



Team Member Guidebook

STEM Outreach/Maine Robotics

University of Southern Maine

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This book is provided as a guidebook and must not be used for rules interpretation. Whenever questions arise, the Official Description and Rules document MUST be used to clarify.

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University of Southern Maine's STEM Outreach and Services Office
Science Building, Portland Campus
www.robottrackmeets.org

The University of Southern Maine's

STEM Outreach & Services office is part of the USM
College of Science, Technology and Health

As part of our outreach, we offer a large summer STEM
camp program at locations around Maine every year.

We also host the Maine STEM Film Challenge, school,
and Group workshops, and operate the

Southworth Planetarium.

If you have any questions about STEM (Science,
Technology, Engineering, or Mathematics), please reach
out to us and we'll be happy to help in any way that we
can.

Event 10: Walking Robot

Time: 60 seconds

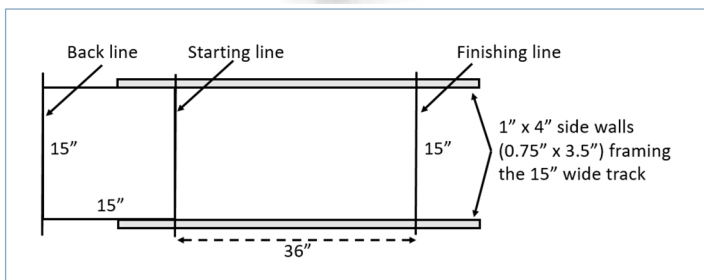
Robot Size: smaller than 15 inches by 15 inches

Build a walking robot that can walk down the 36" long course to get the fastest time without falling over or getting stuck.

The course is 24" wide and 36" long

Time is from when you touch the start line to the time you touch the finish line.

Each robot gets three trials to get its best time.



Each track meet has different events you can enter.

Each team can enter up to 7 robots and/or bridges at a meet.







Teams can have from 1 to as many students as you want, but most teams are 1 to 15 members.

Ten events that you or your team may enter!

- Fastest Robot
- Strongest Robot
- Slope Climbing
- Steeplechase race
- Table Clearing challenge
- Delivery mission challenge
- Walking robot race
- Robot Speed Build Competition
- Ping Pong Shot Put challenge and the
- LEGO Bridge Competition

Scoring

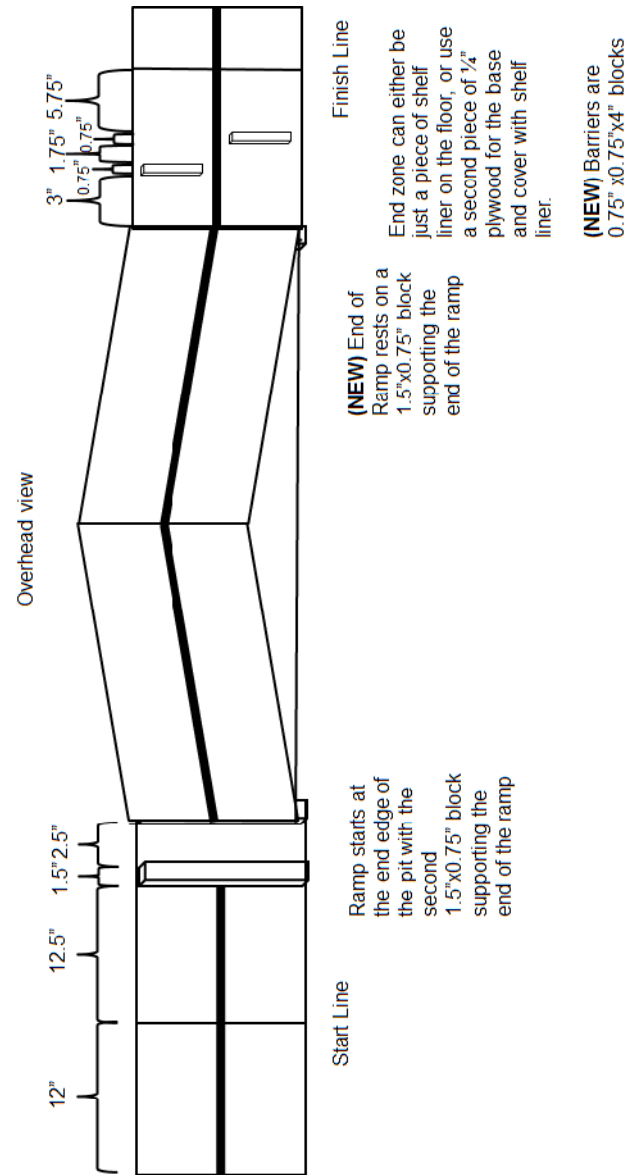
Each robot or person who scores in first place to sixth place will earn points for your team!

