

# 2019 Competition Events

## Notes to Teams:

- ★ You do not need to complete or compete in all events. Each event has different point ranges. Do what you can in an event to earn the most points. The overall winner is awarded to the team with the most points in all events. Plan your strategy/time to maximize your points during the competition time.
- ★ We suggest that part of your team focus on the EV3 events and the other part of the team focus on the Sphero events.
- ★ Events close at staggered times. You will not be allowed to compete in an event after closing time.
- ★ Robots that destroy a playing field are disqualified from the event.
- ★ We will have backup Chromebooks and MacBook computers for teams that may need them.
- ★ The judge's decision is final. If you have a question, your team captain may talk with the head judge.

## Building the Robot

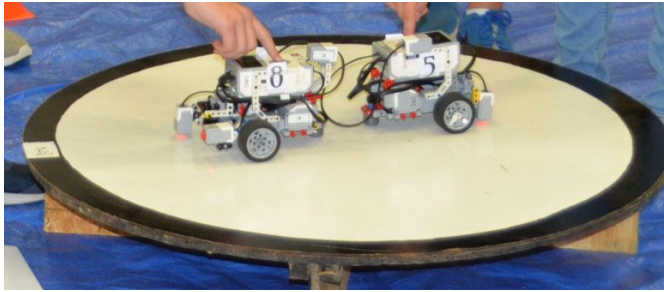
- ★ For most events, you will need the basic robot build.
- ★ Build attachments that can be quickly added to the robot to compete in an event.
- ★ What you can use to build attachments:
  - Any raw materials that do not damage the field or another robot. If you have questions about what you can or cannot use, ask! Email (lholmes@ncmcs.org)
  - Any materials from the [Lego Expansion pack](#).
  - There is no limitation on the number of motors.

## Rescue Missions

Rescue Mission	Robot Type	Description	Points <i>(Links to score cards available at a later date)</i>
Burning Building	EV3	<p>Objective: Rescue Lego people from a burning building and deliver them to a safe zone.</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Robot begins in the base zone.</li> <li>● Robot returns to base zone and team may remove rescued people and add attachments within the 2 min time limit.</li> <li>● Rescue as many Lego people as you can in 2 minutes.</li> <li>● Robot can be reset during the 2 min time limit if the robot drives back to the base zone. Points deducted for robots reset out of base zone.</li> <li>● <a href="#">Picture</a></li> </ul>	<p>+10 points for 1st floor rescue</p> <p>+20 steps and 2nd floor rescue</p> <p>+50 points for 3rd floor rescue</p> <p>Total Points Possible = 90 pts.</p>

		Number of attempts: 2 per team (highest total score recorded)	
Lifeguard	EV3	<p>Objective: Rescue the swimmers from the ocean.</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Robot begins in the base zone.</li> <li>● Robot must push the swimmers to the shore.</li> <li>● There will be <a href="#">fish</a> scattered in the ocean also. Fish should not be rescued.</li> <li>● Fish are red and <a href="#">swimmers</a> may be any other color.</li> <li>● Time Limit: 1 min.</li> <li>● Robot can be reset during the 1 min time limit if the robot drives back to the base zone. Points deducted for robots reset out of base zone.</li> <li>● <a href="#">Picture</a></li> </ul> <p>Number of attempts: 2 per team (highest total score recorded)</p>	<p>+5 points for each person rescued 12 people max -2 points for each fish removed</p> <p>Total Points Possible = 60 pts.</p>
Storm Chaser	EV3	<p>Objective: Warn the people that a tornado is coming but watch out for the debris!</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Robot must follow a black line through debris to ring a doorbell to warn the people that the tornado is coming.</li> <li>● After the alarm is pushed, robot should back up and display the word "WARNING"</li> <li>● Each team will begin the competition in a base zone.</li> <li>● <a href="#">Picture</a></li> </ul> <p>Number of attempts: 2 per team (highest total score recorded)</p>	<p>Maneuver through debris = 15 pts. Ring doorbell = 15 pts. Back up and display warning = 10 pts.</p> <p>Total Points Possible = 40 pts.</p>
Wildfire	EV3	<p>Objective: Work as fast as you can to contain the wildfire (<a href="#">pom poms</a>).</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Robot begins in the base zone.</li> <li>● Start with a vat of 1 inch pom poms randomly placed in a 48" x 48" playing field.</li> <li>● Robot has an arm that can collect the pom poms and then brings them back to a container.</li> <li>● Pom poms must be in the container to count for points</li> </ul>	<p>Points awarded according to weight.</p> <p>Total Points Possible = 60 pts.</p>

