

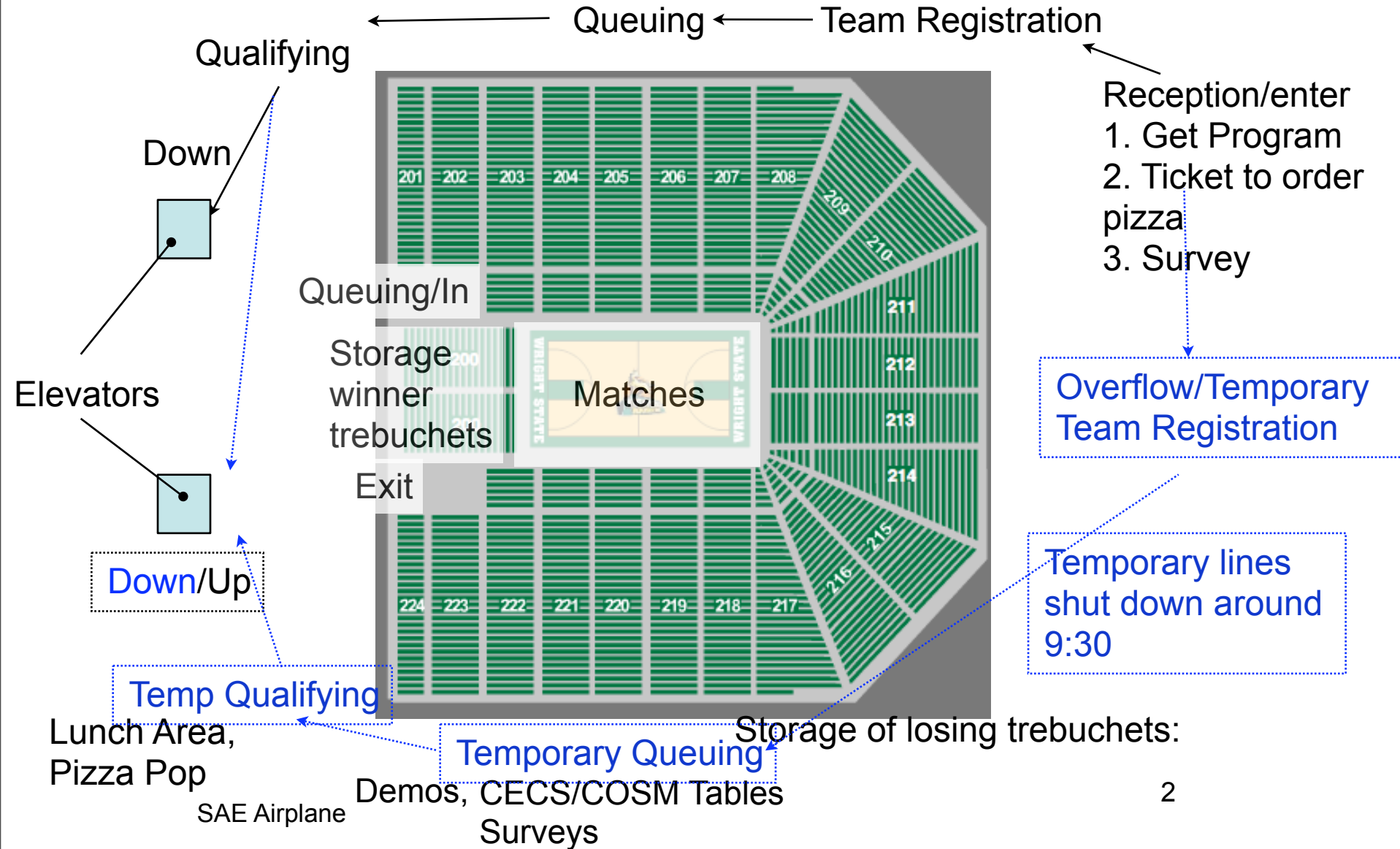
Wright State University 9th Annual Trebuchet Competition

**Colleges of:
Engineering and Computer Science
Science and Math**

**Friday, January 30, 2009, 8 AM - 2 PM
Ervin J. Nutter Center, Main Arena**

Please arrive as early as possible. We will start setup at 6:30 AM

Flow



Reception

- Tickets to individual students
 - Inform that tickets are for getting surveys after they have completed the event
 - Completed survey gets a t-shirt

Team Registration

- Makes sure complete teams exist
- Checks trebuchet feet to make sure they aren't damaging
- Hands out trebuchet qualification sheets
AS NEEDED
- Hands out Team Qualification Sheets
 - Assign Team numbers
 - Mark tops of trebuchets with permanent marker: #-letter (e.g. 21A, 21B, 21C, 21D)

