ROBOTIC ENGINEERING CHALLENGE 2012

NOVICE RULES

GENERAL

1. Teams are not allowed to alter or interfere with any other robot or programs other than their own. Violation of this rule will lead to immediate disqualification of the offending team.

2. Teams are not allowed to bring anything to the competition that would give their team an unfair advantage such as pre-constructed robots, books, notes or programming tools. Paper, pens, pencils, and instructions on programming will be provided to each team upon arrival at the competition. Students should **bring a calculator** to answer the Challenge questions.

3. Any situation not covered by the enclosed rules will be determined by a ruling from the appropriate Arena Judge. **All Judges' rulings are final.**

TEAM COMPOSITION

1. Each team is composed of a faculty sponsor and up to four (4) students. One student will act as the team leader.

2. Each student must attend the school that they are representing.

3. The faculty sponsor along with team representatives must attend the Robotic Engineering Challenge.

4. Faculty sponsors **are allowed to assist student teams** with challenges.

CHALLENGES

1. Team materials are assigned at check-in. **Teams should check-in no later than 9:00 AM.**

2. The Challenge instruction and Challenge Question Packet will be in each team kit.

3. The Challenge Question Packets **must be turned into the Judges stand no later than 1 PM**. Keep all questions together in the Challenge Question Packet. Answer as many questions as possible.

4. **Challenges must be completed sequentially: a team may only move onto the next challenge if they successful completed the previous challenge or had three (3) voided timed runs of the previous challenge.**

5. Each team will be given access to the Challenge Area for test runs. A team performing a test run will have two (2) minutes to complete their testing.

6. Teams are allowed **as many practice runs as they desire**, however upon completion of a practice run they must re-enter the queue to await another run.

7. A team will have three (3) qualifying runs to perform the assigned challenge. Each team **must declare** to an Arena Judge that they are prepared to perform a timed run and provide the judge with their score sheet. The Arena Judge will then time the team's run. When all three runs are completed, the Arena Judge will retain the team's score sheet.

8. Teams **may** alter or modify their robots between runs.

9. All robot programs will be stored in ***Program 5*** for timed runs.

10. Each team will have fifteen (15) seconds to activate their robot at the beginning of each timed run. Failure to start within the specified time may void that timed run and reduce the number of timed runs available to the team by one (1).

11. If a team voids all three attempts for a given Challenge, they may move to the next Challenge. Once all teams have completed or attempted to complete a Challenge, a team that voided all three (3) timed runs may repeat that Challenge.

12. The Robotic Engineering Challenge will run from **9:00AM until 3:00 PM**. During this time period, the teams will attempt to successfully complete as many challenges as possible. Scoring will be completed at 3:00 PM with a brief awards ceremony held immediately following the scoring.

13. The competition ends at 3:00 PM. Only a team currently completing a timed run will be allowed to finish that run. All other runs are void. Any team in the queue at that time **will not** be allowed to run their robot.

14. There are to be **NO Cell Phones** on or with students from 9am to 3pm. If a student(s) are found with a cell phone their team's present challenge and all three (3) runs for that challenge will be voided.

SCORING

1. Base points are assigned to each of the Five (5) challenges. These points are tied to goal throughout each challenge.

2. Some Challenges may have bonus points or multipliers added to the collected base points. Typically, bonus points are determined by taking the fastest completed run time accomplished by a team during their three (3)-timed runs and adding it to a challenge constant and then using that total to divide the bonus. The team's score will be the addition of the base points plus any bonus points.

3. There is a Sixth Challenge that is the Quiz packet that each team receives at the start of the day and will be worth its own points for a maximum total of 50 points.

4. Awards will be based on the team's total point accumulation for all Challenges and Challenge Question Pack results.

DEFINITIONS

Autonomous: A self-contained, self-guided, mobile robot. No human interaction for control other than power application.

Remote-Control: A **tethered** control system between the robot and a control device. Examples of allowable control devices include touch sensors tethered to the RCX, a stationary RCX tethered to the mobile portion of the robot or other sensor combinations used to enhance Human-Machine-Interface (HMI).

