balloons are permitted.
5. There is no limit to the number of rubber balloons used on or about the vehicle.
6. The vehicle must be able to carry a single **removable** payload which consists of a standard 3-oz Dixie cups filled with paperclips weighing a total of 25 grams.*
7. Vehicle must be able to start from the "Launch Site" and propel itself to the specified mid-point area which it will need to come to a complete stop.
8. Once the vehicle has made a complete stop at the mid-point area, the vehicle will need to be rotated towards the "Rendezvous Point". This rotation can be done by a single student lifted the vehicle and manually turning it towards the



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Rendezvous Point, or the vehicle can be operated by remote control, but **"ONLY to rotate"** the vehicle. Teams who can rotate their vehicle without touching it with human hands will receive bonus points towards their overall score.

9. In the case that a student will need to manually rotate the vehicle, a marker will be placed on the field map to designate the mid-point starting position.
10. The vehicle is **NOT** allowed to have any robotic components that will propel the vehicle in any way. Using robotics with propel capabilities will be disqualified.
11. Once the vehicle has made its mid-course correction, it must re-energize and re-start its propulsion system and travel to the "Rendezvous point" which will be marked by a three-ringed bulls-eye.
12. Points will be given to teams according to where the "payload" is located over the bulls-eye. The vehicle's payload must land within the three-ringed bulls-eye to obtain points for their team.
13. Teams will have two chances to propel their vehicle from the "Launch Site" to the "Rendezvous Point". The top score of the two matches will be used towards their final overall Challenge score
14. The vehicle cannot be larger than 15cm width by 25cm length, and has no restrictions for its height. These dimensions are solely for the vehicle and do not include the size of the balloon.
15. The vehicle may be constructed out of any material/s and has no weight restrictions.

* Note: A pre-weighed payload will be provided for teams to use at the formal Design Challenge Event