

Mission Possible (Div B)

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MISSION:
POSSIBLE

**DO YOU ACCEPT
THIS CHALLENGE?**

Students will design, build, test, and document a Rube Goldberg-like device that completes a required task through an optional series of specific actions.



- Device made of a series of actions
- Device must run autonomously
- Specific Start and End Task
- Use up to 12 unique actions defined in the rules (once each)



- **Impound at Regionals**
- **Impound at the State Tournament**



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SAFETY FIRST

Students must wear high impact safety spectacles and the device must be free of hazardous materials.

Unsafe devices must not run and teams receive only participation points



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Students will be allowed to remove unsafe items during their set-up time. Once the device is declared safe, it will be allowed to run.



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SAFETY FIRST

3.h. There is a 9-volt limit on the only circuit.

3.j. Candles, flames, matches, hazardous liquids, gases, materials (e.g., rat traps, lead objects, combustible fuses, dry ice, liquid nitrogen, flammable gas), and unsafe handling of chemicals are not permitted.



NO

- Spring timers over 10 sec.
- Use of electricity except action 3c.X
- Dimensions over 1 m.

Set-up

If teams can set-up their device and have it ready to run in 30 minutes or less, they will be awarded 50 points.





Be sure to check, double-check, and triple-check the device so that it meets all construction parameters and is reliable.

Violations are serious! Even one!

- **Starts and ends correctly**
- **Operates autonomously**
- **Consecutive sequence**
- **Visible-top & 2 sides open**
- **No parallel paths**
- **No dead-end paths**
- **Use each object used only once**
- **All tasks must contribute**
- **Include a timer**



THE START=100 pts.



Drop an unaltered golf ball into the device from above it so that it initiates the next action.



Size does count! The device must get through the door!

Penalty points will be assessed for each dimension greater than 60 cm.

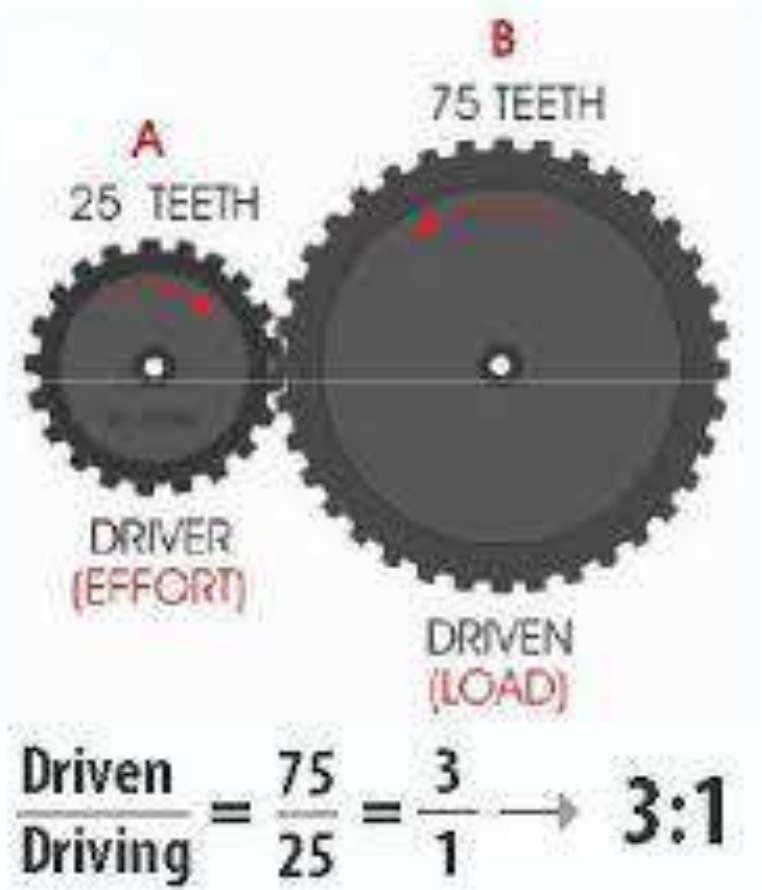
.1 point awarded for each .1 cm under 60 cm./dimension (1 pt. per cm.)

Be sure each dimension is under 60 cm. Dowels, rods, bolts, the plunger, etc. sticking out the device are measured too.

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Each action can only count one time.

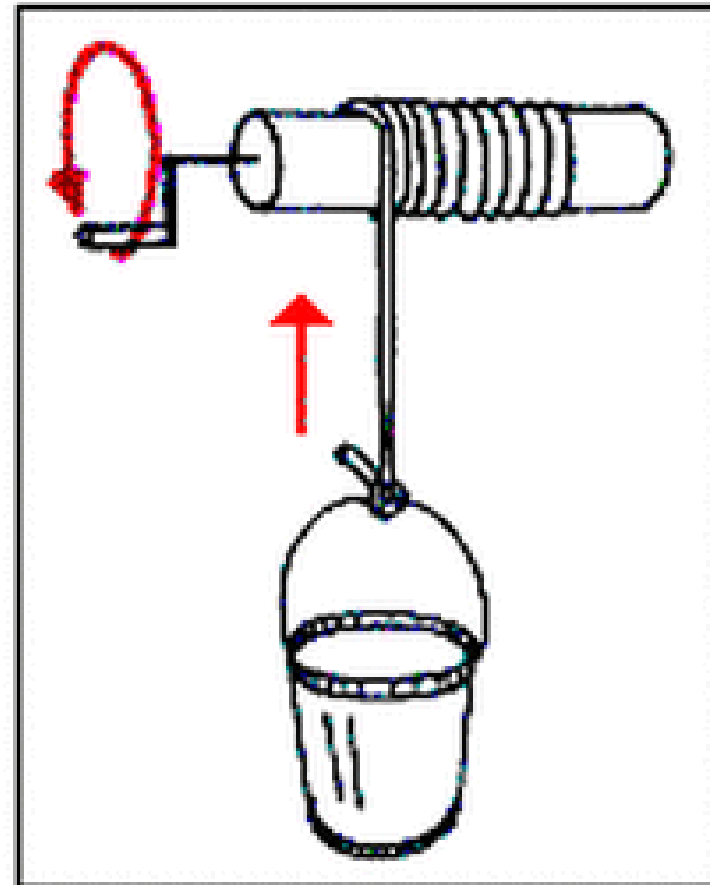
I. Use a 3:1 ratio gear system to initiate the next action.