Qualification Setup

~25-30 Tables

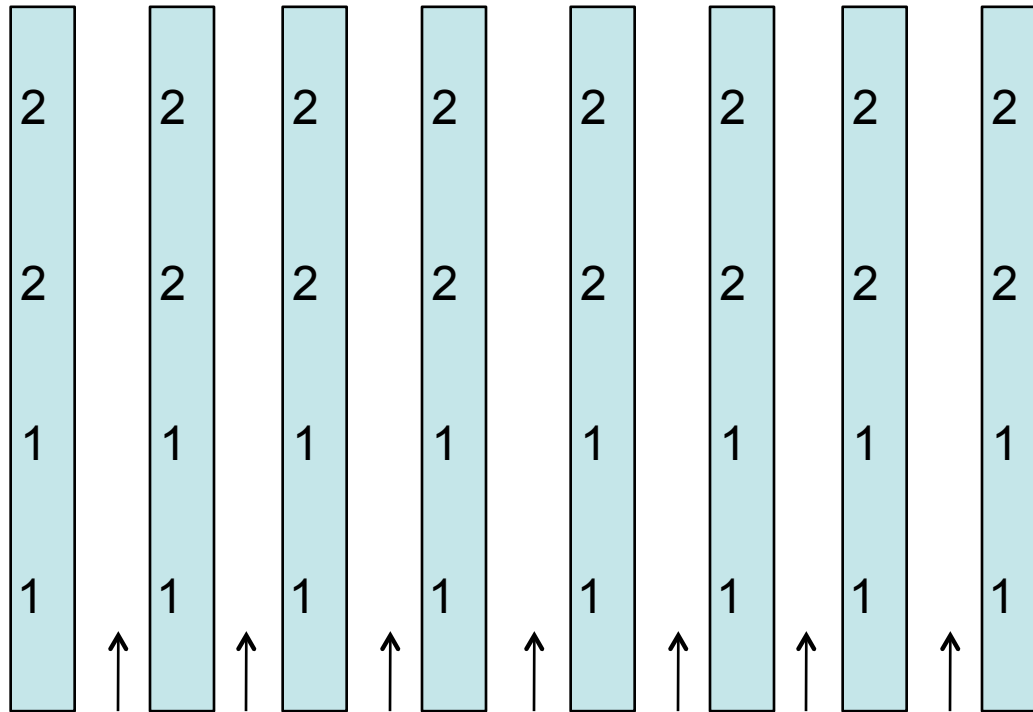
Qualifying Manager

Disqualified

Second Chance Table

Weight Check

Qualified/Second chance



T_{1A/B} T_{1C/D} T_{2A/B} T_{2C/D} T_{3A/B} T_{3C/D} T_{4A/B} T_{4C/D}

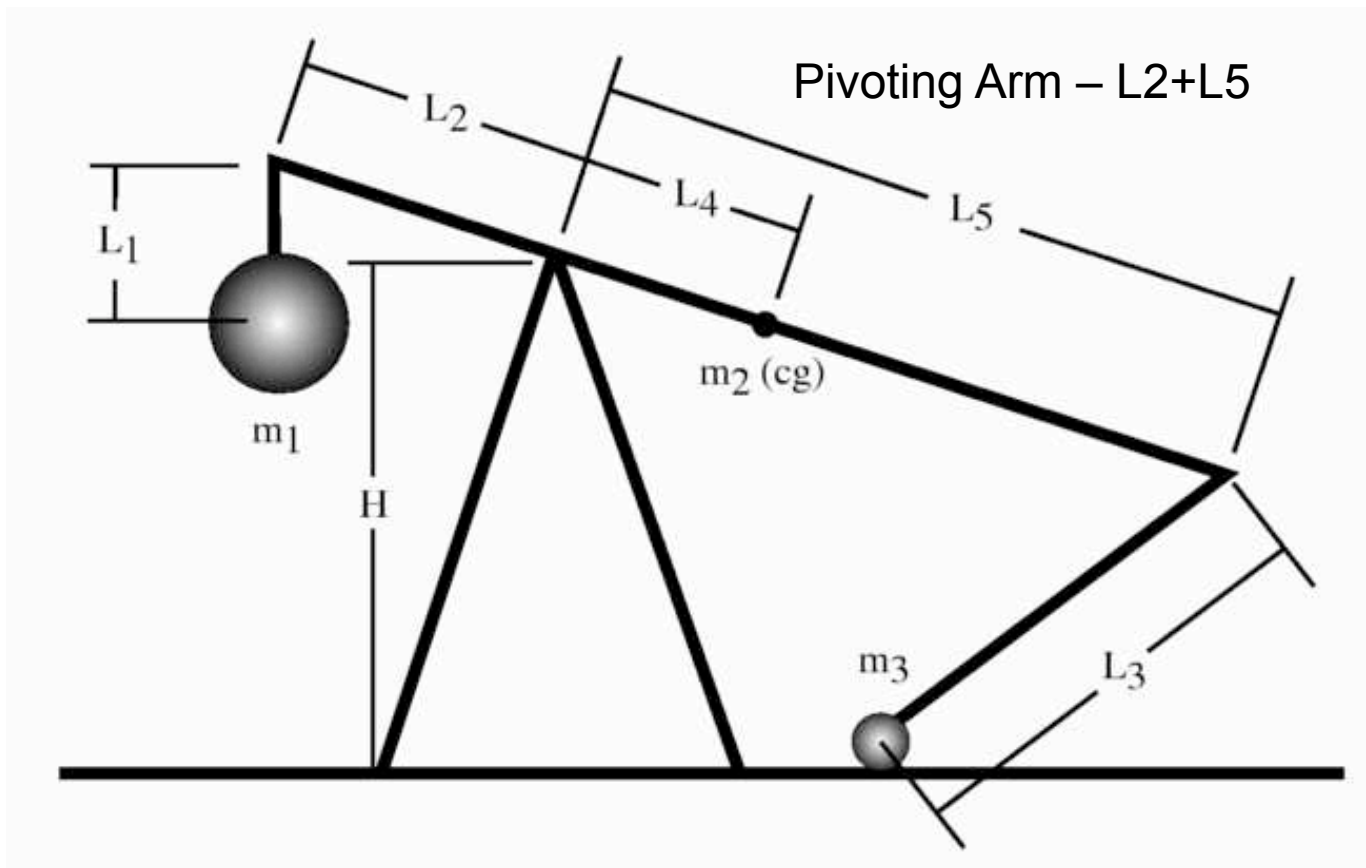
Waiting area for the next team in line -- NO REPAIRS ALLOWED IN THIS AREA