***Attempt*:** Is the ability to start your robot within the allotted time (15 seconds) and for it to begin its movement.

ROBOTIC ENGINEERING CHALLENGE

NOVICE CHALLENGE ONE

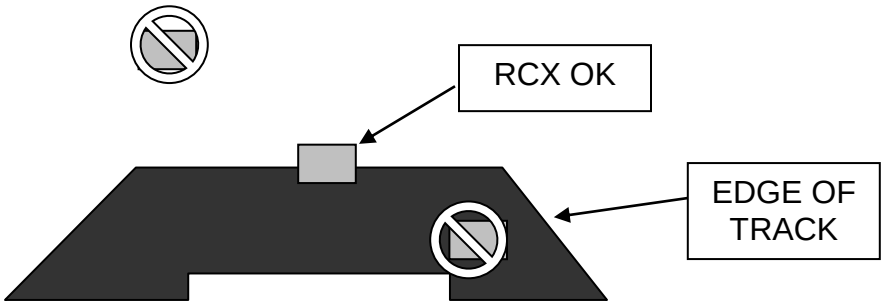
GOAL

Complete **ONE** lap around the outside edge of the Binary 500 Raceway as fast as possible.

RESTRICTIONS and GUIDELINES

Control Mode: Autonomous only

The RCX must straddle the outside edge of the track during the entire run.



The leading edge of the RCX must be placed on the **blue** start arrow along the side of the track.

The robot may travel clockwise or counter-clockwise around the track.

Only one robot on the track at a time.

All other rules apply.

Maximum Time Limit per Run: 60 seconds

SCORING

Bonus Points are added to the Base Points to determine the total score.

Base Points: Attempt: 5 points

Complete ONE lap: 15 points.

Bonus Points: 240 divided by team's fastest time in seconds plus 20 and rounded down.

Novice Challenge One

Team Name: _____

School Name: _____

Run 1

Attempt	YES / NO
Completed lap in time	YES / NO
Time in Sec (to the hundredth)	_____

Run 2

Attempt	YES / NO
Completed lap in time	YES / NO
Time in Sec (to the hundredth)	_____

Run 3

Attempt	YES / NO
Completed lap in time	YES / NO
Time in Sec (to the hundredth)	_____

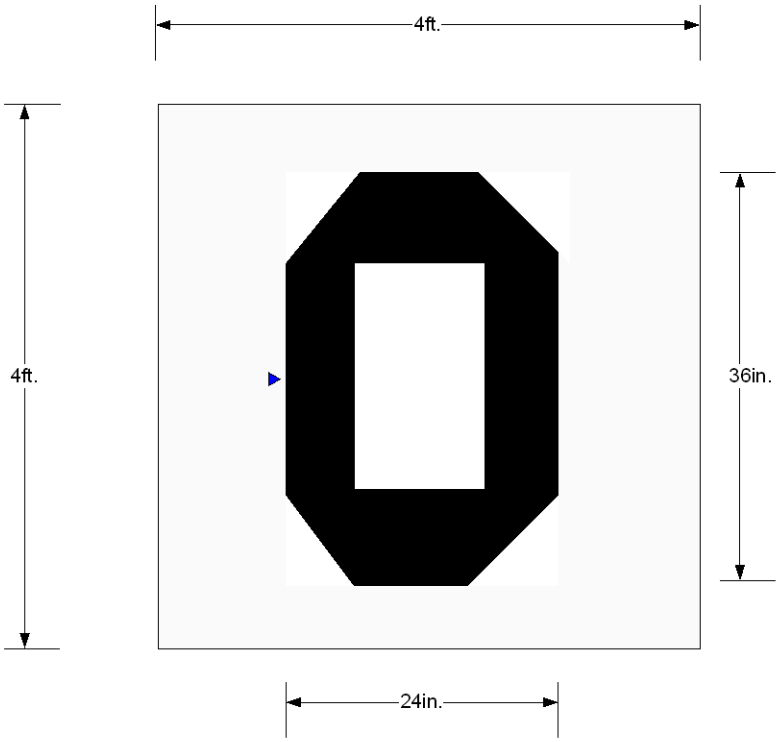
Judge's Printed Name: _____

Score Keeper Only

Score = Attempt (5 pts.) + Completed Lap (15 pts.) + Time Bonus [240/(t+20)]