-  10 points for 1st place
-  8 points for 2nd place
-  6 points for 3rd place
-  4 points for 4th place
-  2 points for 5th place
-  1 point for 6th place

You can earn points at each event and awards are given out for the best entry in each event as well as the Meet Champions who have the most team points at the end of the day.



Event 9: Steeplechase



Event 9: Steeplechase

Time: 60 seconds

Robot Size: smaller than 12 inches by 12 inches

Build a robot that can race across an uneven course and over a hill.

Fastest robot to reach the finish line, without being disqualified, wins.

Robot must fit inside a 12" x 12" starting area.

Robot must have a "rider" or LEGO figure that does NOT fall off during the run for the finish line.

You are disqualified if:

- You leave the course
- You get hung up on the edge or the top of the hill
- You can't get over an obstacle
- Your rider falls off
- You touch the robot

This event requires you to use wheels that are smaller than a certain size. The standard NXT and EV3 drive wheels and the Spike Prime drive wheels are allowed. Treads are also allowed but can't have wheel diameters larger than the allowed wheels. See the full rule book for allowable wheels and other details.

The Basic Rules

1. Teams may have more than one robot
2. Robot must be a single unit
3. Robots may only be used by 1 team for the same event.
4. Check specific events for additional info
5. Event rules overrule these rules
6. All robots must be either LEGO robots or VEX Go or VEX IQ robots. You may only have 1 robot controller on a robot.
7. Robots may be repaired between trials but cannot be altered (rebuilt differently)
8. Robots must start behind their start lines
9. No power adapters, extra power supplies or battery packs allowed. No wind ups or elastic or string power.
10. LEGO or VEX weights are allowed
11. No remote control of robots
12. If sensors are required, you must use them.
13. For most events, each robot will have 2 or more times to compete. These are called trials.
14. All robots MUST have a 1 second delay programmed at the start of its run
15. You must be ready to go when you are called. You may get a 0 or incomplete if you aren't there to compete.
16. Robots cannot have extensions or parts that make it larger after it starts, except for the ping pong shot put, which may have an arm.
17. No projectiles or throwing of items, except for ping pong shot put, which must launch balls.

Terminology

Meet: Refers to the entire day

Event: Refers to each of the 10 different competitions

Entry: Refers to one robot, one speed build, or one bridge entered into one event

Trial: Refers to a robot or persons official run within each event, there may be more than one trial depending on the event.

Robot: A robot controller (RCX, NXT, EV3, Spike Prime or VEX GO or VEX IQ) plus motors, plus building components, plus battery supply, and including the programs running on the unit.

Round: All trials within an event, different events may have 1, 2, or 3 rounds.

All first trials = Round 1

All second trials = Round 2

All third trials = Round 3

Knob: LEGOs bricks and plates are measured by the number of knobs, also called studs, which is what LEGOs are covered with.

Event 8: Robot Speed Build



Event 8: Robot Speed Build

Time: 6 minutes (360 seconds)

Robot Size: doesn't apply

In this event you get to show off your building speed. There are three different models you can choose to practice on and then come and compete at.