32 @ qualification tables + 1 @ Weights + 2 @ Second chance table + 1 @ directing traffic near the QT's + 1 @ calling the teams from the staging area + 2 @ leading them to the elevators (inform the floor about the qualified teams). With 39 volunteers we can qualify 4 teams at a time in the beginning and then we can bring it down to 2 teams at a time and release 16 people from the QT's.

Qualifier 1

Check for:

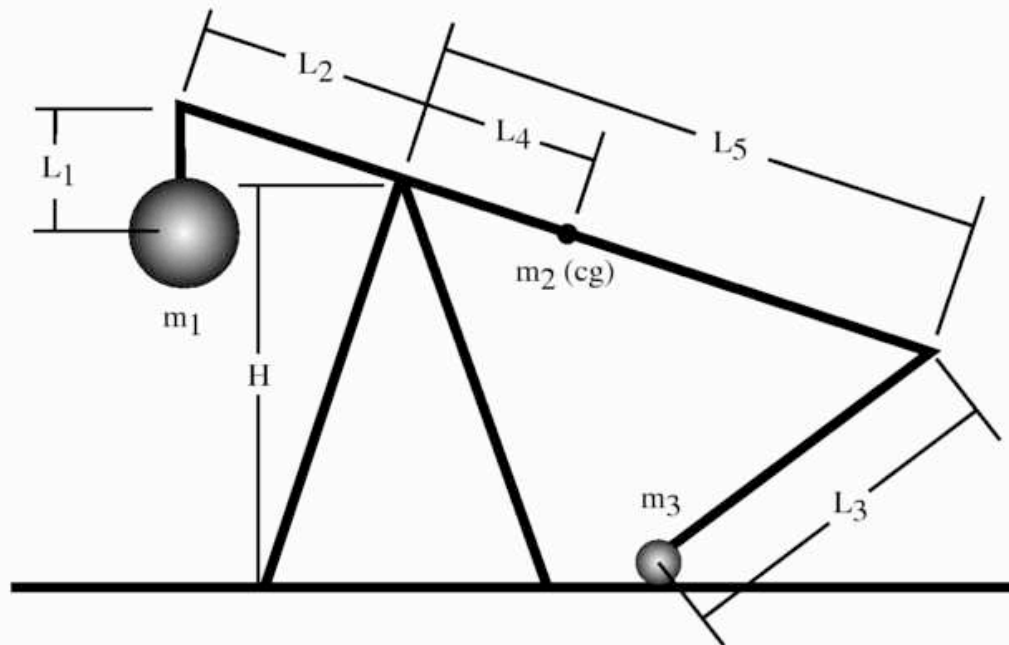
- 1) **Is the trebuchet safe?** No loose parts are allowed that will break free
- 2) Trebuchet will throw at least 30 feet – **Just check the box**
- 3) **Top pivoting lever > 1/4" thick**



Qualifier 1

Check for:

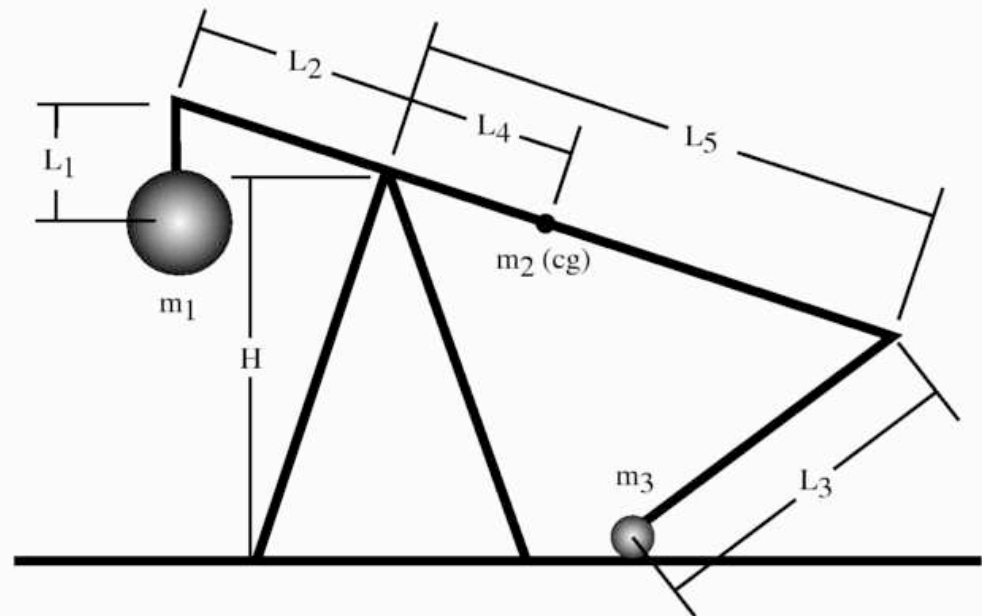
- 1) Counter weight (m_1) is **two un-opened 12 oz. soda pop cans (or less)**
- 2) The counterweight must be either **a) dangling throughout the entire throwing motion** (makes no contact with other parts of the trebuchet lever arm (L_2+L_5 in the figure)) **OR b) must be rigidly attached to the arm** (can't slide, jiggle...).
- 3) **Is the counterweight attached such that it doesn't come free on its own.**