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II. Rotate a wheel & axle to raise a golf ball ≥ 10 cm. vertically so that it then initiates the next action.

Each action can only count one time.





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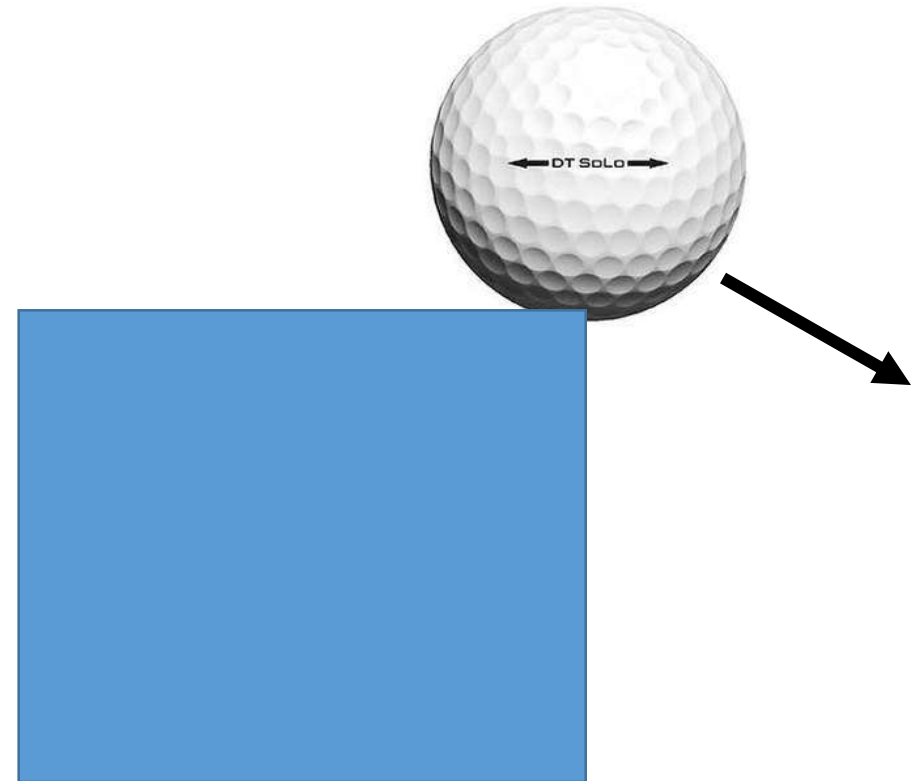
III. Knock over a series of 4 dominos so the last one initiates the next action.





Each action can only count one time.

IV. Add water to a container to raise a golf ball located in the same container at least 5 cm so that the golf ball rolls out of the top of the container and initiates the next action.



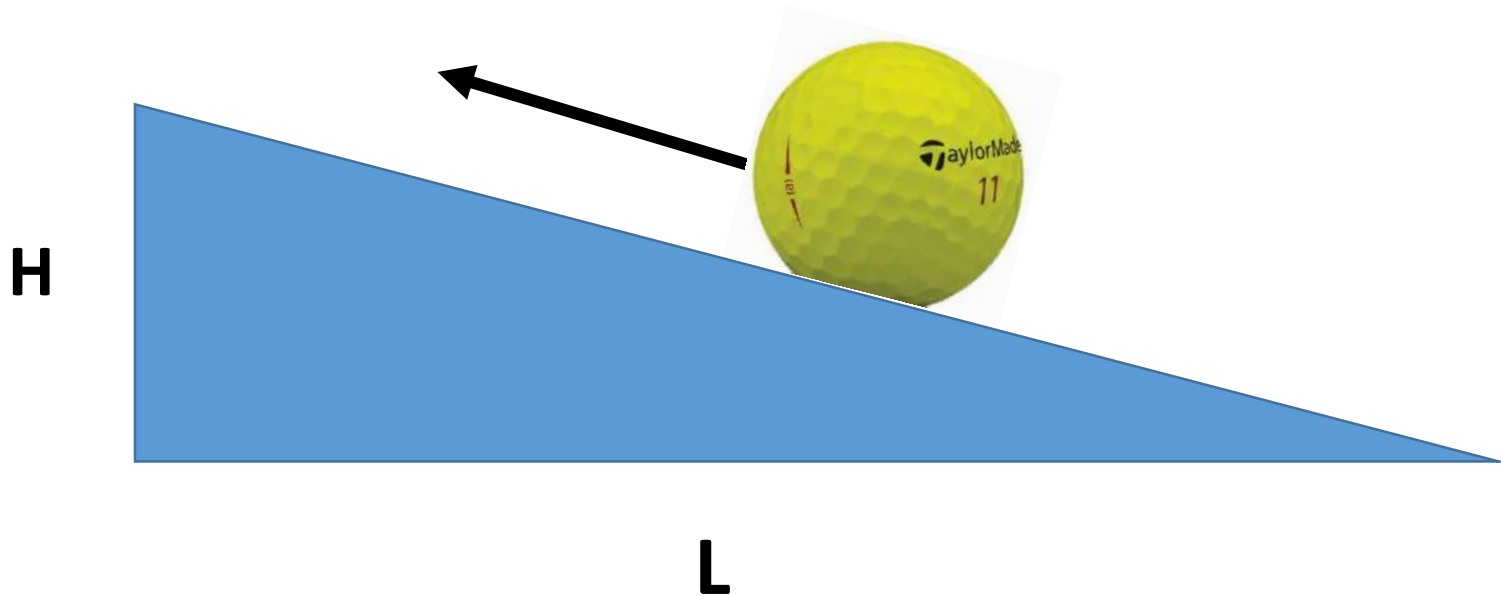
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V. Rotate a screw to move a wingnut ≥ 2 cm horizontally so that it contacts an object which initiates the next action.