- Simple NXT Robot
- Simple EV3 Robot and the
- Simple Spike Prime Robot

The meet officials will provide you with a box of all the parts you need.

The directions are available on the www.robottrackmeets.org website in the Downloads section. You must build one of these robots!

You will have two trials to do this as fast as possible. But you must be able to finish the robot in under 6 minutes.



Fastest to finish wins (best of your two trials)

Gold Standard Winners

Every event has a set Gold Standard Level. If you meet that level, you will get a Gold Standard Ribbon to take home!

Fastest Robot.....	3.5 seconds
Strongest Robot.....	40 pounds
Slope Climbing.....	60 degrees
Steeplechase race	20 seconds
Table Clearing challenge.....	8 cans in 1 trial
Walking robot race	20 seconds
Robot Speed Build Competition.....	3.5 minutes
Ping Pong Shot Put challenge and the ..	20 points
Bridge Competition	60 pounds
Delivery	Complete in first 3 trials

Event 1: Slope Climber

Time: 60 seconds

Robot Size: not longer than 11 inches or wider than 7.5 inches

You need to build a robot that can drive up a LEGO slope!

The event starts at 30° (30 degrees) and then it keeps getting steeper until you can't climb up the slope anymore. Trials at each of these levels

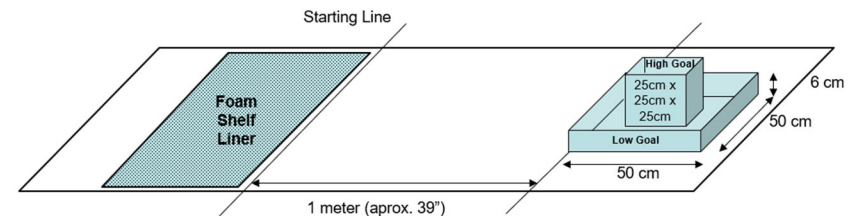
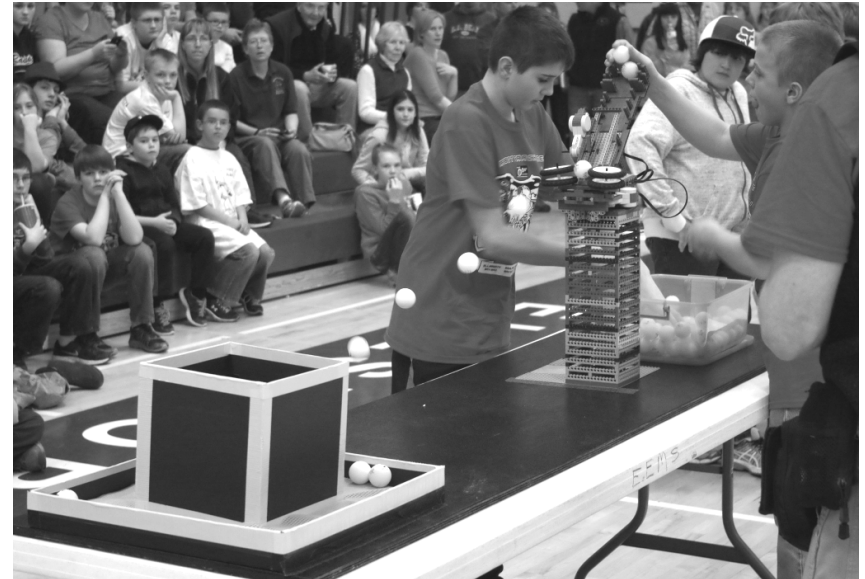
- 30°
- 40°
- 50°
- 60°
- 65°
- 70°
- 72.5°
- 75°
- 77.5°
- 80°
- 82.5°
- 85°

Just an FYI, staircases are usually 30-50 degrees, and most ladders are set to 75°

The slope is 24 knobs wide and 132 knobs long and has walls made of wood. Your robot **MUST** fit inside these walls.

