

OFFICIAL RULES FOR 2019 JPL INVENTION CHALLENGE

The JPL Annual Invention Challenge is celebrating its twenty-second year. The title for this year's contest is the "**Ping Pong Ball Run Contest**". The objective and rules are listed below. Questions related to this contest should be directed to: Paul MacNeal at work phone (818) 354-7824, M/S T1723-118, located in Building T1723-165, or e-mail to paul.d.macneal@jpl.nasa.gov.

OBJECTIVE: Create a device that can move up to 10 ping pong balls into a jar located 5 meters away. The winner will be the team that moves the highest number of ping pong balls into the jar.

Rules:

ELIGIBILITY

- 1) The contest is open to all JPL employees, contractors, and immediate family members. The contest is also open to teams of students from Southern California middle schools and high schools if they have completed all required forms as outlined in rules 3 and 4 below.

REGISTRATION – JPL PERSONNEL

- 2) The entry form for JPL employees, contractors, and immediate family members entering the contest (found on website) must be filled out and submitted to Public Services prior to midnight November 9, 2019. The Excel spreadsheet should be filled out for every team member, teacher, or chaperone on a separate row. Entry forms consist of an Excel spreadsheet and are found on the website. The completed spreadsheet should be sent to Public Services via **email** to Kimberly.C.Johansen@jpl.nasa.gov. If you have more than one entry, please skip two or three rows between each team. Only the first 20 JPL/contractor entries will be permitted to compete. Five alternates will be accepted in case some entries withdraw prior to the competition.

JPL employee family members and friends are welcome to watch the contest but must be cleared through the security office well in advance of the contest date. JPL employees must fill out the visitor request form as found in the link: <https://id.jpl.nasa.gov/login>

REGISTRATION – SCHOOLS

- 3) To make it easier to process badging at JPL, each team must **email** their completed, entry form (found on website) to Kimberly.C.Johansen@jpl.nasa.gov. The Excel spreadsheet should be filled out for every team member, teacher, or chaperone on a separate row. The Team Name should be listed on each row to help avoid confusion. The Single Point of Contact (POC) only needs to be filled out once for each team. Please skip two or three rows when providing multiple teams on the entry form. Additionally, to make the badging process flow smoothly each team must **mail** a printout of the spreadsheet **and** the "Authorization and Release for Photos, Audio and/or Video Recordings of and/or Artwork" agreement form (found on website) for each person (student, guest, teacher, and chaperone) planning to attend the JPL contest. Each video release form must be completely filled out and signed. If

the student is under 18 years of age, then use the appropriate form filled out and signed by their parent or guardian. **The emailed entry form and entire set of video release forms must be filled out and submitted to Public Services no earlier than September 2, 2019 and be postmarked no later than midnight September 28, 2019. Completed forms must be mailed to Public Services at Jet Propulsion Laboratory, M/S 186-113, 4800 Oak Grove Drive, Pasadena, CA 91109.** All entries will be time stamped based upon the time received. Student teams will be notified to verify their acceptance into the contest by October 2, 2019. Questions regarding the entry forms can be directed to Kimberly.C.Johansen@jpl.nasa.gov in Public Services at (818)393-4641. Each school is allowed no more than three teams. Internal school competitions are encouraged to select the top three teams if necessary.

IMPORTANT: Any foreign person, 18 or over, student or adult, will need to fill out a special form which is processed by the Public Services Office. The process takes nearly three weeks; therefore, if anyone (students, teachers, chaperones) plans to attend the contest at JPL, and they are a foreign national, it is **important that they contact Paul MacNeal prior to November 4, 2019.**

For those teams invited to the final contest held at JPL, additions or corrections to the registration forms and/or video release forms need to be mailed to the Public Services Office with a postmark no later than Wednesday, December 4, 2019. Failure to send in the signed video release form by the requisite time will prevent participation and access to the JPL contest for those that fail to comply with this request.

