

**Utah Elementary Robotics
Obstacle Course Rules
USU Physics Day**

**Competition at
USU Brigham City Campus
989 S Main St
Brigham City, UT 84302**

**Starting at 10:00 AM
May 2nd, 2017**

COMPETITION OBJECTIVE

The aim of the competition is to foster math, science, engineering and team work in students in a junior high school.

DESIGN STATEMENT

Prior to the day of the competition, students will construct and program a robot that will navigate an obstacle course. This robot will use designated pieces from the Lego Mindstorms Education Kit. There are two parts to this competition, first is the robot that will navigate the obstacle course and second is the controller, which the students operate to control the obstacle robot.

OBSTACLE COURSE CHALLENGE RULES

1. All robots will use either the NXT or EV3 Kits as the base for their robots. Any other Lego piece can be used by the team to help improve their robots design.
NXT
https://c10645061.ssl.cf2.rackcdn.com/resources/9797_v120.pdf
EV3
<https://c10645061.ssl.cf2.rackcdn.com/resources/45544sortingoverview.pdf>
2. No glue or tape is allowed in the construction of Team Robots.
3. Participants shall use either the Lego Mindstorms Education NXT or EV3 software or student designed software using other languages for the obstacle robot. Only NXT or EV3 brick-based obstacle course robot designs will be accepted in this challenge. For the controller, it is up to the teams choosing what software and hardware they use.
4. The weight of the obstacle course robot cannot exceed 1000 grams.
5. All obstacle course robots must fit within a 12 inch by 12 inch square frame at the start of the challenge match. They can have any flat orientation within that frame; in other words, the front of the robot could be diagonal within the frame if the rest of it fits in a 12 inch by 12 inch square frame.
6. All robots shall be built and programmed by the team. Any robot where it has been determined that was built by a third party or programmed by someone other than the team members shall be disqualified. Only exception to this is assistance by the Teachers/Mentors during the instruction time and prior to the competition.
7. The robots for the obstacle competition will be remote controlled. The team may choose any type of controller for controlling the obstacle robot. That is another NXT or EV3 Brick, I-Pad, Cell Phone, other computer, no limitation on what is chosen for the remote controller.
8. Each robot will be identified with the team number and school. Lettering shall be easily visible so that judges can identify what robot is competing. Minimum height for lettering is 1 inch.
9. The Obstacle Course Challenge is limit to junior high students. If a younger student wishes to participate, it will need to be coordinated with the other mentors on a one for one basis. Students in high school and higher will not be allowed to compete against the junior high students.
10. On the day of competition, each student team, with their robot will check in with the Obstacle Course judges to have their robots measured and weighed. The Obstacle Course judges will verify that each robot meets the requirements of

items 4 and 5 above, and then mark the robots to show that it meets these requirements.

MINDSTORMS OBSTACLE COURSE

1. MINDSTORMS Obstacle Course is a competitive sport where a robot will navigate a predetermine course with obstacles in its way. Obstacles will include a stair stack of $\frac{1}{2}$ inch high boards (3 layers), $\frac{1}{4}$ inch dowels, turns, ramp and other objects to be determined. At the end of the course will be one of the balls included with the NXT kit. The robot will retrieve this ball and return it to the starting line, back through the obstacle course.
2. The robot will make two trips through the obstacle course. Each student on a team will operate the robot through the course and the teams score will be based upon the combined total of the team's times.
3. If a robot flips over or gets stuck, a team member is allowed to reset the robot, but no further along on the course. A five second penalty will be assessed each time the robot is touched.
4. For the running of the course, the students will place their robot behind the starting line. Then when instructed by the judge, the team will proceed back through the course. When the retrieved ball touches or crosses the start/finish line, the time will stop.
5. Parts that have fallen off during the bout may be reattached. The robot should be removed from the playing field while parts are being reattached. The match will continue while an operator is trying re-attached, but the robot cannot be re-designed. The parts must be attached within one minute or the robot will be disqualified.
6. The path that the robots shall follow will be marked and may even be a wall. Robots have to stay within that path or their robots will be penalized 10 seconds for each time they exit the course.
7. The ball to be retrieved will be placed upon a small Lego wheel prior to the start of the team's trip through the maze.

TEAMS

1. Suggestion is for two person teams. The reason for this is that for the overall first place team, there are two identical prizes that are for each of the winners of that team. If there are more than two members on a team, it should be discussed with the team members prior to the competition that this may occur.
2. It is desirable that teams consist of 2 students. Under certain conditions, a 1 or 3 student team can compete (1 per school).
3. During competition, teachers and mentors can only act in an advisory role.
4. The robot will come built and programmed on the day of the competition.