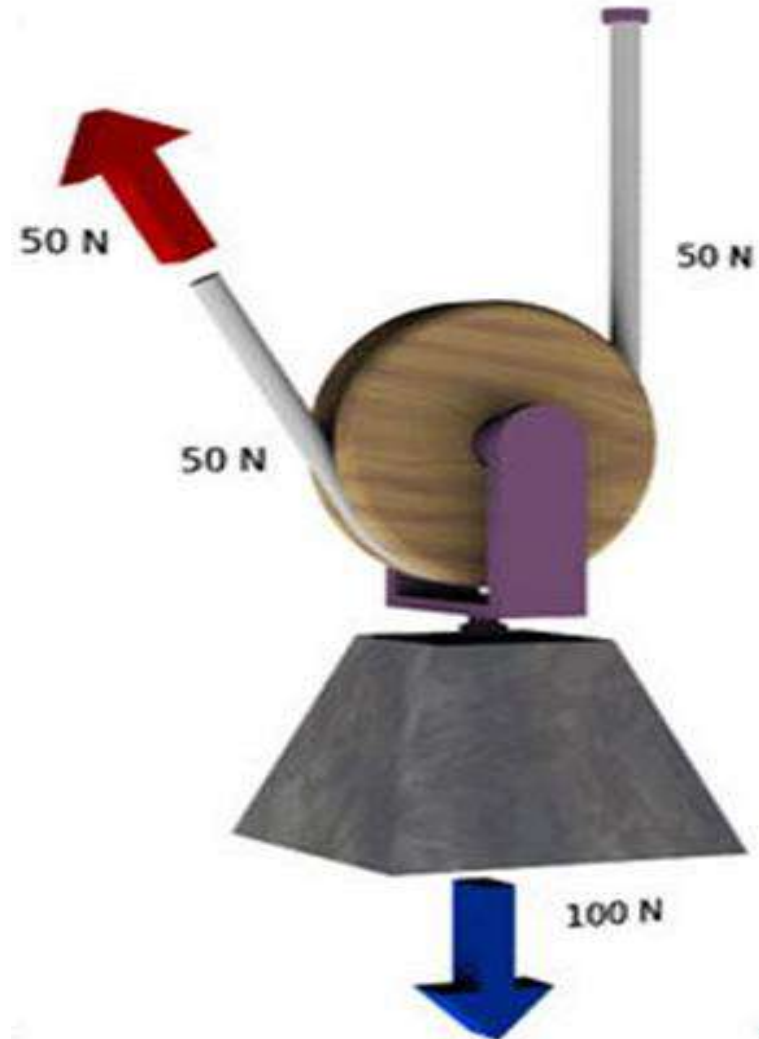
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VI. Push or pull a golf ball ≥ 10 cm. vertically up an inclined plane with an IMA ≥ 2 before the ball initiates the next action.