SPECIAL RULES FOR SCHOOL TEAMS

- 4) Only the first 90 student team entries will be permitted to compete at the regional competitions. Student teams will compete at a regional competition held on Saturday, November 23, 2019 at either Augusta Hawkins High School in Los Angeles or the University of California at Irvine (UCI) in Irvine. Details for the regional competitions will be sent to all registered teams. The top five teams with the fastest times for completing the task from each regional competition will be invited to compete at the JPL contest held on Friday, December 13, 2019 (see Rule 5 below). In addition, the next 10 teams with the fastest times between both regional competitions will also be invited to compete at the JPL contest.

LOGISTICS

- 5) The date and time for the final contest is Friday, December 13, 2019 between 11:30 AM and 1:00 PM. The contest is held at the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109. The contest area is located north of the fountain area, in front of the Administration Building (Bldg. 180) steps. In the event of rain (more than mist) or wind greater than 10 MPH, the contest will be held indoors. Check-in for the event will begin at 10:15 AM.

DEVICE RULES

6) The device must have the following characteristics:

- a. Can move officially supplied ping pong balls (see Rule 8) into the official jar (See Rule 7) located 5 meters from the starting point of the task. Only one ping pong ball can be transported in any given run. Multiple runs are allowed. Realignments can only occur when no balls are touching any part of the device. The ping pong ball(s) must remain inside the jar for it to be counted.
- b. Can complete the entire task of moving all 10 ping pong balls within sixty seconds. Any runs started after sixty seconds will not count.
- c. Cannot damage the ping pong balls in any way. No cracks or permanent dents can be caused by the device. Damaging any ping pong ball may lead to disqualification.
- d. Cannot alter the balls in any way. No adhesives or tapes are permitted to touch the balls.
- e. Can initiate each run by a single operation (cut a string, flick a switch, pull a pin, drop a weight, lifting a gate, etc.) provided by the contestant. No human power may be used during the initiation of the device to add dynamic or potential energy to produce motion of the device. Please avoid touching the balls to initiate the run as this can be construed as adding energy even if you are not. All stored energy systems must be energized prior to the start of the task.
- f. No remote control devices of any kind are allowed.
- g. Can hold or touch the ping pong ball such that the ping pong ball starts each run behind the 5-meter line as indicated in Figure 1 shown in Rule 9.
- h. Can hold or touch the ping pong ball such that the top of the ping pong ball starts each run no more than 30 cm above the ground.
- i. Cannot violate a 30 cm x 30 cm stay out zone surrounding the jar in any way before, during, or after the run. Any balls that enter the jar while in violation of this rule will not be counted.
- j. Can remain within the device dimensional limits before, during, or after the task as defined in Rule 9. Any balls that enter the jar while in violation of this rule will not be counted.
- k. Must utilize safe energy sources. Examples of disallowed energy sources are chemical explosions, caustic gases, and rocket motors. High pressure gas or vacuum systems and other questionable sources must be cleared through Paul MacNeal and the Safety Coordinator prior to performing at both the regional contest and the final contest. An electrical cord with a maximum of 15 Amps be available for use.
- l. Can be made from any materials if they are non-toxic and safe.
- m. Must place the official entry number provided by the contest organizer (3" high numbers or larger) on at least two sides of the device for easy identification.**
- n. Must not use any clamps, tape, or any other means to attach to the ground. The device must only rest on the ground, however heavy weights may be used.
- o. Can adapt to non-level ground (see Rule 9).
- p. SPECIAL RULE FOR SCHOOL TEAMS ONLY: To avoid plagiarism, each team that competes at the regional contest will have photographs taken of their device. The basic concept of the device (energy source type, maneuver method, and size) must be

maintained. Minor modifications to the device are allowed within these constraints.