		<ul style="list-style-type: none"> <li>● Time Limit: 1 min.</li> <li>● Robot can be reset during the 1 min time limit if the robot drives back to the base zone. Points deducted for robots reset out of base zone.</li> <li>● <a href="#">Picture</a></li> </ul> <p>Number of attempts: 2 per team (highest total score recorded)</p>	
Resupply	EV3	<p>Objective: Build a mechanism to throw supplies to a target.</p> <p>Event Directions</p> <ul style="list-style-type: none"> <li>● Build <a href="#">mechanism</a> to throw supplies to a target</li> <li>● Field <a href="#">Layout</a></li> <li>● Robot will be placed 12 inches from edge of target.</li> <li>● Robot must throw the ball at the target on the ground.</li> <li>● Total points awarded by adding the points of the three shots.</li> <li>● <a href="#">Picture</a></li> </ul> <p>Number of attempts: 2 per team (highest total score recorded)</p>	<p>3 shots</p> <p>10 points outer ring 20 points 2nd ring 30 points 3rd ring 40 points bullseye</p> <p>Total points possible = 60 pts.</p>
The Big Cleanup	EV3	<p>Objective: After the disaster, your robot must clean up the mess.</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Robot begins in the drop zone.</li> <li>● Robot picks up or pushes debris (Lego blocks).</li> <li>● Robot places collected debris in collection area.</li> <li>● Robots can push debris or pick up and place in the collection truck..</li> <li>● Time Limit: 1 min.</li> <li>● Robot can be reset during the 1 min time limit if the robot drives back to the base zone. Points deducted for robots reset out of base zone.</li> <li>● <a href="#">Picture</a></li> </ul> <p>Number of attempts: 2 per team (highest total score recorded)</p>	<p>1 point for each object pushed to a collection zone</p> <p>3 points for objects placed in dumpster</p> <p>Total points max = 60 pts.</p>
Emergency Power	EV3	<p>Objective: Generate the most power</p> <p>Event Directions:</p>	<p>Score based on ranking: 1st place: 45 pts</p>

		<ul style="list-style-type: none"> <li>● Connect robot to small DC motor (teams will be provided an adapter)</li> <li>● Robot spins DC motor, generating electricity.</li> <li>● DC motor is connected to multimeter to measure output voltage.</li> <li>● The faster the robot spins the motor, the higher the voltage</li> <li>● Scores will be based on ranking.</li> </ul> <p>Note: This challenge tests your knowledge of gear ratios using power, speed, and GEARS!</p> <p>To attach to the power generator: Your robot needs a gear axle with about 2.5" clearance.</p> <p>Number of attempts: 1 per team</p>	<p>2nd place: 40 pts  3rd place: 35 pts  4th place: 30 pts  5th place: 20 pts</p>
Battlebots	EV3	<p>This is a heat based event. Your team will be provided a competition schedule. Teams not on the field at the assigned time forfeits their game.</p> <p>The winning robot must push it's opponent off of the battlebot board. The board has an outside black line. Robots can be modified to assist with the push; however, the robot is not allowed to destroy the other robot. Heats are 1 min. The judge may call for a reset of both robots if necessary.</p> <p>Each robot must fit in a 10" x 10" x 10" box at the start of the competition. Each team must demonstrate a working program before they can compete. <a href="#">Link</a> to working program.</p> <p>Robots cannot weigh over 1000 grams.</p> <p>Picture:</p> 	<p>Total Points Possible = 65 pts</p> <p>1st = 55 pts  2nd = 35 pts  3rd = 25 pts</p> <p>+10 pts for every team making the final tournament (8 teams total)</p>
Wrecker Pull	EV3	<p>Objective: Design a robot to pull the most weight</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>● Attach your robot to a string that is connected to a force gauge.</li> <li>● There are no points awarded for speed.</li> </ul>	<p>Score based on ranking:</p> <p>1st place: 45 pts  2nd place: 40 pts  3rd place: 35 pts  4th place: 30 pts</p>