Event 7: Ping Pong Shot Put

Here is a team shooting for points



Event 7: Ping Pong Shot Put

Time: 30 seconds

Robot Size: shorter than 36" in height, and not be larger than 24" in width or 30" in length

Build a stationary robot (doesn't move around) that can shoot/throw/bounce ping pong balls into the goals that are 1 meter away (39").

You'll have time to get your robot set up and run some tests to make sure it is working properly.

Each trial is 30 seconds long and you'll get points for every ping pong ball that makes it into a goal.

The low goal is worth 1 point for each ball and the high goal is worth 3 points for each ball.

All the ping pong balls must be loaded into a hopper or other mechanism to feed the robot. You may NOT hand feed the balls into the launch mechanism.

Make sure your robot can be safely moved to the competition area. If it falls apart on the way, you may be out of luck and have to skip the competition.

Event 1: Slope Climber

Here is a look at a robot going up a slope



Event 2: Table Clearing Mission

Time: 90 seconds

Robot Size: smaller than 12 inches by 12 inches

Build a robot to knock as many empty cans as possible off a flat table without having the robot fall off

Robot **MUST** use at least 1 sensor

Each robot gets 3 trials to get their best score

Each can knocked off is worth 1 point and there are 8 empty cans on the table each trial

If there is a tie, then the highest total score for all three trials wins. If still a tie, then the fastest robot to clear the table wins.

The table is 36" wide and 48" long with a 12" square in the middle where the robot must start.

Event 6: Bridge

The bridge must hold at least 10 pounds to qualify.



The bridge that can hold the most weight (up to 80 pounds) wins.

If more than 1 bridge can hold 80 pounds, then the **LIGHTEST** bridge wins.

If your bridge can hold 80 pounds, we'll ask if you want to keep going to see if we can break it. It is up to you if you want to keep going, its just for fun at this point.

Event 6: Bridge

Time: No time limits

Robot Size: Bridge must be at least 92 knobs long and 24 knobs wide

Bring your pre-built bridge to the track meet to see how much weight it can hold!

The bridge must be 100% made of LEGO pieces.

No string or wires allowed.

No suspension bridges allowed.

The span (gap you must go over) is 80 knobs, or about 25 inches. So, make sure your bridge is at least 92 knobs long so it can rest on each end.

The top of the bridge (the deck) must be at least 24 knobs wide, or about 7.5". It must be big enough to balance weights on.

The competition goes to 80 pounds and the bridge will be loaded by adding weights to it until we get to 80 pounds or until the bridge breaks, whichever comes first.

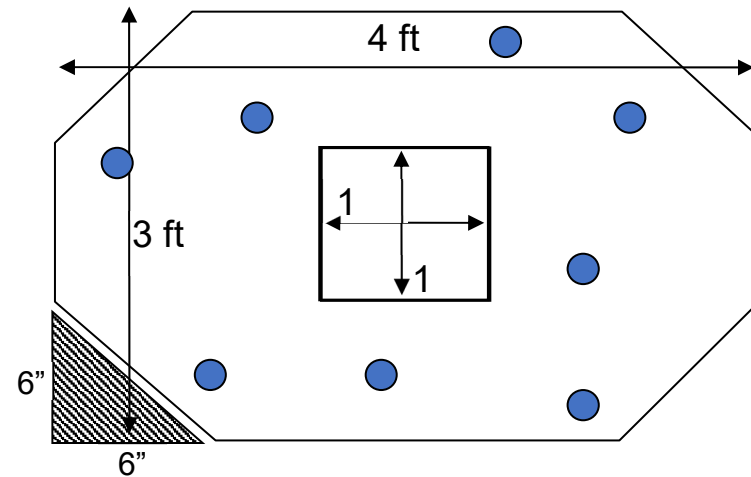
The bridge rests on LEGO structures and if you take the time to connect to these structures with your LEGOs on the bridge, it works better. So plan on taking the time to make that connection.