TARGET DESCRIPTION

7) The target for the ping pong balls is the inside of a large Ball jar. The Ball jar is manufactured by Ball and has a UPC Number of 014400681103. The jar can be purchased at Michaels Stores for practicing purposes. The dimensions of the jar and jar support are as follows:

- a. Height of the rim is 30 cm [11.8 inches] above the ground and is level.
- b. Diameter of the opening is 7.5 cm [2.95 inches].
- c. The jar support is 15 cm [6.0 inches] square and is approximately 6.6 cm [2.6 inches] tall. The jar is placed on four blocks.



PING PONG BALL DESCRIPTION

8) The officially supplied ping pong ball is an official size and weight table tennis ball. They are manufactured by Franklin and are known as “40mm 1STAR WHT TT balls 12 CT from Franklin”. The table tennis balls (ping pong balls) have been purchased at Target and the UPC Number is 025725413676. The details of the ping pong ball are as follows:

- a. Weight is 2.7 grams [0.1 ounces].
- b. Outside diameter of the ping pong ball is 4.0 cm [1.57 inches]



CONTEST AREA DESCRIPTION

9) The contest site is in front of the steps leading to Building 180. The site will contain two areas for setting up and operating the device. The size of each area is 2 meters by 7 meters. Each team will be randomly assigned to either set-up area. The ground is concrete with a rough finish and has a slight slope (approximately 1 degree across the width as shown in Figure 1). See Figure 1 for a description of the contest area.