		<ul style="list-style-type: none"> <li>The objective is to generate maximum torque in 30 sec.</li> </ul>	5th place: 20 pts All other attempts: 5 pts.
Mine Rescue (Programming Challenge)	Sphero	<p>Objective: Find the miners without knocking over the wrong bottles and collapsing the mine</p> <ul style="list-style-type: none"> <li>Example: <a href="#">LINK</a></li> <li>Program Sphero to knock down the bottles that are clear. Teams lose points if they knock down the incorrect bottles</li> <li>No attachments allowed</li> <li>Picture to <a href="#">print</a></li> <li>Picture with <a href="#">dimensions</a></li> </ul>	+2 pts for clear bottles -3 for color bottles +7 for 2 liter  Total Points possible = 35 pts.
Obstacle Course (Free Drive)	Sphero	<p>Objective: Maneuver through the storm damage to rescue the people.</p> <p>Event Directions</p> <ul style="list-style-type: none"> <li>Drive the robot through various obstacles.</li> <li>Points awarded for successfully completing different segments of the course.</li> <li>Max time limit: 2 min; however, points awarded for fastest times.</li> <li>Highest score from two tries.</li> </ul>	Time-based 1st place = 35 pts 2nd place = 30 pts 3rd place = 25 pts  +5 points for each way point reached  Total points possible = 35 pts.
Search and Rescue (Programming Challenge)	Sphero	<p>Objective: You must locate everyone in the building</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>Program your Sphero to maneuver through the maze</li> <li>Max time limit = 2 min.</li> <li><a href="#">Picture</a> with dimensions</li> </ul>	Complete maze = 35 pts  ½ maze 20 pts Total Points Possible = 35 pts.
Medic Rescue (Build and Free Drive)	Sphero	<p>Objective: You must use your gurney to transport a patient to the medical facility.</p> <p>Event Directions:</p> <ul style="list-style-type: none"> <li>Teams must engineer a gurney to transport a <a href="#">patient</a> (little people person)</li> <li>Gurney must be constructed from raw materials. Teams may not use pre-built carts.</li> <li>Teams may use pre-made wheels on their carts.</li> <li>The patient cannot be taped to the cart or</li> </ul>	Time based 1st place = 35 2nd place = 30 3rd place = 25 All teams that cross finish line with person on gurney receive 15 points

		attached with string, etc. around the person. Person must be free to move. The person can be laying down.	
Coast Guard Rescue (Build and program)	Sphero	<p>Objective: Robot must jump in the water to rescue the fishermen on a sinking boat</p> <p>Event Directions</p> <ul style="list-style-type: none"> <li>• Teams must engineer a ramp for their Sphero to jump the farthest.</li> <li>• Ramps must be built from raw materials and cannot be 3D printed.</li> <li>• Teams are encouraged to be creative in terms of size and design of their ramp.</li> </ul>	<p>Score based on ranking:</p> <p>1st place: 35 pts  2nd place: 30 pts  3rd place: 25 pts  4th place: 20 pts  5th place: 15 pts  Airborn: 10 pts.</p>