



# ROBOTICS CHALLENGE

## Challenge Description

### “Line Touch Freeform”

Robot carries out a series of feats after reaching a designated line.

## Specifications

Challenge starts at designated “start” area.

- Robots must be made with LEGO Mindstorms Robotics Invention System and be programmed with Robolab programming environments.
- Robots can consist of a maximum 1 RCX, 8 Wires, and 3 motors.
- Nothing can be added or removed from the robot during a round.
- No non-lego parts are allowed
- Challenge is maximum 3 minutes long

This challenge allows the team’s imagination and talent to run wild. The team may pick any task to accomplish a planned script of actions. Please see the example task list for ideas.

There is no limit or restriction to the order and selection of the tasks. The only requirement is that the robot follow the team’s planned script.

The team may bring course materials of their choice as long as they fit in the designated 6 foot area. Teams may select a group of tasks that may not require any additional course material.

A maximum of 3 minutes is allowed to complete the script. If a robot has not completed the script in the time allowed, it will **not** be disqualified but it will no longer be entitled to acquire points after the time limit has expired.

## Adaptations

*See example tasks below ...*

## Scoring

The team may pick up its robot a limit of 2 times without a penalty.

Individual functions are counted once. Repeated functions will not count toward your score.

To receive credit for climbing or mounting an inclined surface the entire machine must be on the plane of the obstacle.

Prior to running the challenge, the team is to submit a list of tasks (script) the machine will accomplish and the number of tasks the machine will achieve. The judges to determine whether the robot functioned as designed and to judge the team’s success will compare the script to the tasks the machine actually completes. The machine is to accomplish the tasks in the order shown in the script.

80 points - Robot accomplishes 8 unique tasks according to plan (10 points for each task successfully completed in the order the task appears on the team's script.)

-10 points each time robot falls off the playing area

Up to 5 points will be deducted from the total score for the total amount of damage sustained by the robot, as determined by the judge.

**Submit a task list in writing before performance.**

## Hints and Tips

### Example Tasks

Audio	Speed	Terrain	Navigation	Color	Mechanism	Time	Communication, Logic and Counting
Single Beep	1 second stepped change in motor speed either increasing or decreasing with a minimum of 3 step changes	Climb a ½ inch step	Turn Robot 90 degrees right	Audio response on any color change	Bump and react	All functions stop at 3 minutes	Enter into a function loop
10 or more note tune	Change one motor speed while holding other motor at constant speed	Climb a series of steps 1 inch high each to a height of 4 inches	Turn robot 90 degrees left	Stop on any color by design	Lift a 20 gram weight	Beep at 1 minute intervals (3 beeps total)	Exit from a function loop
Hold single tone for 5 seconds	Change speed of 2 motors simultaneously	Climb a slope 5 to 30 degrees	Locate an edge and follow it	Follow a color contrast line	Clear ½" high barrier with a 20 gram weight	Between any 2 tasks stop all motion for a fixed # of seconds.	Count to a value
Generate tones randomly	Change any motor speed at a controlled descending rate from full design speed to zero speed (stop)	Climb a slope 31 to 45 degrees	Turn robot 360 degrees either clockwise or counter clockwise (complete circle)	Cause a functional response on color shade change	Rotate mechanism 90 degrees and stop  (drive wheels are excluded)	Accumulate a time and cause a function change	Make a logic jump
	Change any motor speed at a controlled ascending rate from any speed to a higher rate of speed	Descend a 50 degree slope	Complete a rectangle		Rotate mechanism 180 degrees and stop  (drive wheels are excluded)		Show an if/then logic branch
	Run a motor for a fixed	Cross through	Complete a triangle		Rotate mechanism		Use a random number

	amount of time	a pool of water a minimum of ½ inch deep			270 degrees and stop  (drive wheels are excluded)		generator
		Traverse a 5 to 30 degree slope	“Flip” direction (program function block)	Ramp an action using a color gradient.	Rotate mechanism 360 degrees and stop  (drive wheels are excluded)		Cause an action of a second RCX through communication between the 2 devices
		Traverse a slope of 31 to 45 degree	Spin the robot a fixed number of times.		Flip or cause the robot to hop		
		Cross a 3” wide gap	Make any directional change by design		Lift a cantilever		
		Push an object from one point to another by design	Stop by using an optical switch		Open or close a gate without breaking through it.		
		Cross over a 12” gap	Steer the robot without using a motor speed change		Pull a string.		