JUDGING AND SCORING

For the Obstacle Course judging there will be two categories. First is running the obstacle course. Second will be software judging.

Running the obstacle course

1. There will be two judges per obstacle course.
2. When a team's number is called, proceed to the game arena.
3. The teams will start their round when instructed by a judge to begin.
4. Judges will time and score the trip through the obstacle course.

Utah State Physics Day

April 28, 2017

Lego Mindstorms Amazing Exhibition Score Sheet

School _____

Team Number _____

{	Obsticale Course Running	
	Did it require assistance? Number of times assistance was required. This will be multiplied by 5 seconds to get total penalty.	
	Driver 1, how long did it take to run the maze? Enter Time	
	Driver 2, how long did it take to run the maze? Enter Time	

Total Time _____

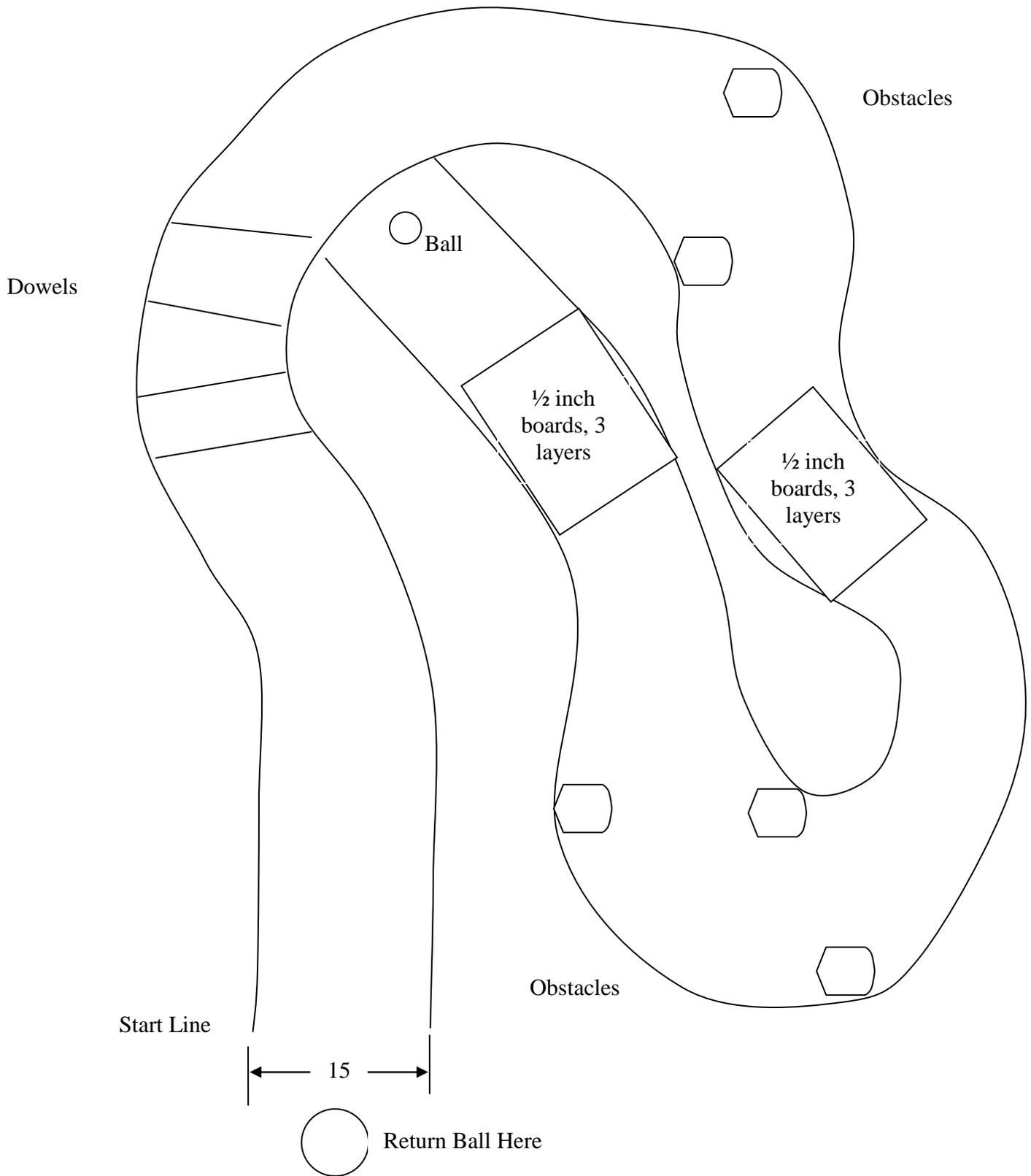


Figure 1. Obstacle Course Example