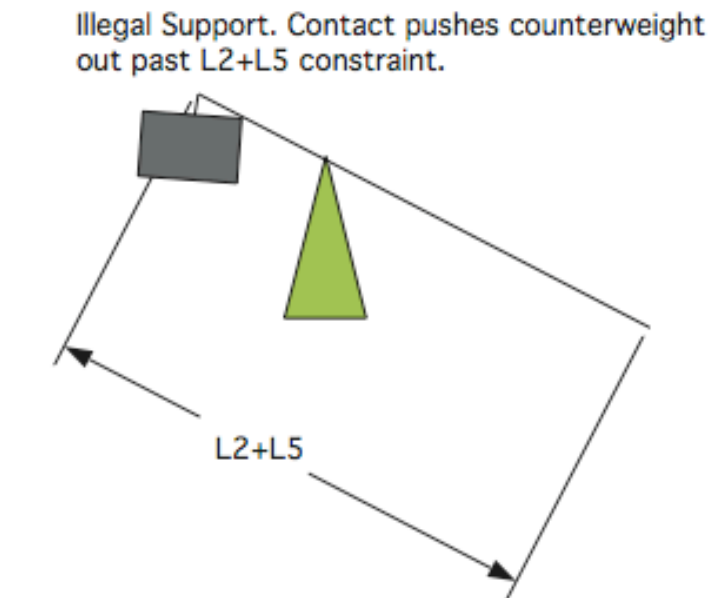
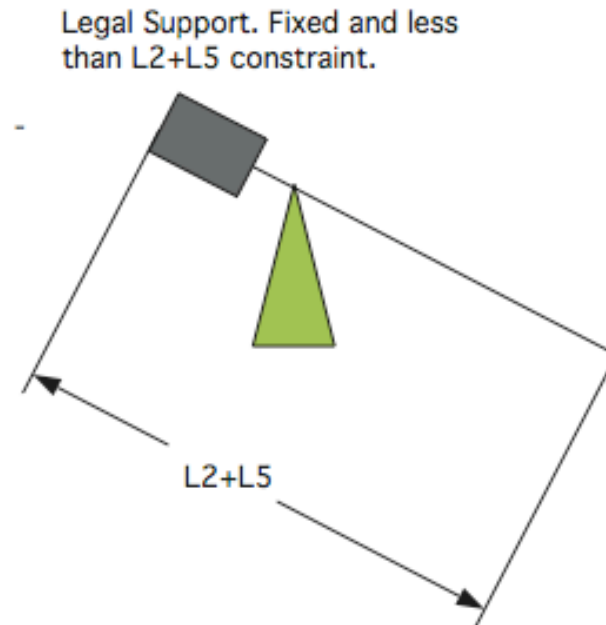
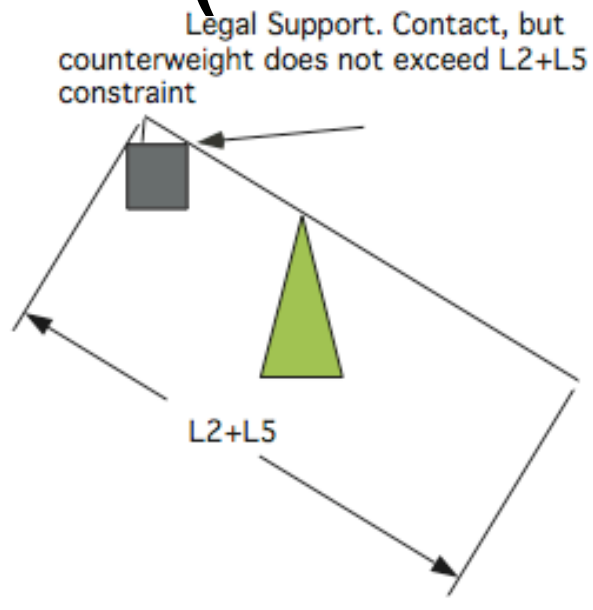
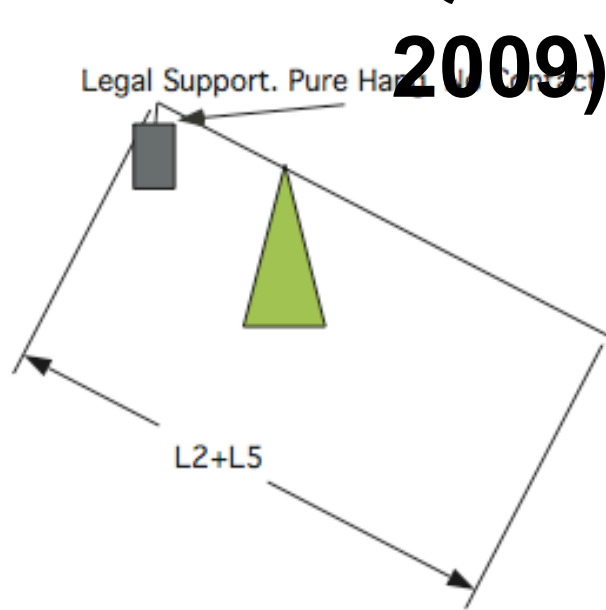
Qualifier 2

