

## **EVENT 5: BERNOULLI BALL**

(rev 1/23)

**OBJECTIVE:** To guide a ping-pong ball through loops using a hair dryer in the least amount of time.

### **RULES:**

1. Any hand held, up to 2,000 watt hair dryer may be used.
2. The team will bring their hairdryer to the competition.
3. An extension cord provided by the team may be used.
4. Dryer speeds may be changed during the run.
5. A mechanical device that modifies the output airflow may be attached to the nozzle of the hairdryer,
6. No modifications (e.g., electrical or mechanical) may be made to the hairdryer itself.
7. The team will be provided with a standard 40 mm diameter ping-pong ball.
8. The course will consist of a series of ring stands with attached ring clamps; the ring clamps serving as the loops. The ring clamps will have an inner diameter between four to five inches. They are similar to those in the Sargent Welch Catalog (item # 470165-432)

### **COMPETITION:**

9. The ring stands with the attached ring clamps will be spaced around a typical high school classroom/lab room.
10. The ring stands will be arranged in an area of approximately 8 square meters.
11. The ring clamps will be at different heights from the floor, ranging from a minimum of 1.0 meter to a maximum of 1.6 meters.
12. The ring stands will either be free standing on the floor or clamped to a desk or lab bench.
13. The number of ring clamps will be announced at the time of the event. The number of ring clamps and the course will be the same for all the teams.
14. The team will be given 20 seconds to place a ping-pong ball into the airflow from the hairdryer. The team will then signal to the judges to start timing.
15. The team must guide the ping-pong ball through all the ring clamps of the course using only the output airflow from the non-modified or modified hairdryer.
16. The ball must be levitated at all times by the airflow from the hairdryer while being navigated through the course.
17. If the ball drops out of the airflow, a penalty of 5 seconds will be added to the team's score for each occurrence. The clock will not be stopped while the team re-levitates the ball by placing it back into the airflow from the hairdryer. The team then continues from where they stopped.
18. The team with the fastest time wins.

**SCORING:**

The Team's Final Score (out of 100) for completing the task will be calculated as follows:

$$\text{Team's Final Score} = \frac{\text{Winning Time, s}}{\text{Team's Time, s}} \times 100$$

Tiebreaker: The Bernoulli course will be re-run, to break a 1st place tie.

Disqualification Score: If a participating team fails to meet the objective as stated in the rules, a minimum Disqualifying Score (greater than zero) will be applied by the judges.

Failure to follow Rules: If a team violates the rules, they may be assigned a Disqualification Score of "zero", at the discretion of the judges.

*It is the team's responsibility to periodically check in or inquire about changes and clarifications to the rules.  
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