_____ = _____ + _____ + _____

Novice Challenge One



TOP VIEW

ROBOTIC ENGINEERING CHALLENGE

NOVICE CHALLENGE TWO

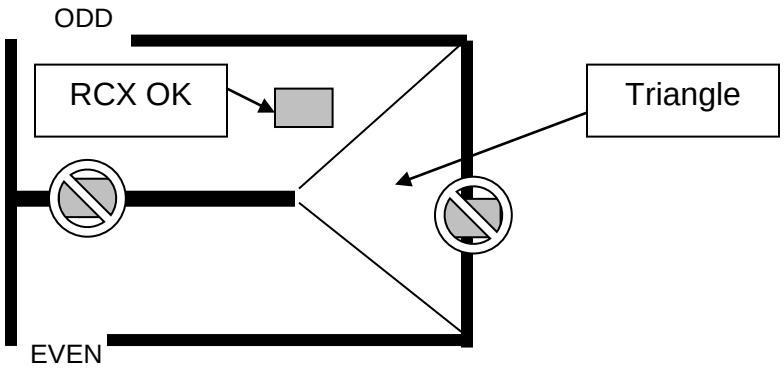
GOAL

Travel through the maze as fast as possible and exit out the opposite opening.

RESTRICTIONS and GUIDELINES

Control Mode: Autonomous only

The RCX may NOT straddle, crawl over or crossover any wall in the maze.



The team leader will roll a **die** for **EACH** timed run:

-if the value of the roll is even, start at the even entrance

-if the value of the roll is odd, start at the odd entrance

The RCX must be placed on the **blue** start arrow at the entrance to the maze to begin the run. The robot must navigate through the maze while traveling toward the exit.

The clock is stopped when the RCX **breaks** the exit plane.

If the RCX exits through the entrance the run will be void.

Only one robot on the track at any time.

All other rules apply.

Maximum Time Limit per Run: 60 seconds

SCORING

Bonus Points are added to the Base Points to determine the total score.

Base Points:Attempt: 5 points
Any part of RCX moves into the triangle area: 5 points
When the RCX exits the other side: 15 points

Bonus Points: 200 divided by team's fastest time in seconds plus 20 and rounded down.

Novice Challenge Two

Team Name: _____

School Name: _____

<u>Run 1</u>	
Dice Roll	Even / Odd
Attempt	YES / NO
Enter Triangle	YES / NO
Make it out other side	YES / NO
Time in Sec (to the hundredth)	_____
<u>Run 2</u>	
Dice Roll	Even / Odd
Attempt	YES / NO
Enter Triangle	YES / NO
Make it out other side	YES / NO
Time in Sec (to the hundredth)	_____
<u>Run 3</u>	
Dice Roll	Even / Odd
Attempt	YES / NO
Enter Triangle	YES / NO
Make it out other side	YES / NO
Time in Sec (to the hundredth)	_____