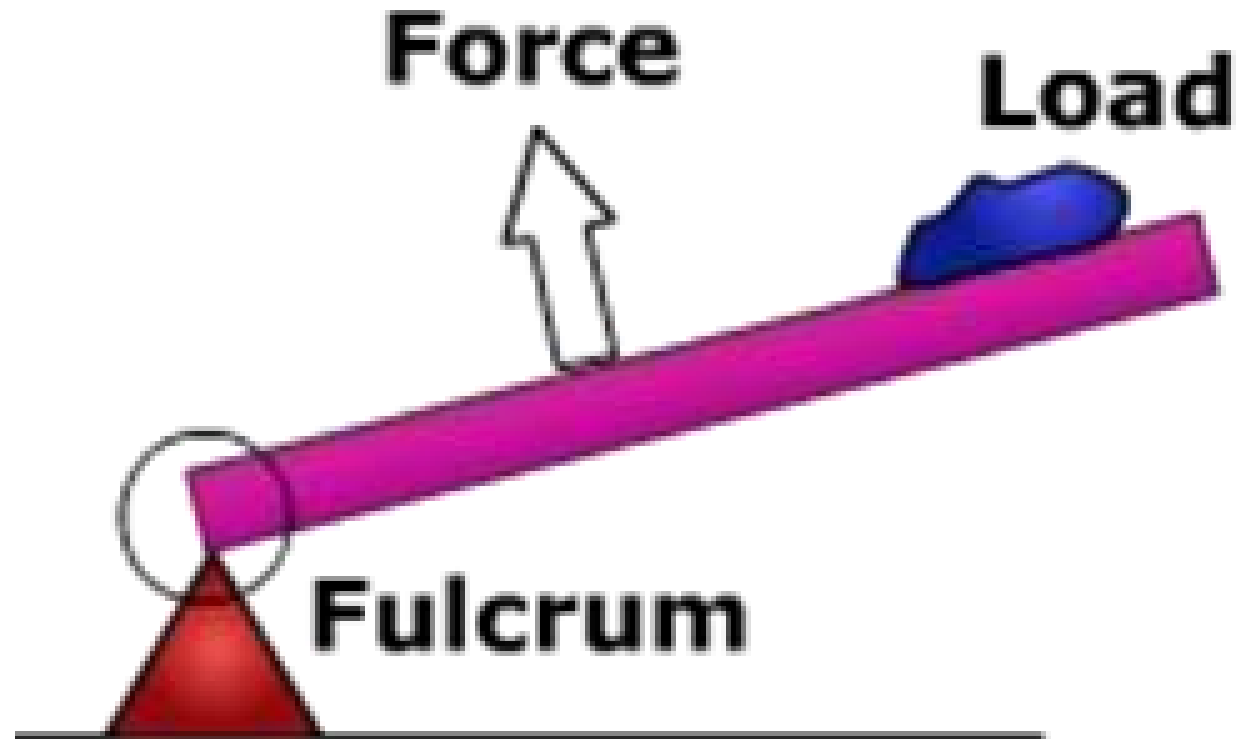
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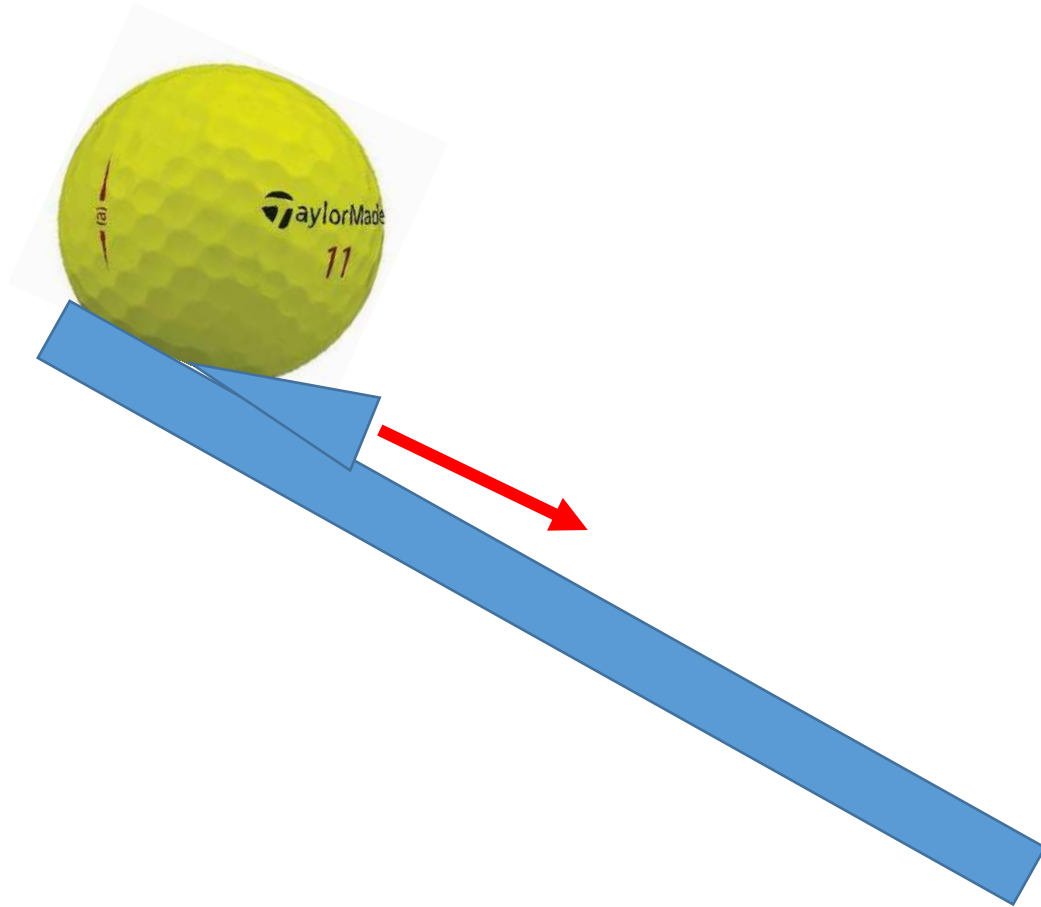
VII. Use a pulley system with an IMA ≥ 2 to lift a golf ball ≥ 10 cm. vertically **before** it initiates the next action



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VIII. Use a 3rd class lever to raise a golf ball ≥ 5 cm. vertically, **then** the ball initiates the next action.

