

ROBOTICS – High School

DESCRIPTION: Programming and Problem Solving with a Sphero Robot

To participate in the Robotics Competition at the High School level at the ROCAME Jamboree, the following items should be presented: an engineering notebook, rap cheer or poem, and knowledge of how to program a “Sphero” robot to complete a maze using the Sphero Edu application.

NO. OF PARTICIPANTS: 3

APPROX. TIME: 50 MINUTES

EVENT COMPETITION:

Engineering Notebook (maximum of 15 pts.) – The engineering notebook should reflect the effort put into learning how to program the Sphero. The entire team’s thoughts, action, failures, and successes must be included from each robotics meeting. Judges will score the following components:

- Performance Testing (4 pts):
 - Show there is a linear relationship between the time, speed, and distance to which you program the Sphero. Use the roll command to compare “Speed vs. Distance” and “Time vs. Distance”. Record results in table format. (1 pts each)
 - Use the orange jump ramps to determine the maximum height and distance the Sphero can jump. Record results in table format. (1 pts each)
- Mazes (6 pts): Create three practice mazes and develop a program to navigate the Sphero through each of them. Include dimensions with each maze drawing and written lines of the program. (1pt each)
- Reflection (5 pts): The following reflection questions should be answered in paragraph form (1pt each)
 - What did you know about programming before training for this event?
 - How are brute force and autonomous algorithms similar/different?
 - What was the trickiest part of the maze?
 - What was the best part about learning to program with Sphero?
 - How would you do things differently in the future?

Rap Poem (maximum of 10 pts.) - The cheer or poem (8 line minimum for middle school) should be written using appropriate science, engineering, and computer programming vocabulary. A minimum of 8 vocabulary words should be used (1 per line). Extra consideration will be given to teams poems that have extra vocabulary words, creative lyrics, performed by team with enthusiasm, and/or robot “reciting” text with flashing lights. Written out versions of the lyrics should be documented in the engineering notebook for review as well.

Sample Science Word List: Speed, velocity, motion, force, acceleration, mass, momentum, force, friction, gravity, weight, circular, action, reaction, hypothesis, work, power, machine, energy, input, output, software, microprocessor, computer, software, Sphero, tablet, robot, algorithm, program, app.

Maze (maximum of 15 pts.) – Prior to the competition, students should practice autonomously programming their Sphero robot to navigate a maze. The block programming on the Sphero Edu App should be used to create practice mazes. High school teams will receive a layout of the competition

maze with outer dimensions 30 minutes (8:30 AM – 9:00 AM) prior to the start of the robotics competition on the day of the jamboree. Teams are allowed to start programming during this window. During the competition, each team will have two, 1 minute, preassigned test trails prior to their judged attempt. Teams will be randomly selected for two judged attempts to complete the maze. Each team will have 15 minutes (maximum) to make adjustments before the second and final attempt for the robot to pass through the maze is made. Teams will be judged on their best ability to complete the maze (5 minute maximum) and by the amount of time, it takes.

- Completion of the maze – 10 pts
- 1st to complete maze – 5 pts
- 2nd to complete maze – 3 pts
- 3rd to complete the maze – 1 pts

Obstacle Course (maximum of 10 pts) – After a team finishes their final maze attempt, they will have a maximum of 3 minutes to steer their Sphero through an obstacle course using manual operation. The obstacle course will include various accessories from the provided Sphero kits and several different surfaces. Teams will be judged on their ability to complete the obstacle course and by the amount of time, it takes.

- Completion of the obstacle course – 5 pts
- 1st to complete obstacle course – 5 pts
- 2nd to complete obstacle course – 3 pts
- 3rd to complete obstacle course – 2 pts

Points in each of the 4 categories will be added together to determine the total scores for each team and the winner. (Maximum of 50 pts.)