Event 2: Table Clearing Mission

Here is a robot pushing a can off a table



And here is the size of a table



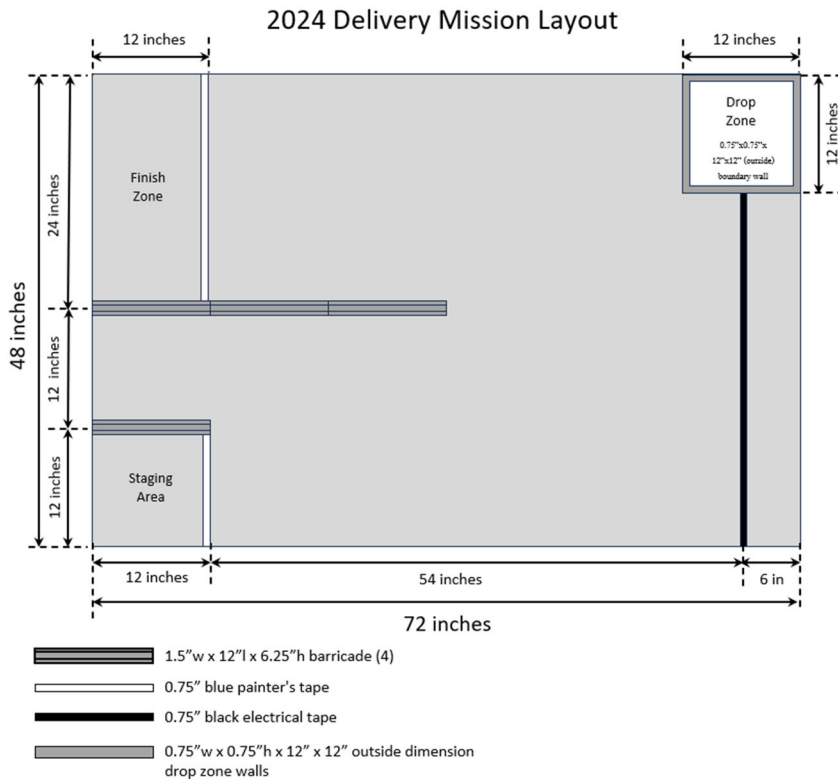
Event 3: Delivery Mission

Time: 30 seconds

Robot Size: smaller than 12 inches by 12 inches

Build a robot that can carry and drop off a specific object to the drop zone and then continue and cross the finish line.

Your score is your time, the quicker your robot can finish this task the higher you will place!

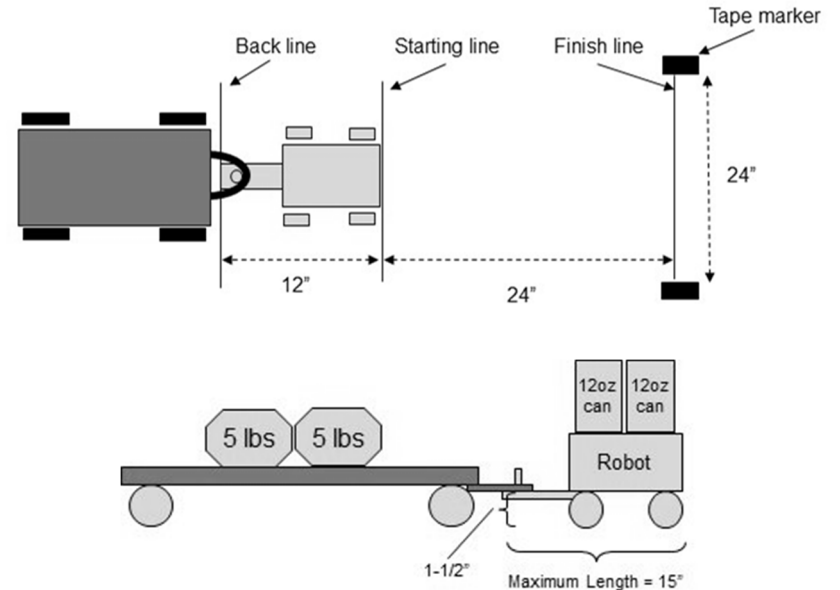


Event 5: Strongest Robot

- 5 pounds
- 10 pounds
- 15 pounds
- 20 pounds
- 25 pounds
- 30 pounds
- 35 pounds
- 40 pounds
- 45 pounds
- 50 pounds
- 55 pounds
- 60 pounds

If you can't pull the cart at one of these weights, then you are done with the competition.

