Rice Bag Catapult

DUE: _____

PROBLEM: To use your knowledge of projectile motion to design a mechanically loaded catapult that will fire a 1/4 cup filled rice bag and accurately hit a target placed at 20 feet

Note: Making the project is relatively easy. Getting it to work accurately is where the main problems occur. Make sure you test your device beforehand.

SPECIFICATIONS

1. The catapult must use some lever design. No cannon type designs will be acceptable.
2. The catapult will be fired in the Commons or the hallway by the stairs up to Com Arts.
3. The projectile shall be a rice bag made of approximately 1/4 cup of rice put in some sort of plastic, rubber or cloth bag or pouch. The more loosely packed the less likely it will side.
4. The catapult should be built out of scrap materials, well constructed and should not self-destruct, or hurt the operator when fired.
5. All catapults will be fired from the floor. No books or other supports will be allowed during the testing (unless they are originally incorporated in the catapult)
6. The catapult should be provided with some type of triggering mechanism allowing the catapult to be fired on command.
7. You should make your catapult adjustable so that you can make changes for each trial.
8. You may work in groups of 1, 2, or 3 members.
9. The day of the activity, each group will get 3 trials. Your best trial counts.
10. An extra credit trial will be taken for who can launch their rice bag the farthest. You must use the same catapult as used for the 20 foot target but adjustments can be made to the original design to make the bag go farther. Only one trial will be allowed. A misfire counts as a trial.

GRADING 50 points

5 POINTS will be awarded on overall design
5 POINTS will be awarded for a triggering mechanism
5 POINTS will be awarded for making the projectile (rice bag). Group members' names on the bag!
10 POINTS will be awarded for a typed journal that explains in detail how you came up with the design for the catapult. Each time your group meets or a member works on the catapult should be a new entry in the journal and you should document what you did toward the design of the catapult on that work day. (You should note who was present and what was accomplished.) Then in the last entry you should explain in a paragraph what your group learned from doing the project. You must also include pictures of you and your group planning and building your catapult. (Be sure group members present at building are all included in the picture.) (Grading – 5 points for written entries and summary, 5 points for pictures)
20 POINTS will be awarded for hitting the center of a target placed at exactly 20 feet from the firing line. 1 point will be deducted for each foot the projectile finally lands away from the center of the target.

Measurements will be taken from where the projectile pouch ends up not where it initially hits.

Note: If your projectile hits the center and bounces the measurement will be taken from where it finally lands not where it initially hits. Make sure the projectile you design meets the characteristics of your catapult.

Group Members: _____

Grading Rubric for Rice Bag Catapult

Overall Design – 10 points _____

- Design is of original construction
- Catapult is still usable after 3 trials
- Design is original

Triggering Mechanism – 5 points _____

- Catapult can be launched by some sort of trigger as opposed to holding it back and simply letting it go

Creation of Projectile (Rice Bag) – 5 points _____

- Rice bag is still usable after all trials
- Rice bag is made with ¼ cup of rice
- Bag has group members names on it

Journal– 10 points _____

- Documentation of each meeting/work day (3 points)
    - Who was present
    - What was accomplished
- Last entry - explain what you learned in full sentences (2 points)
- Pictures taken during all phases of construction, showing group members (5 points)
- (One paper per group)

Hitting exactly 20 feet – 20 points _____

- 1 points deducted for each foot away
- You get the best of 3 trials

Trial 1: _____

Trial 2:_____

Trial 3:_____

TOTAL POINTS OUT OF 50 _____