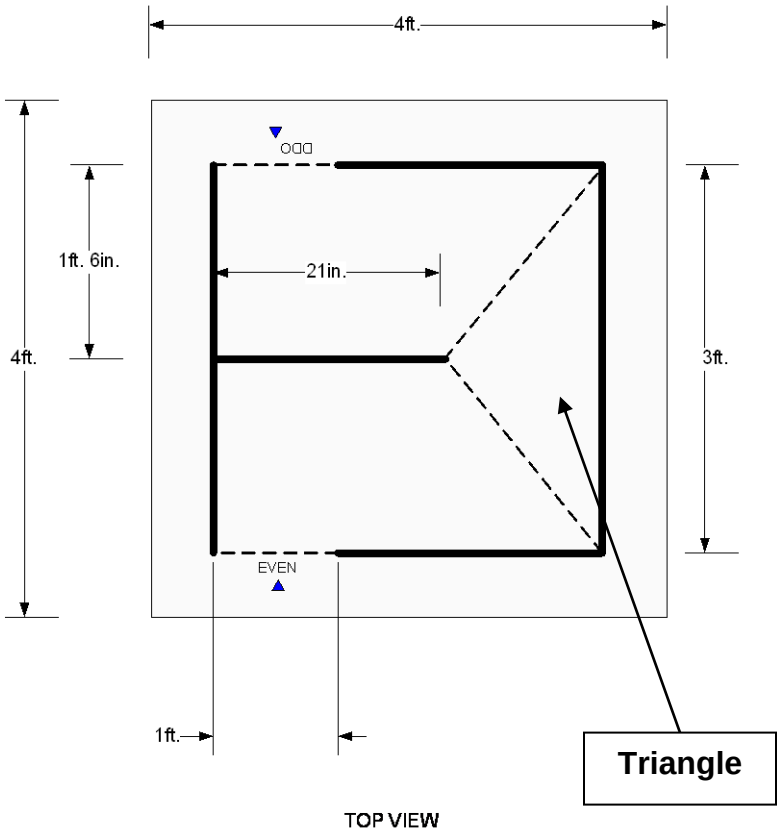
Judge's Printed Name: _____

<u>Score Keeper Only</u>

Score = Attempt (5 pts.)+ Enter triangle (5 pts.)+ Exit (15 pts.)+ Time bonus [200/(t+20)]

_____ = _____ + _____ + _____ + _____

Novice Challenge Two



TOP VIEW

ROBOTIC ENGINEERING CHALLENGE

NOVICE CHALLENGE THREE

GOAL

Sink as many of the fifteen pool balls into any pocket as fast as possible.

RESTRICTIONS and GUIDELINES

Control Mode: Autonomous only

Any pool ball knocked out of the playing area may **NOT** be returned to the table during the current run.

Fifteen pool balls are placed in the rack area of the table. The RCX is placed on the **blue** start triangle. The robot faces in the direction of the point of the **blue** start triangle.

If the robot leaves the table the run is voided.

Only one robot on the track at anytime.

All other rules apply.

Maximum Time Limit per Run: 30 seconds

SCORING

Base Points:

Attempt: 5 points

Pocket Points:

Either Front	:	2 points
Either Side	:	4 points
Either Back	:	8 points

Novice Challenge Three

Team Name: _____

School Name: _____

Run 1

Attempt YES / NO

Pool balls in pocket (front/middle/back) / /

Run 2

Attempt YES / NO

Pool balls in pocket (front/middle/back) / /

Run 3

Attempt YES / NO

Pool balls in pocket (front/middle/back) / /

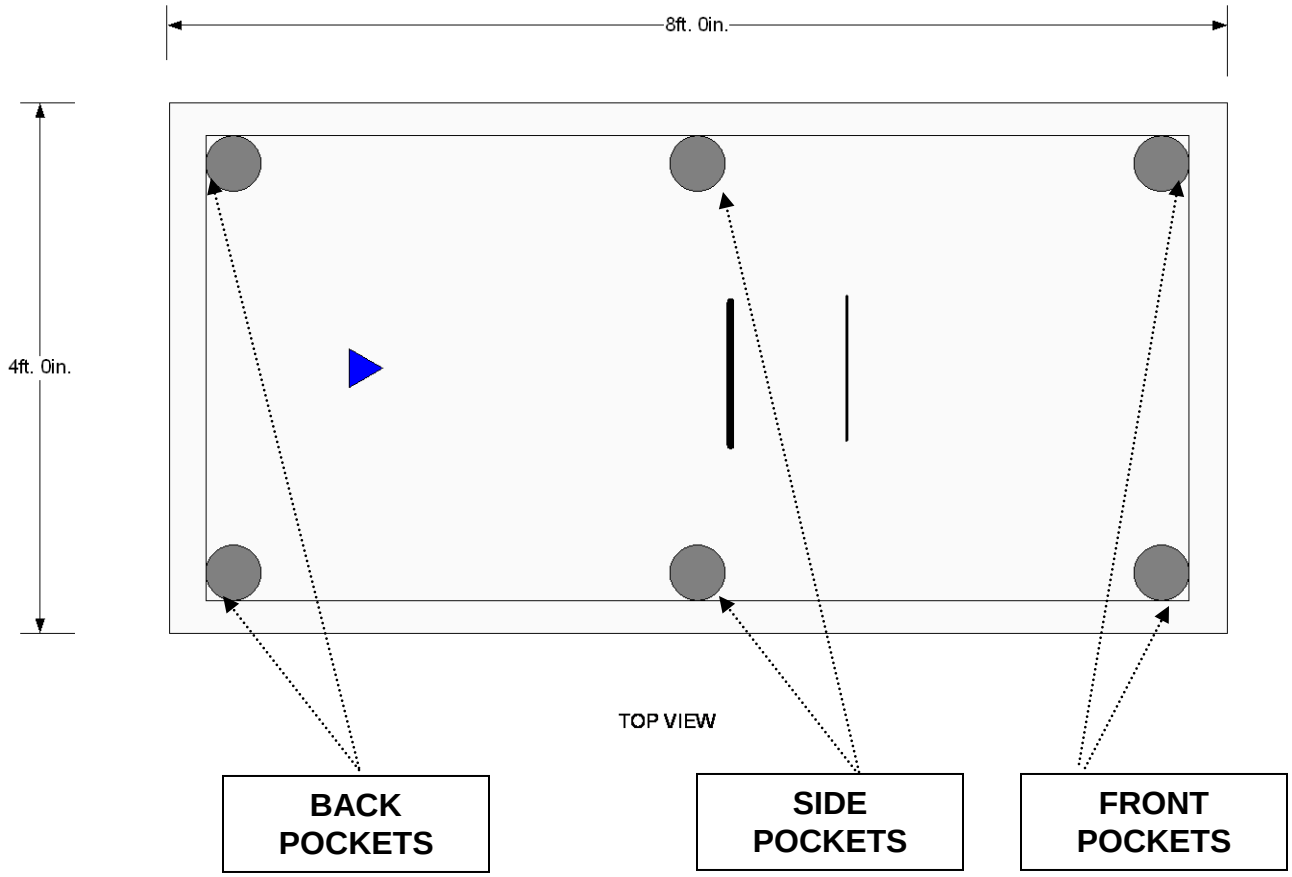
Judge's Printed Name: _____

Score Keeper Only

Score = Attempt (5 pts.) + Front pocket (2 pts. each) + Middle pocket (4 pts. each) + Back pocket (8 pts. each)

_____ = _____ + _____ + _____ + _____

Novice Challenge Three



ROBOTIC ENGINEERING CHALLENGE

NOVICE CHALLENGE FOUR

GOAL

Push the house robot completely out of the ring (black circle) or preforming a takedown.

RESTRICTIONS and GUIDELINES

Control Mode: Autonomous only

“Contact” is defined as the front of the challenger impacting the front, top, sides, bottom or back of the house robot.

“Survive” is defined as the continuous autonomous operation and movement of the challenger robot.

“Takedown” is defined as rendering a robot motionless and/or unable to continue operation or forcing the robot out of the ring and unable to return to the ring.

The house robot and challenger (your robot) will be placed on the perimeter of the ring facing opposite each other to start.

The challenger (your robot) must confine its search to within the ring.

The RCX of the house robot must be completely out of the ring to count as a takedown.

The challenger should always remain in contact with the ring expect as outlined below:

If the challenger leaves the playing area during the Challenge and does not attempt to return to the ring the run is ended.

Only one challenger on the track at any time.

All other rules apply.

