

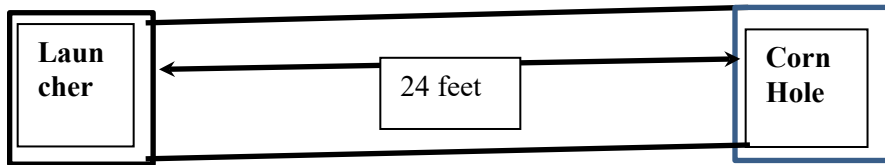
LEVEL:	Middle School/High School
NUMBER OF TEAMS:	One (1) team per school can participate at the MESA Day state competition. Up to three (3) teams can participate at MESA regional events.
TEAM MEMBERS:	Two (2) to Six (6) Students per Team
OBJECTIVE:	Students will design a device to launch regulation Corn Hole bean bags at a regulation Corn Hole board to score 21 points in the fewest number of throws Students will also be required to submit their Video Journal during specification check for review and scoring.
MATERIALS:	Any materials that coincide with the design parameters may be used to build the launcher. Hazardous materials are not allowed. Teams may use their own Corn Hole target provided it conforms to regulation parameters,

DESIGN PARAMETERS:

1. Bean Bags must be regulation size
 - a. Size: 6 in by 6 in
 - b. Weight: 15-16 oz
2. Any launcher design is allowed unless deemed unsafe by the judges. Unsafe designs could include use of compressed gas (other than air) and/or caustic materials.
 - a. If compressed gas is used, teams should document at least one successful pressure test to 150% of maximum launch pressure in their Design Notebook to assist in the judge's safety evaluation.
3. The Corn Hole target must be regulation size.
 - a. Hardwood plywood playing surface measuring 47.5" to 48" x 23.5" to 24".
 - b. The playing surface has a minimum thickness of 1/2" with cross-section backing, or 3/4" with or without cross-section backing.
 - c. Each hole is 6" diameter, centered 9" from the top of the board and centered from each side edge.
 - d. The front of the board is 3" to 4" from the ground to the top of the playing surface.
 - e. The back of the board is 12" from the ground to the top of the playing surface.
 - f. The playing surface should be finished -sanded to a very smooth texture. There should be little to no blemishes in the wood surface that may disrupt or distort play.
 - g. The playing surface can be painted with a high gloss latex paint or varnish. The surface should allow bags to slide when thrown, but not be so slippery that the bags slide back down the platform.

TESTING PARAMETERS:

1. Two (2) team members are required to be present during testing.
2. The throwing lane will be 48 inches wide.
3. The front edge (or closest point) of the Corn Hole target will be placed of 24 feet away from the throw line.
4. No part of the launch device may pass the throw line.



MINIMUM SAFETY EQUIPMENT:

1. All team members participating in the launch must wear plastic hard hats and goggles.
2. Team members shall remain behind the launch line during testing.
3. Teams should bring their own safety equipment. A set of hard hats and goggles will be available at the event if needed.

SPECIFICATION CHECK:

1. During specification check, all teams will check in to the competition area and submit their launcher, Corn Hole target, bean bags and Engineering Poster for impounding. Teams not arriving during spec check will be receive a score of zero. See event agenda for exact times.
2. Immediately upon submission for competition, each launcher, all bean bags, and target receives a specification check to determine whether it conforms to dimensions, materials, and construction rules. Any launcher or receptacle which fails the specification check will be given a performance score of zero. Neither may be modified for competition during or after judging.
3. Judges **may disqualify** any entry if, in their opinion, the testing of the device might create a safety hazard for spectators, team members, or property (i.e. sharp edges).
4. Corn Hole targets will be tested to ensure that they meet measurements for size, hole placement.
5. Devices (launcher and target) must be in testing condition prior to device inspection. If devices are disqualified during inspection check, design changes will not be allowed. Only devices passing inspection will be allowed to participate in the performance tasks.
6. Repairs are allowed, replacement parts and materials only, and all repairs must be done in the impound area under supervision of a judge. The addition or exchange of parts that, in the opinion of the judge, would alter the design or function of the launcher or target is NOT allowed. No tools or supplies will be available at the event. Teams should bring any repair tools and repair materials with them.
7. All repair materials to be used during the competition must be impounded with the device. Tools may be kept by the team and need not be impounded.
8. After clearing specification check, all launchers and targets will be impounded until testing.