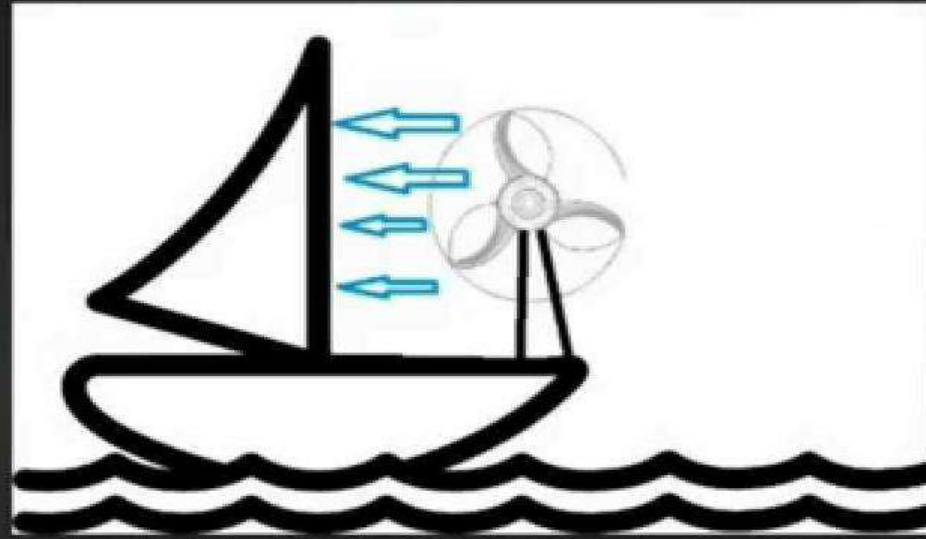




IX. Remove a wedge from under a golf ball so it rolls 20 cm. and **then** initiates the next action.



X. Use 9v. to power a stationary fan to move air to push a floating object ≥ 10 cm. on water to initiate the next action.

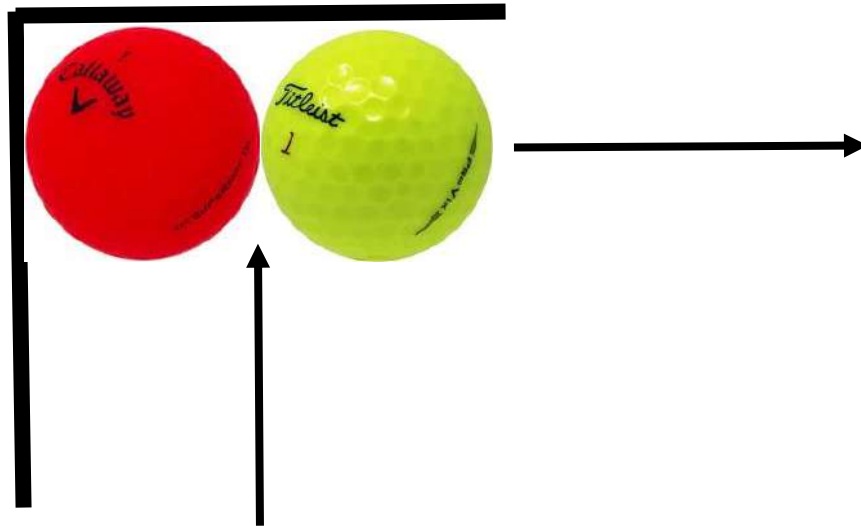


It will blow our sail

This will not count!

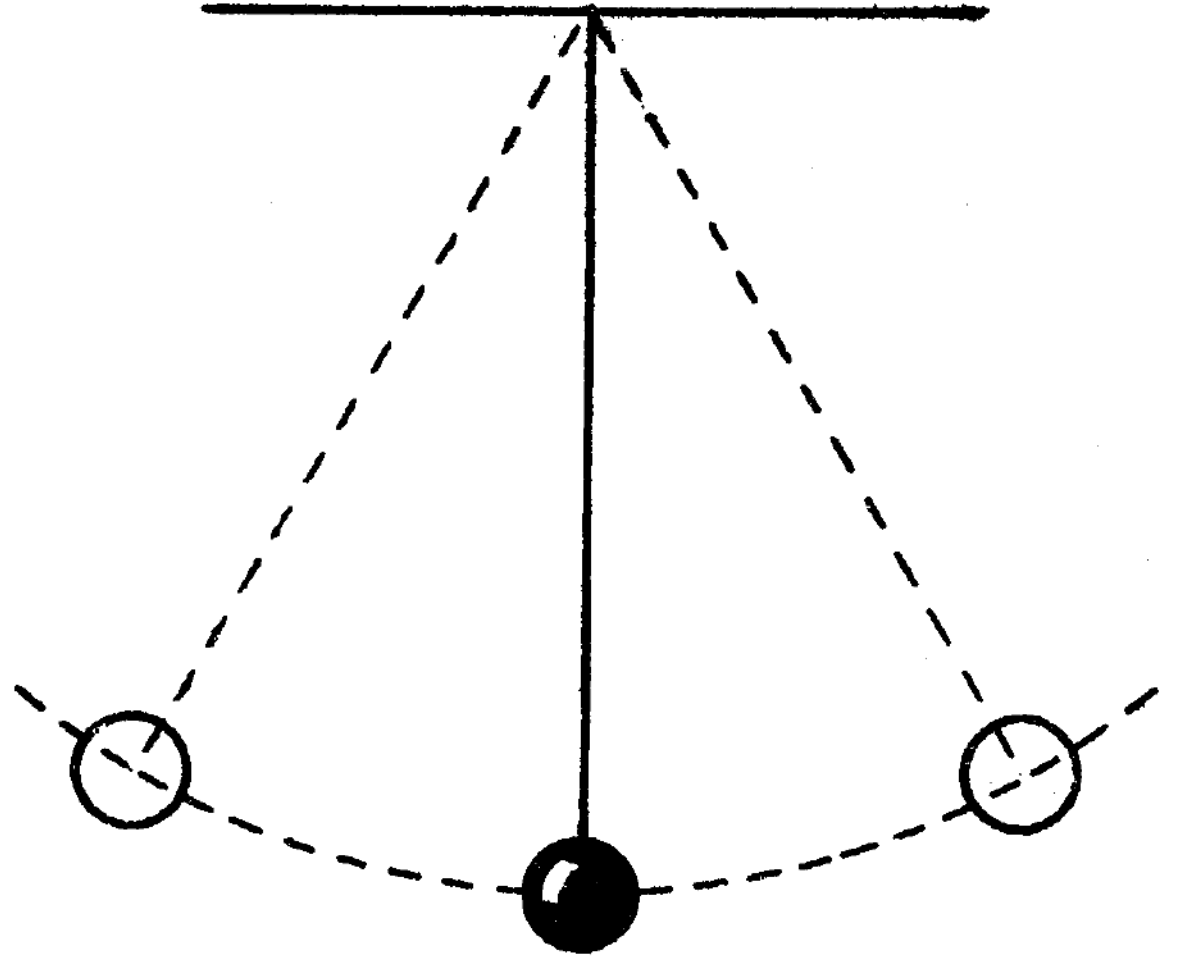
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XI. Push a wedge between 2 touching golf balls so that one moves ≥ 20 cm. and initiates the next action.