Check for:

1. The **top pivoting lever** (length **L_2+L_5**) must not be able to lift off the ground in the **cocked position until the counterweight is attached**. Any fastening devices/holders/brackets to be used during the competition will be included as part of the arm during testing for balance.
2. The **top pivoting lever must be balanced toward the projectile end** (**L_5 end**) throughout the entire range of motion.
3. The top pivoting lever (**L_2+L_5**) must not be longer than **12'**. This length includes the hook.
4. The top pivoting lever (**L_2+L_5**) may not be collapsible.
5. **Mark the Pivot Point!**



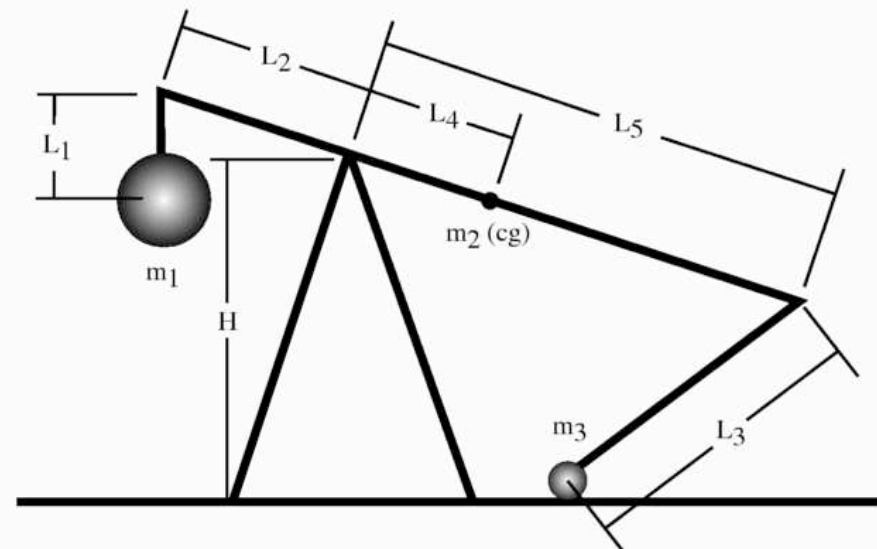
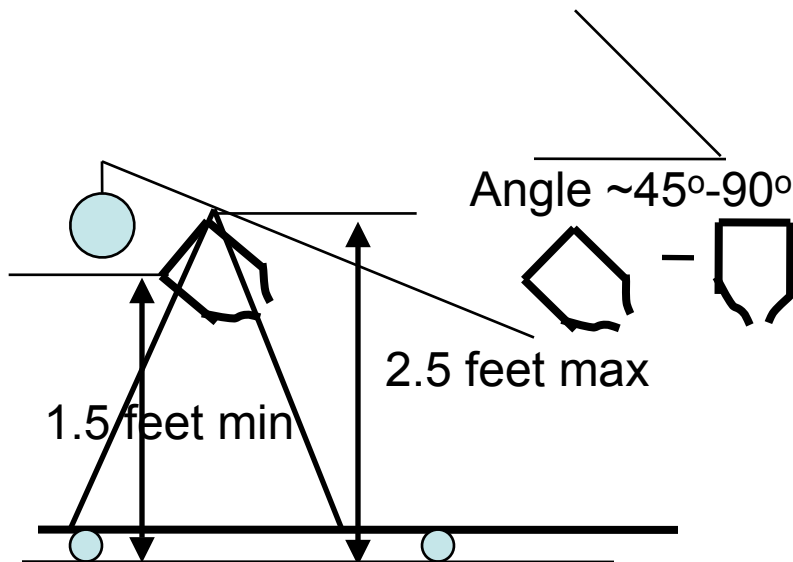
Qualifier 2 (unnecessary 2009)