JUDGING:

1. Teams (including launchers and targets) must be ready for competition when called or forfeit that launch.
2. Teams will be given as many launches as needed to score 21 points.
3. All team members participating in the launch shall wear at least the minimum safety equipment prior to starting launch set-up until launching is complete. If any team member fails to wear the minimum safety equipment, the team will receive a zero score for that launch.
4. Launch set-up is limited to two (2) minutes.
5. Teams are required to use their own bean bags.
6. The team member responsible for operation of the device will indicate to the judge that the devices are in the “ready-to-operate” condition.
7. Judges will give the launch order and students may release their bean bag.
8. Teams must launch, at minimum, three (3) bean bags before adjusting their launcher and/or collecting bean bags.
9. Teams may launch, at maximum, ten (10) bean bags before adjusting their launcher and/or collecting bean bags.
10. Team will be allowed, at maximum, 40 launches or 10 minutes, whichever comes first.

SCORING CRITERIA:

1. Point system for bean bags:
 - Misses the target – 0 points
 - Any part of bean bag on target – 1 point
 - Any part of bean bag over hole without going through – 2 points
 - Entire bean bag falls through hole – 3 points
2. Bean bags can be pushed through the hole by other beans bags.
3. Score Points will be totaled for Score (S).
4. The Launch score is the total of all Launches (L).
5. The Performance score is found by dividing Score (S) by the Launch Score (L) multiplied by 10.
For example, if a team needed 15 shots to score 21 points their Performance Score is $21/15 \times 10 = 14$
6. The Final Score is the Performance Score * Video Journal Score
7. In the event of a tie, the team with the shortest time to reach 21 points will be the winner.



Event Specifications
Cornhole Catapult
MESA Day 2022

School: _____

Student Name: _____

For Official Use Only

Specification Check

Pass ☐

Fail ☐

1. Team arrived on time for spec check and impounding

Yes

No

2. The target is regulation size?

Yes ☐

No ☐

3. Launcher is safe for competition?

Yes ☐

No ☐

4. Bean bags are regulation size?

Yes ☐

No ☐

If the answer is No for any of the above checks, the team is disqualified

Time	
Number of shots	
Score from shots	
Performance Score (Score/Launches * 10)	
Video Journal Score	
Total Score	

Judge's signature: _____

Student signature: _____

Score Tracker Sheet
L = Launch, S = Score
Use to tally score during competition

L	S	L	S	L	S	L	S	L	S
1		9		17		25		33	
2		10		18		26		34	
3		11		19		27		35	
4		12		20		28		36	
5		13		21		29		37	
6		14		22		30		38	
7		15		23		31		39	
8		16		24		32		40	

Time to complete: _____

**Rubric for Video Journal
(VJ).**

Category	3	2	1	0
1. Define the Problem				
- Problem is clearly identified - Definition of Problem makes aligns with problem statement in specifications - Definition of Problem matches solution	All	Most	Some	None
2. Initial Design				
- Picture of sketch of initial design is present - Sketch can be clearly seen - Sketch is aligned to objective as specified objectives in specifications	All	Most	Some	None
3. Design 2				
- Changes from Initial Design to Design 2 are visible and/or marked - Sketch/Prototype can be clearly seen - Design 2 is clearly marked as Design 2	All	Most	Some	None
4. Reasoning for change from Initial Design to Design 2				
- Reason(s) for change(s) are based on testing - Reason(s) for change(s) make logical sense - Reason(s) for change(s) keep prototype aligned to Problems Statement	All	Most	Some	None
5. Design 3				
- Changes from Initial Design to Design 2 are visible and/or marked - Sketch/Prototype can be clearly seen - Design 3 is clearly marked as Design 3	All	Most	Some	None
6. Reasoning for change from Design 2 to Design 3				
- Reason(s) for change(s) are based on testing - Reason(s) for change(s) make logical sense - Reason(s) for change(s) keep prototype aligned to Problems Statement	All	Most	Some	None
7. Final Prototype				
- Final Prototype addresses the problem statement - Final Prototype is clearly visible - Final Prototype is clearly marked as Final Prototype	All	Most	Some	None
Audio is clear and does not distract from video			Yes	No
Video Journal is 5 minutes or less			Yes	No
School name is part of journal			Yes	No
Competition name is part of journal			Yes	No
Total				