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XII. Start a pendulum clock so that it runs for at least 10 sec., then initiates the next action.



The fine print!

Actions between the Start Action and Final action may be in any order.

Additional actions may be built into the device between the scoreable actions but will not earn points.

Additional actions must contribute to the completion of the final action.

Additional non scoreable actions must be listed on the Action Sequence List (ASL)

Timing



Starts when golf ball drops into the device;

Stops when either the original golf ball touches the tee
or 180 sec. elapse;

Ideal time at Regionals is 60 seconds.

Get 4 points for each full second of operation up to 60 seconds;

Lose 2 points for each full second past 60 seconds up to 180 sec.;

If the device stops a 4th time and does not start, the clock keeps
running up to 180 sec.;

Teams will not be allowed to touch the device more than three times;

The Final Task – (250 points)

**The original golf ball
must move ≥ 20 cm.
horizontally and stay on
the tee for 3 seconds.
(and not touch anything)**



More points!

If the system that delivered the golf ball to the tee is removed so that nothing except the tee and holder are within 10 cm. of the ball,

then 150 more points may be awarded.

2 copies of Action Sequence List (ASL)



25 points each for:

- Correctly submitted on-time
- Correct format
- Accurate*
- Actions numbered to match device in correct sequence

Scoring

- 4 pts - each full second of operation up to the “ideal” time.
- 100 pts – Start Action
- 250 pts - Final Action completed in 3 mins. (150 additional points if the delivery system is removed more than 10 cm.)
- 50 pts – no more that 30 min. setup
- 50 pts – each successful unique Scorable Action (max 600 pts)
- .1 pt for each .1 cm that the dimensions of the device are under 60.0 cm x 60.0 cm x 60.0 cm
- 75 points for no touches
- 1 point per full second prior to the target time for a non-spring timer (Must run at least 10 sec. to qualify).



- Exceeding dimensions =25 each
- 25 pts., if 2 sides & top not visible
- Touches = 25 pts. each (up to 3)
- 2 pts. per full sec. over ideal time
- Anything leaving device = 50 pts.
- 150 points for spring timer > 10 sec.
- 150 pts. for each use of electricity other than action 3c.X



Two More

No Parallel Paths
(No actions in the
path will count.)

Stalling can lead to
disqualification!!!

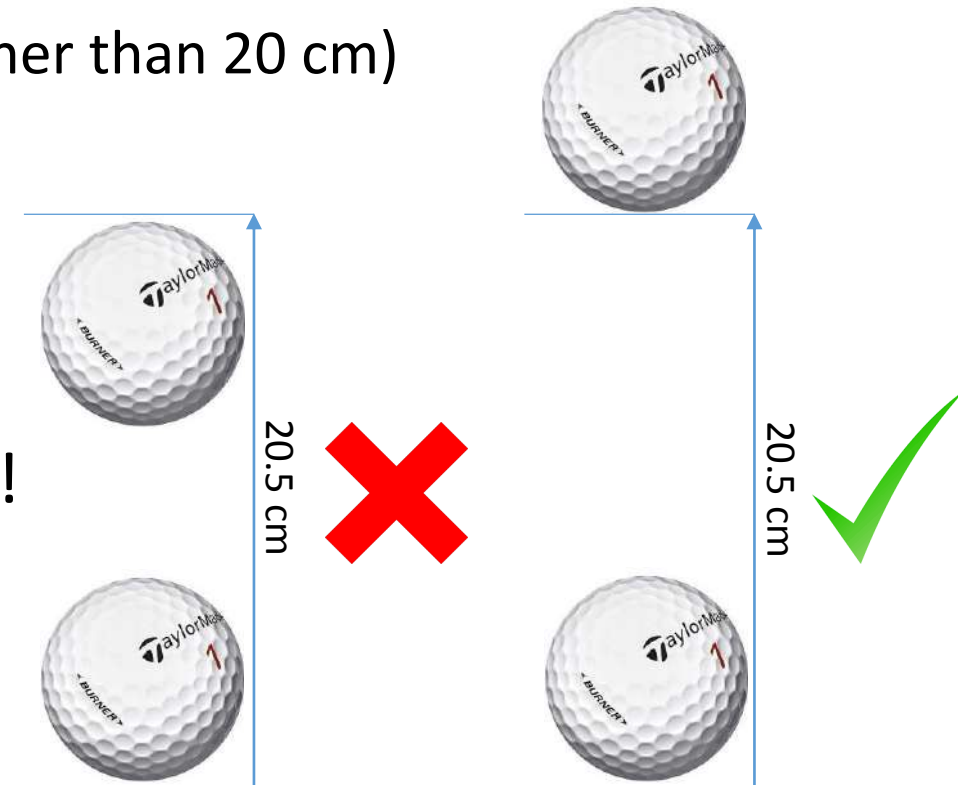


Points not Awarded

- **Points will not be awarded for actions when a touch or adjustment leads directly to the action's completion.**
- Actions skipped or completed out of sequence on the ASL will not earn points.
- Points will not be awarded for action completion after time has elapsed.