Maximum Time Limit per Run: 60 seconds

SCORING

Base Points:

Attempt: 5 points

Make contact with the house robot: 10 points

Survive 60 seconds with the House Robot: 25 points
OR
Takedown: 50 points
(receive these points only if takedown occurs in less than 60 seconds)

Novice Challenge Four

Team Name: _____

School Name: _____

Run 1

Attempt	YES / NO
Contact	YES / NO
Survived 60 sec	YES / NO
Takedown House Bot	YES / NO

Run 2

Attempt	YES / NO
Contact	YES / NO
Survived 60 sec	YES / NO
Takedown House Bot	YES / NO

Run 3

Attempt	YES / NO
Contact	YES / NO
Survived 60 sec	YES / NO
Takedown House Bot	YES / NO

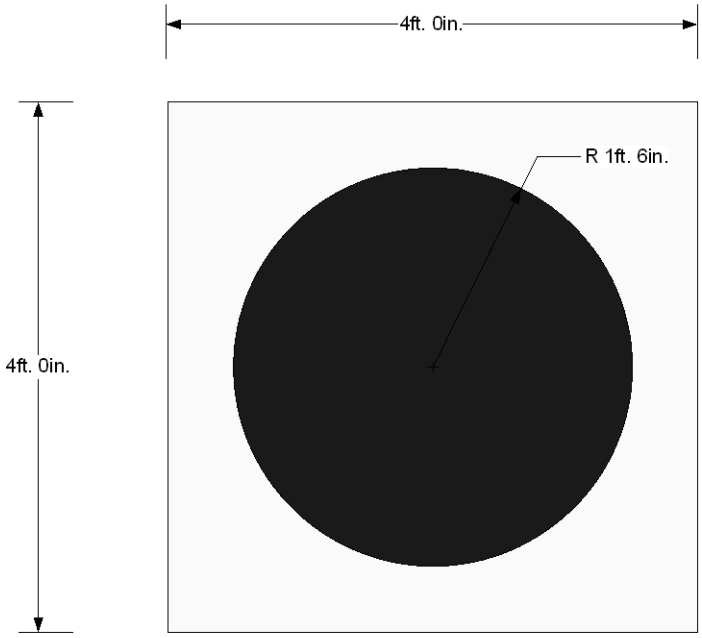
Judge's Printed Name: _____

Score Keeper Only

Score = Attempt (5 pts.) + Contact (10 pts.)+ Survival or Takedown (25 pts. / 50 pts.)

_____ = _____ + _____ + _____

Novice Challenge Four



TOP VIEW

ROBOTIC ENGINEERING CHALLENGE

NOVICE CHALLENGE FIVE

GOAL

Move through the rooms knocking down randomly placed cones to release the suspended scoring ball as fast as possible and return to the start point.

RESTRICTIONS and GUIDELINES

Control Mode: Autonomous only

The robot will start from the start circle and seek out cones in the rooms. Once a cone is located, the robot is to knock it over to release the scoring ball. There are six (6) scoring balls each with a point value of five (5) points. A scoring ball's points will not count if it is caught between the wall and the cone.

The robot **may not** climb over the walls to move into a room.

The robot **may** touch the walls during the run.

For maximum points, **once all the cones are down** the robot should return to the start circle to complete the challenge.

If the robot returns to the start circle at **anytime** prior to downing all cones the run is ended.

If the robot leaves the playing area the run is ended. Only one robot on the track at anytime. All other rules apply.

Maximum Time Limit per Run: 60 seconds

SCORING

Bonus Points are added to the Base Points to determine the total score.

Base Points: Attempt: 5 points
Down a cone: 5 points per cone
If all cones are down and the robot returns to the start: 20 points

Bonus Points: 240 divided by team's fastest time in seconds plus 20 and rounded down.

Novice Challenge Five

Team Name: _____

School Name: _____

Run 1

Attempt	YES / NO
Contact with cone	YES / NO
Number of cones knocked over	_____
Return to start after contact	YES / NO
Time of return in Sec (to the hundredth)	_____

Run 2

Attempt	YES / NO
Contact with cone	YES / NO
Number of cones knocked over	_____
Return to start after contact	YES / NO
Time of return in Sec (to the hundredth)	_____

Run 3

Attempt	YES / NO
Contact with cone	YES / NO
Number of cones knocked over	_____
Return to start after contact	YES / NO
Time of return in Sec (to the hundredth)	_____