You get at least 2 chances to complete each weight until you get eliminated.



Event 5: Strongest Robot

Time: 60 seconds

Robot Size: smaller than 15 inches by 15 inches

Build a robot that can pull a cart across the floor.

You can use as many motors and wheels or treads as you want but remember you can only use one controller!

The cart has a hoop at the front that you must connect to in order to pull it.

You may add whatever non-electric/battery LEGO or VEX Go or VEX IQ weights you have, and you can use two 12-oz cans of soda or juice as weights to help with traction.

Weights are added to the cart, and you'll have several trials at each weight level to pull the cart. But once you've pulled the cart across the finish line for that weight, you are done until the next weight level.

The start line is 24" wide and the robot must cross here to start the timer.

The finish line is 24" away and 24" wide and you must at least touch the finish line to complete this competition.

You'll start your robot pulling the cart with different weights, up to 60 pounds. The robot that can pull the most, the fastest, wins.

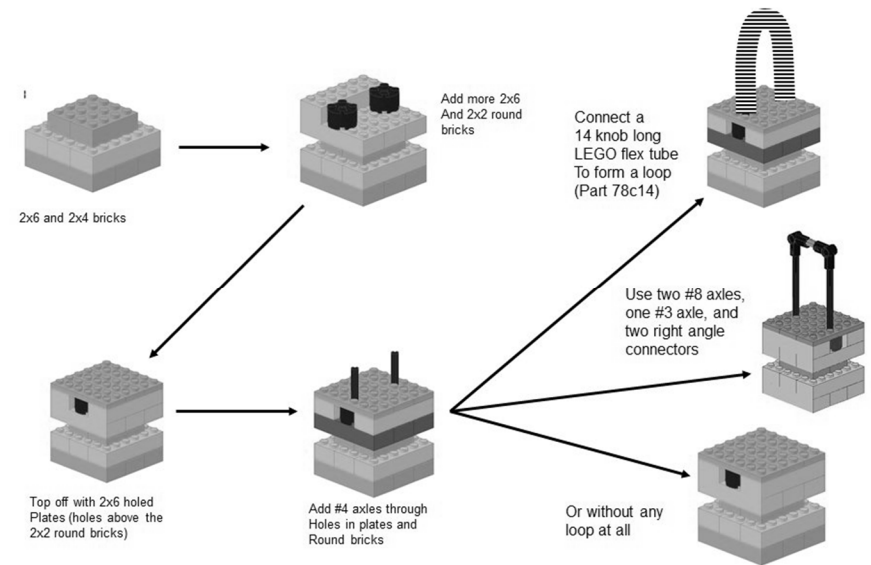
Event 3: Delivery Mission

Your robot must start completely inside the staging area, which is 12" x 12".

The drop zone is a 12" x 12" area in the opposite corner of the 4' x 6' playing field.

The Finish Zone is at the end of the U-shaped course and your robot must at least touch that line to finish.

You can pick between 3 different options for your object. See the image below.



Event 4: Fastest Robot

Time: 30 seconds

Robot Size: smaller than 12 inches by 12 inches

Plain and simple. Build a robot that drives as straight and fast as possible.

Robot starts in a 12" x 12" area and then races forward 18 feet until it crosses the finish line. The finish line is 48" wide and the robot must pass through the 48" zone without hitting the timers on either side.



Event 4: Fastest Robot