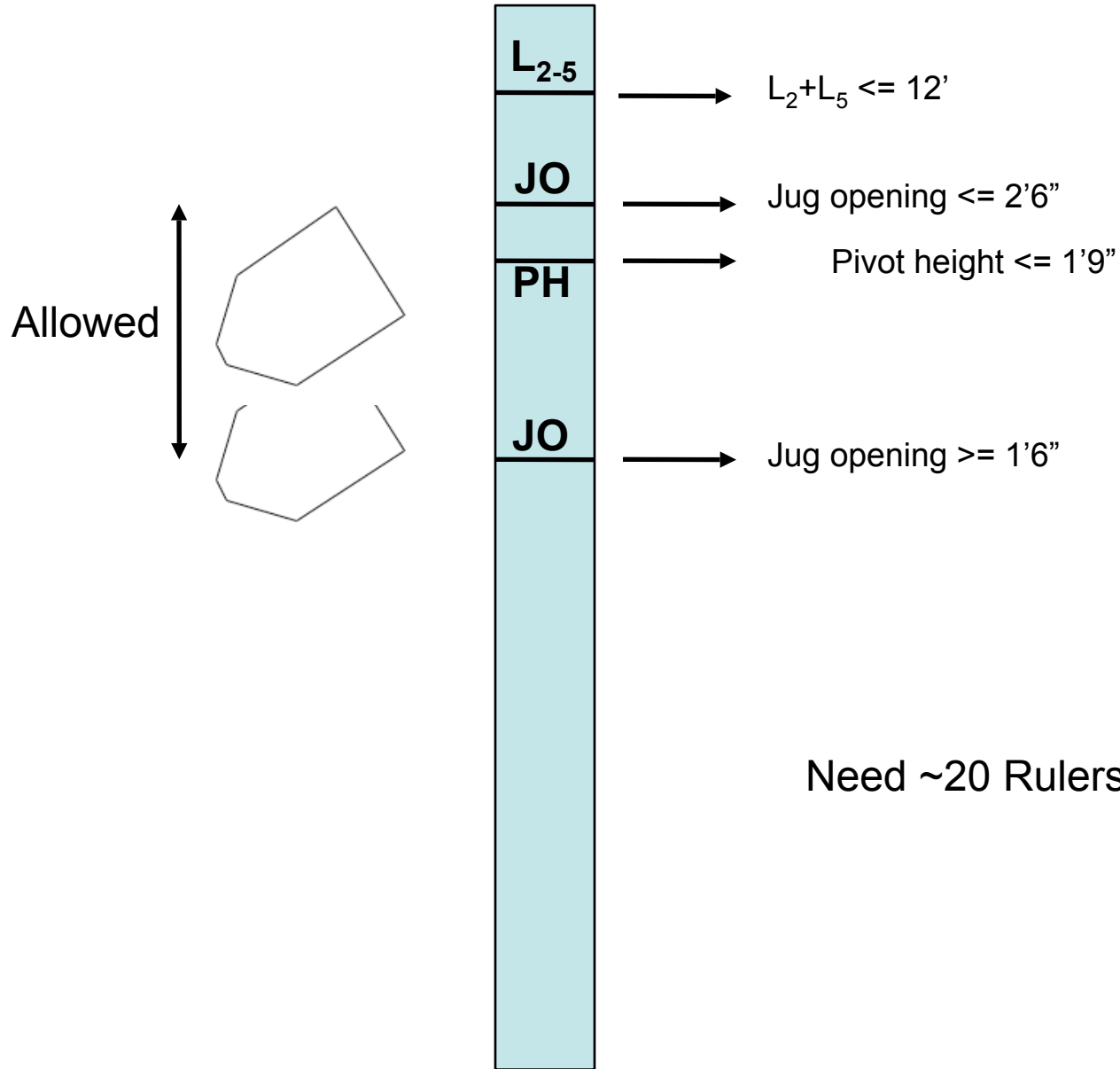
Qualifier 2

Check for:

1. The height of the pivot point (**H**) must be less than or equal to 1 feet 9 inches.
2. Each trebuchet must be outfitted with **one plastic 1 gallon milk jug target** mounted on the side of the trebuchet in a clearly exposed area.
3. The milk jug is to have the bottom 1" cut off and be inverted.
4. The target opening must be **no less than 1.5 feet from the ground, and no more than 2.5 feet from the ground.**
5. It must be **forward facing, and on the front most pillar** or support of the trebuchet. It can be mounted **at a decline to the direction of fire of up to 45 degrees** (pointing forward and up).
6. **Trebuchets with inadequate targets will not be allowed to participate.**



Measurements for Q2



Weight table

- Random checks of counterweights
- Use super-secret knowledge of reasonable counterweight mass

Trebuchet Qualification Checksheet
(must be completed by team advisor and accompany trebuchet to the competition)

Trebuchet Number: _____
(To be filled by judge)