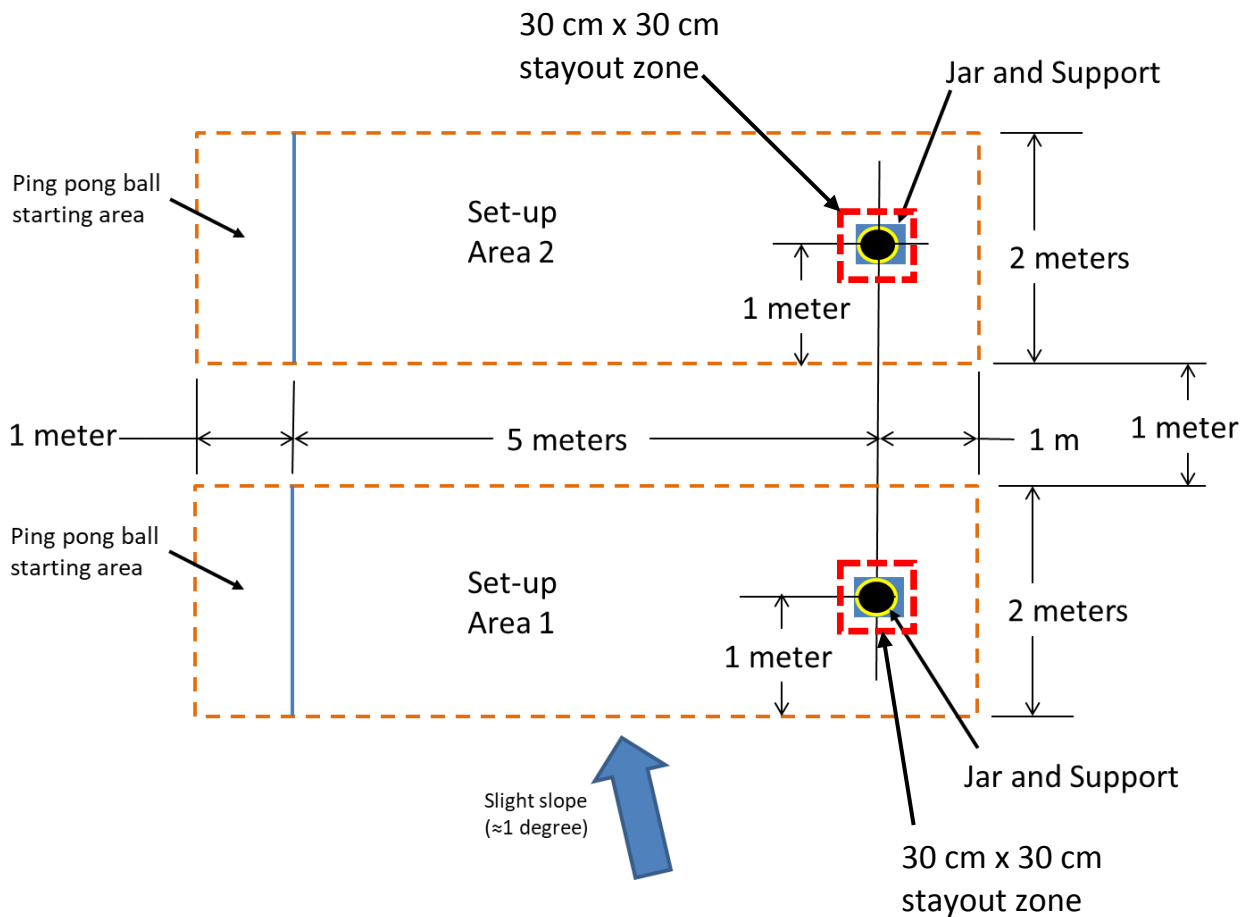


Figure 1. Contest Area – top view

CONTEST PROCEDURE

10) The order in which teams will participate is selected by a random process. The team will be given a three-minute period to setup their device. Safety advisors will be observing the team during their setup time and will warn and potentially stop the team if any setup operations can lead to potential accidents. Strict time limits will be imposed to ensure that all contestants are able to operate their device. At the beginning of the setup period each team will be handed the ten ping pong balls. Each team is responsible for placing the ping pong balls into their device making sure that the balls start behind the 5-meter line and the tops of the balls are less than 30 cm above the ground.

Each team shall designate a speaker that is not involved with the device setup to talk about their team and their device during the setup period. The team will be asked if they are ready to proceed. The procedure for running the task and determining the official time for the task is as follows:

- a) The referee will give a countdown (3...2...1...GO!) for the start of operation for the device.
- b) The timer will start the time at the referee's direction. At 45 seconds, the timer will yell "15 SECONDS REMAIN". At 60 seconds, the lead timer will hit the gong, or make another loud sound.
- c) The referee will observe the task and make sure that the team does not provide any energy to assist the motion of the ball(s) during any of the ping ball motion runs. The referee will also observe that the device remains within the set-up area and that no part of the device violates the 30 cm x 30 cm stayout zone before, during, or after the last event.
- d) The field judge will announce in a loud voice when the last ball is initiated by saying "LAST BALL".
- e) The referee will yell an audible "STOP" when the last ball has passed through the opening of the jar or hits the ground. If the last ball was "launched" after the 60 Second mark, that ball will not be counted even if ball makes it into the jar. The decision of the referee is final.
- f) The referee will count the number of balls remaining inside the jar and give that count to the area monitor to be entered onto the score sheet keeping in mind any violations per Rule 10c, 10i, and 10j.
- g) The timer will write down the time it took to complete the task, but as long as it was under 60 seconds, it is not a discriminator.
- h) All decisions of the referee are final.

All teams will be asked to remove their device and place it back in their original waiting area.

The winning team will be the team whose device places the greatest official number of ping pong balls into the jar. If two or more teams are tied, there will be a tiebreaker contest.

TIEBREAKER RULES: Teams will run side by side. Area 1 or Area 2 will be randomly

assigned. The teams will be given a four minute period of time to set up. In the first tiebreaker round, each team will be given 15 ping pong balls. The teams will be asked to complete their task in under 60 seconds. All other rules remain in effect.

If a second tiebreaker round is required, each team will be given 20 ping pong balls. All other rules from the first tiebreaker round remain in effect. If a tie still exists, both teams will be awarded identical trophies.

AWARDS

11) Trophies will be divided into two categories: JPL employees/family/contractor entries and school team entries. Trophies will be given for first, second, and third place for each category at all contests (regional contests and the JPL contest). Certificates will be issued for the lightest, heaviest, most unusual, most artistic, and most creative designs.