Tips from a former competitor:

- Focus on developing a few solid tasks in the beginning, specifically starting, final, and timer
- Don't worry about having the minimum dimensions in the beginning
- Play it safe with task dimensions (20.5 cm rather than 20 cm)
- Properly word your ASL, no ambiguity...
- Be able to defend your tasks
- Reach out to companies for resources
- Check FAQ's and rule clarifications regularly!



Most importantly... **TEST AGAIN AND AGAIN!**

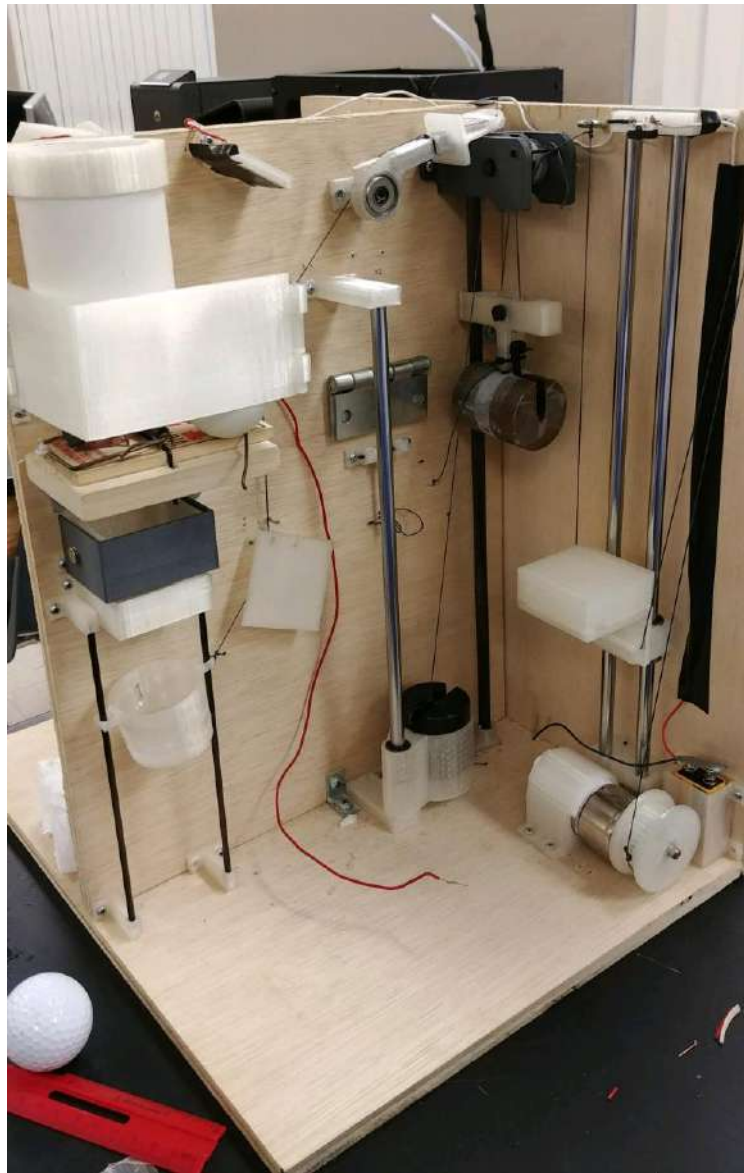
Repeatedly test and solidify a task before moving on to the next

- A task that works 99 times can/will fail on the 100th time
- This process is all trial and error