Qualification Requirements	Adv. Check	Judge Check
Trebuchets, and/or their platforms, must have soft feet (felt, or cloth). No rubber or wooden feet are allowed to touch the ground.		
Recoiling trebuchets (with wheels) must be on a platform (board) to stop rolling motion.		
Is the trebuchet safe? No loose parts are allowed that will break free.		
The trebuchet shall consistently throw a squash ball a horizontal distance of at least 30 feet before ground impact to qualify.		
No catapults or catapult/trebuchet hybrids are allowed. No energy can be stored in deformation of components. That means no springs, rubber bands or flexible arms. No pulleys can be used. The counterweight must be attached, not looped over, the end of the arm (or in close proximity). Top pivoting lever must be greater than 1/4" thick.		
The counterweight (see mass m1) is two un-opened 12 oz. soda pop cans.		
The counterweight must be either: a) dangling throughout the entire throwing motion (makes no contact with other parts of the trebuchet lever arm (L2+L5 in the figure)) OR b) must be rigidly attached to the arm (can't slide, jiggle...).		
Is the counterweight attached such that it doesn't come free on its own.		
The top pivoting lever (length L2+L5 on the example figure) must not be able to lift off the ground in the cocked position until the counterweight is attached. Any fastening devices/holders/brackets to be used during the competition will be included as part of the arm during testing for balance.		
The top pivoting lever must be balanced toward the projectile end (see L5 end) throughout the entire range of motion.		
The top pivoting lever (see L2+L5) must not be longer than 12 feet. This length includes the hook.		
The top pivoting lever (see L2+L5) may not be collapsible.		
The height of the center of the pivot point (H) must be less than or equal to 1 foot 9 inches.		
Each trebuchet must be outfitted (i.e. come to the tournament ready) with one plastic 1 gallon milk jug target mounted on the side of the trebuchet in a clearly exposed area. The milk jug is to have the bottom 1" cut off and be inverted. The target opening must be no less than 1.5 feet from the ground, and no more than 2.5 feet from the ground . It must be forward facing, and on the front most pillar or support of the trebuchet. It can be mounted at a decline to the direction of fire of up to 45 degrees (pointing forward and up) if necessary (i.e. so that it is even more exposed). This is what the other teams will shoot at. The operator may not protect the target during competition. If you do not understand these rules, the simple explanation is "put it where everyone can easily hit it." Trebuchets with inadequate targets will not be allowed to participate.		
Judge has dated (year only) and signed trebuchet.	XXXXXXX	

Check all that apply

Not pre-qualified		Other - put note on back	
Failed 1st qual		Failed 2nd qual	

Qualification Judge's Signature

Team Qualification

- Team is officially formed as a team
- Sign off on team (next page)
- Announce to Floor (Dr. Hill) that team is coming
- Send to elevator/queuing assistants

TREBUCHET COMPETITION

Team Qualification Sheet

- You must have it signed off after qualification.
- You must get it back after you win a match
- You are called by team number. Remember it.

Team Number: _____

Team Name: _____

Penalties (mark box): "from Trebuchet Qualification check sheet"

	Trebuchet Letter			
	A	B	C	D
Not pre-qualified				
Failed 1 st qual				
Failed 2 ^{nt} qual (OUT)				
Other (see back)				

Trebuchets checked (initial for pass, x for fail):

A	B	C	D

Team in Good Standing

"Judge's Initials"

Referees:

- Not pre-qualified: 1 free barrage from other team for each trebuchet not pre-qualified EVERY match.
- Failed 1st qual: Other team gets free barrage at trebuchet before 1st round match (mark completed once performed).
- Failed 2nd qual: Trebuchet is out of Competition
- Other TBD

Floor Queuing

- Announce teams have arrived to Floor/Hill
- Instruct where to go, when to go there, what to do if lose or win.
- Educate, as possible, on how the matches are run.

Matches

1. Penalty Barrages

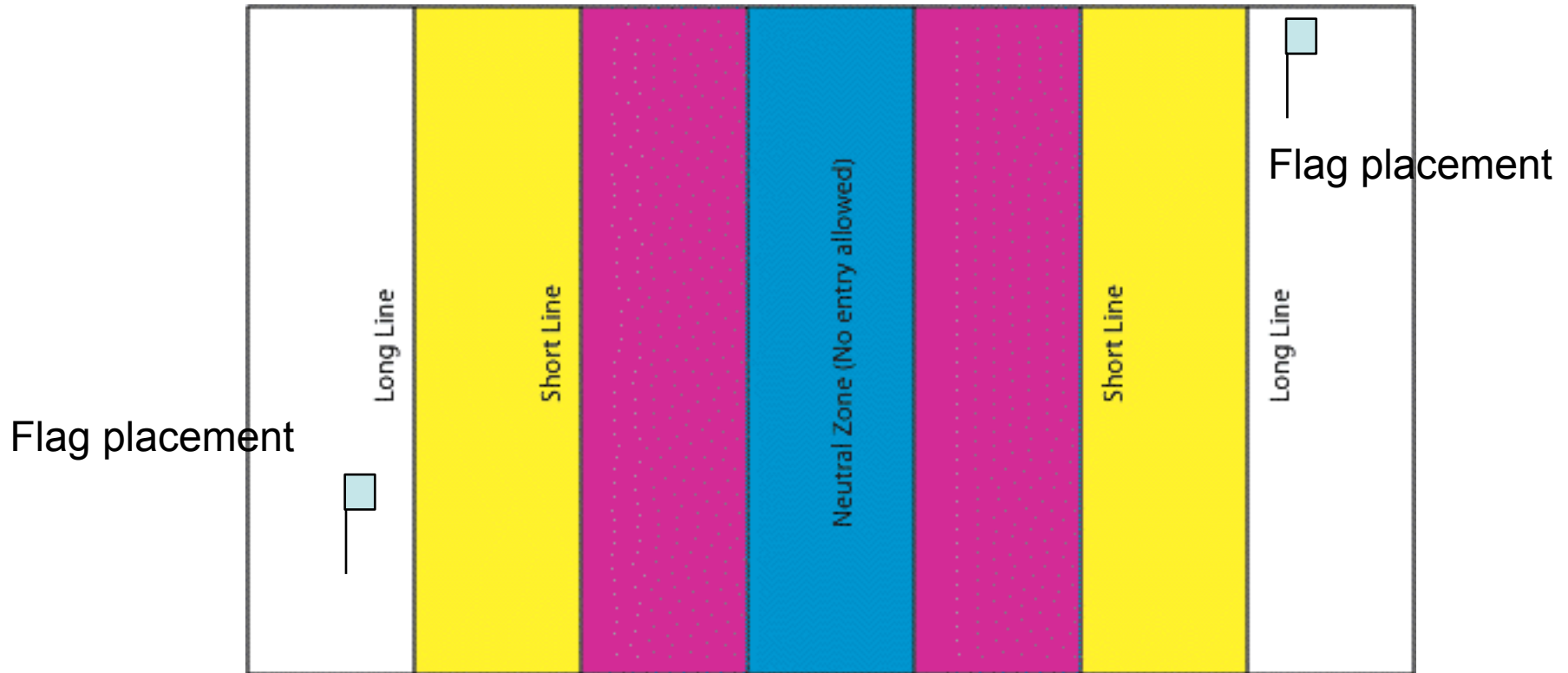
1. Teams will be subject to 1 barrage per incomplete pre-qualification sheet per match. (Please come pre-qualified).
2. Individual trebuchets will be subject to 1 barrage per qualification failure **in the first round only.**