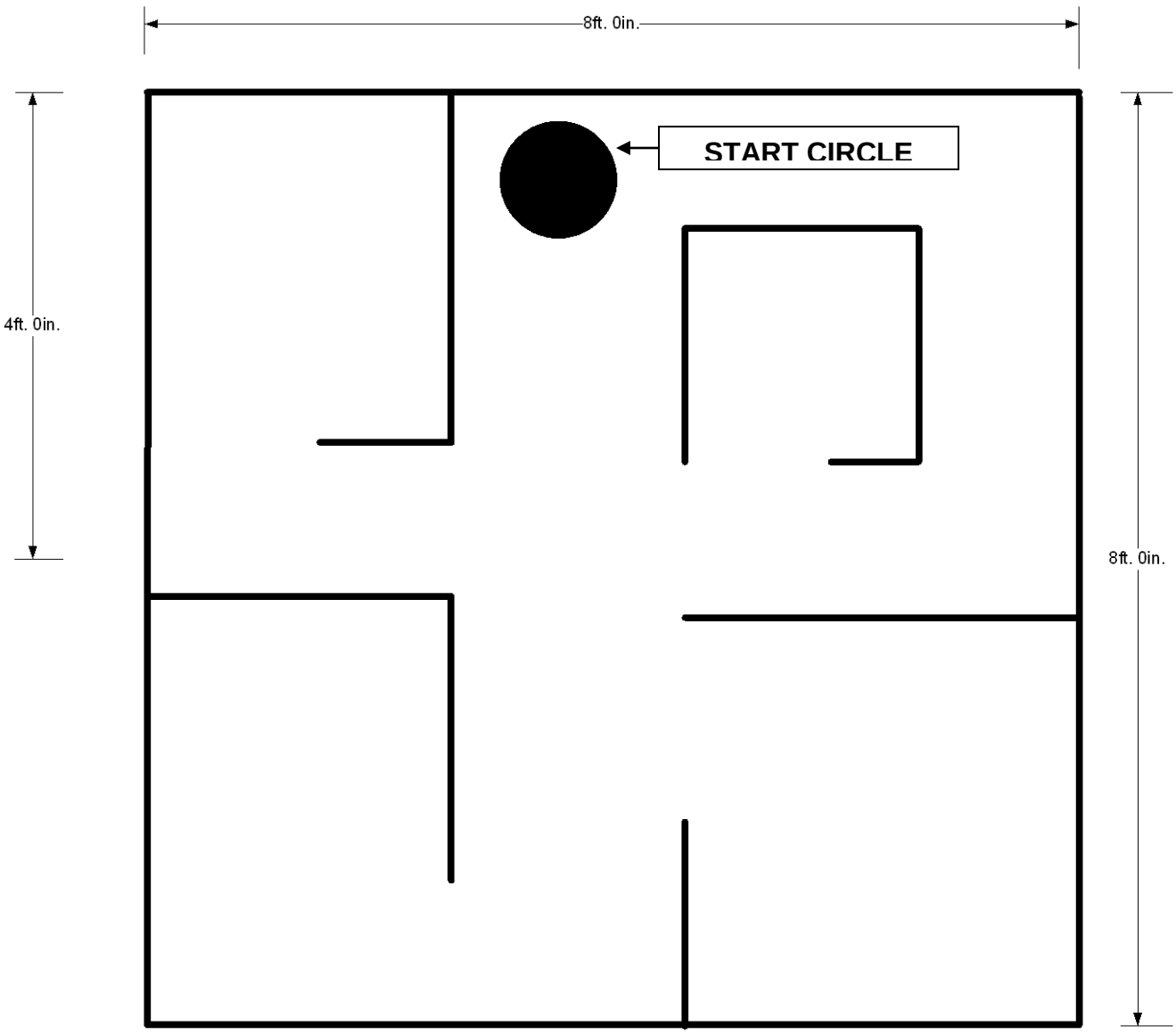
Judge's Printed Name: _____

Score Keeper Only

Score = Attempt (5pts.) + Number of cones knocked over (5pts. each) + Return (20pts.) +Time Bonus [240/(t+20)

_____ = _____ + _____ + _____ + _____

Novice Challenge Five



TOP VIEW