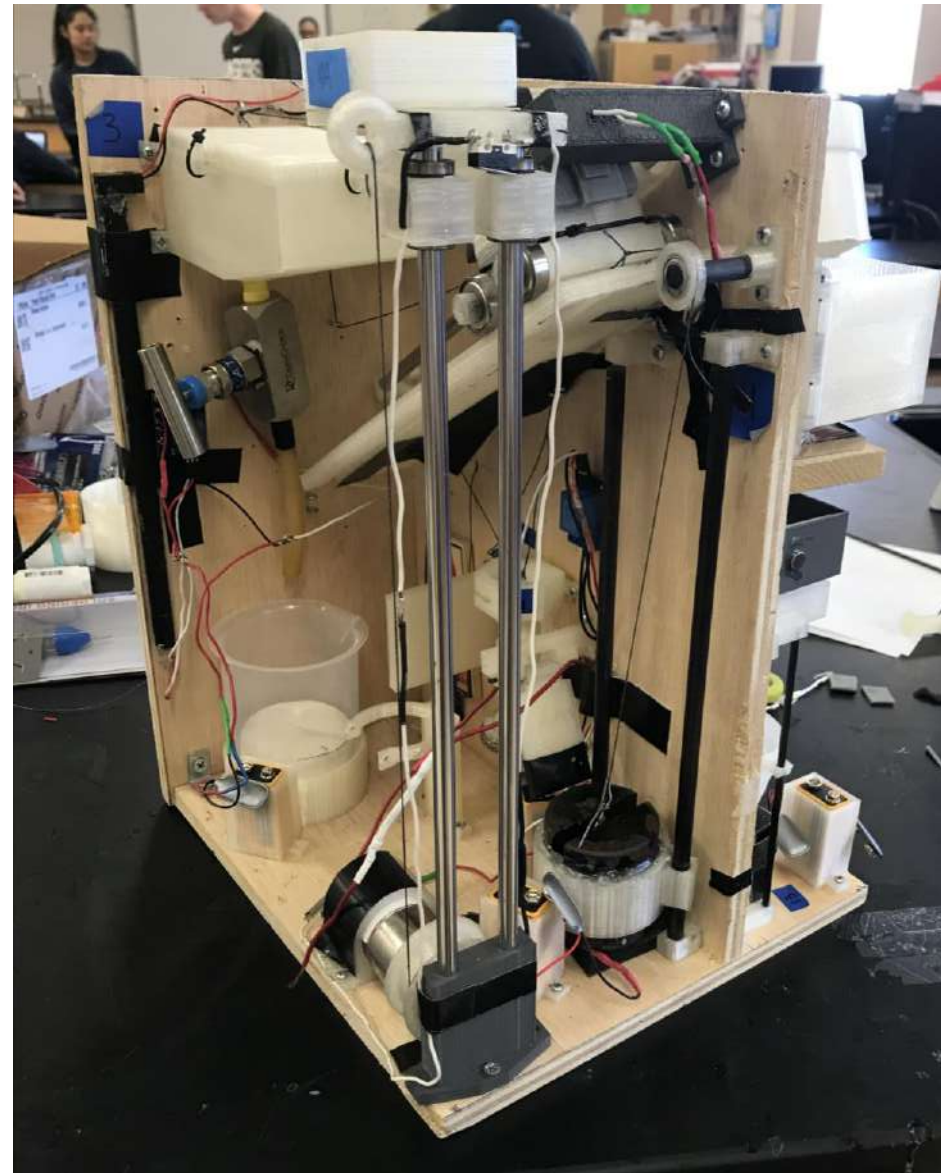
Complete full runs as often as possible

- Tasks may work on their own, but not necessarily all together
- You are able to troubleshoot the device as a whole
- **Practice as if you are competing at the real competition**
- The day of competition should NOT be the first time running the finished device

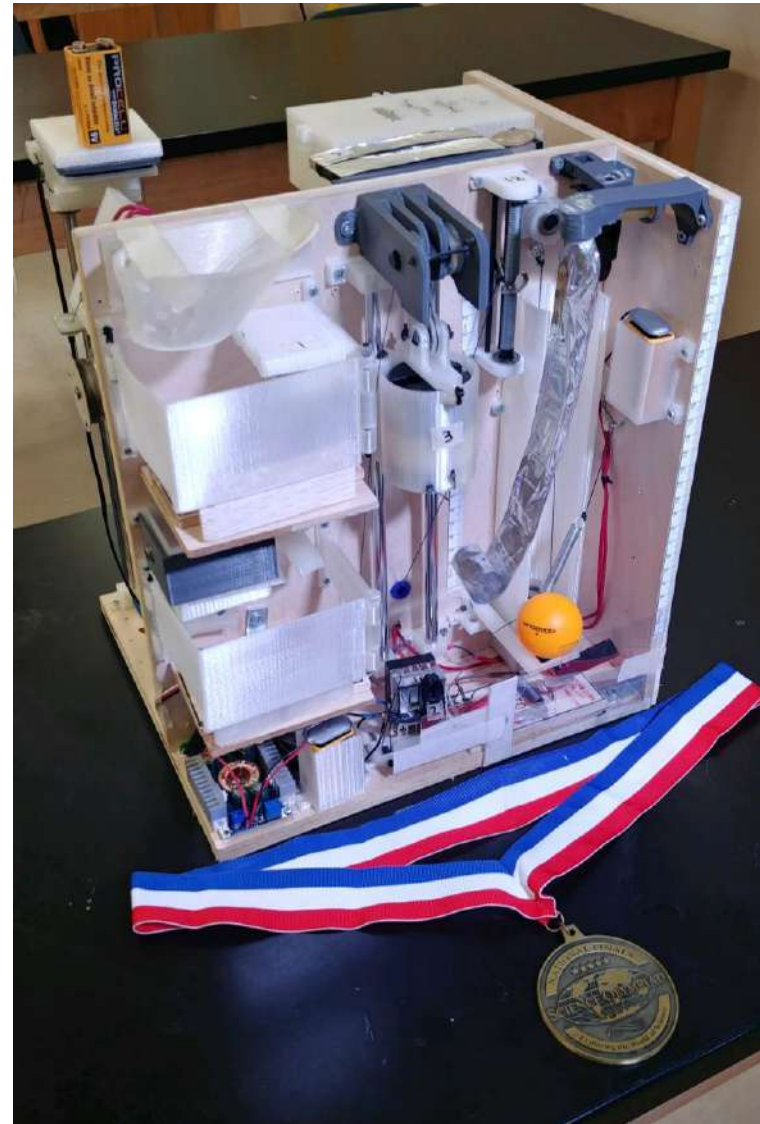
Create a testing schedule and set goals



December 2018
8 tasks
35x40x40 cm



January - March 2019
10 tasks
35x30x40 cm



May 2019
12 tasks
30x25x35 cm

Test Questions

- What if the final delivery removal system uses electricity?
- If a golf ball rolls out of the device, can we put it back in it?
- What if the delivery system knocks the ball off the tee after it has been put there?
- What if the legal timer starts at 30 sec. but stops at 70 sec. and the device must be touched to re-start it?
- What if the original golf ball falls out of its place after it comes to rest, but stays in the device?
- If the delivery device jams at the end when it is being removed, can the students touch it to get it going again?
- What if the device stops and the golf ball wasn't put on the tee?

Why we call it:



It can be done!