2. The Playing Field

1. The matches will take place in the Main Arena of the WSU Nutter Center.
2. Captains will have 5 minutes to position their Flags and trebuchets.
3. Trebuchets may be positioned any place left/right on your side of [the playing field](#), outside of the Neutral zone.
4. All but one trebuchet will be positioned at start by the captain on or behind the "Long Line". The remaining trebuchet **must** be positioned between the Short Line and the Long Line.
5. At each end of the playing field, there will be a single flag representing the opposing team's castles. In order to win, a team must either knock out (**hit**) the opposing team's flag or eliminate all opposing trebuchets. The flag pole/base is not considered to be part of the flag. **Flag size may be changed between matches (in order to expedite matches), but will always be equal for both sides during any given match.**
6. The boundaries of the playing field will be marked.
7. **Bounces count!**

Playing field

- Start by getting captain
- Get them to pick location of flag and other trebuchets
- All but one trebuchet will be positioned at start by the captain on or behind the "Long Line". The remaining trebuchet **must** be positioned between the Short Line and the Long Line.



3. Firing

1. The match will start at the sound of a horn. Trebuchets fire-at-will once the match starts. Trebuchets that aren't ready are valid targets for the opposing team. Trebuchets that aren't set up as targets when the match begins may not enter the playing field during the match.
2. Trebuchets are eliminated by hitting their targets. See [graphic](#).
3. Trebuchets eliminated from competition are eliminated for the remainder of the match. They may be "rebuilt" to "fight another day".
4. Friendly fire may destroy a trebuchet by making hitting the trebuchet's target.
5. Trebuchets may not destroy an enemy target using anything other than a projectile.

4. Moving

1. A clock judge will be responsible for timing advancement on the match field. At the clock judge's determination, trebuchets may advance one line (i.e. from the Long Line to the Short Line, or from the Short Line to the Neutral Zone Line) or retreat.
2. Only 10 seconds will be allowed for the move.
3. Both teams will move during the 10 second period, and no firing can take place.
4. There will be only two moves in the entire match.
5. Trebuchets may not screen one another, or be positioned to screen their flags.
6. You may not advance your trebuchet outside of the playing field.
7. Trebuchets may be pivoted (rotated) for aiming.
- 8. Trebuchets may not pivot for the purpose of dodging a projectile.**
- 9. No match will be given more than 20 minutes, including setup time. If a match ends by decree, then the judges will vote for a winner.**

5. Miscellaneous

1. Operators must not interfere with in-flight projectiles. Operators who are considered to have potentially protected one of their targets by interfering, intentionally or not, with their bodies or other trebuchets will have that target removed. Hint, don't stand in front of the flag. You become the target to hit if the judge thinks you are in the way.
2. No part of the trebuchet may interfere with an opponents projectile. If a projectile hits a part of a trebuchet that shades the target (the trebuchets target, or the flag), the trebuchet is considered to have been hit. Advice: after firing, get the arm back out of the way.
3. You may not hoard ammunition. You must return ammunition that your team is not using. If your team at any time has **75%** or more of the projectiles (there will be a total of 20 or more), the assistant must send (by rolling) no less than 10 projectiles to the opposing team. Targets hit while the opposing team is low an ammunition will be considered undamaged.
4. All judge decisions are final. Under no circumstances shall a video replay of an event be used to reverse a decision.

End of Match

- Winners stay in bleachers at the end of the court
- Losers leave out to the concourse to store their trebuchets and continue as observers