Note:

You MUST REVIEW the entity of the rules sheet before you attempt to build anything. The following covers some odd points which serve as a reminder. It does not tell you exactly how you should build every single component of your robot. Also, you can use anything that you can think of. You are not required to use parts from a particular manufacturer.

This document contains checklist for Rescue Line and Maze.

Robot CheckList for Maze

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(There is no Primary Division for **Maze**. So, you will be going against high schoolers.)

1- Watch the robot dimension restriction in order to maneuver around the maze easily. The smaller the better. As it needs to go uphill, a bit longer from front to back is better than from side to side.

2- Need to go up 25 degrees incline. So, you should watch out for:
   a. the center of gravity of your robot.
   b. whatever mounted in front of the front wheels must not obstruct its path going up the 25 degrees uphill.

3- Watch out the obstacle:

   Ideally, if you keep your robot as small as possible, you do not even need to worry about obstacle avoidance routine. You should always consider to have a rim around the robot to protect your robot's part being stuck at a corner turn, etc.

4- About the center for victims detection:

   We'll try the thermal sensors from Dexter Industry, http://www.amazon.com/dp/B0057ABHZ0/. Need two. The heat source (the simulated victims) are flat and placed on the wall of the field. The location can be on right below the top edge or the bottom of the wall. So, you should try to to come up with a mounting on the side to be capable of detecting in different height, one up and one down facing to the side. You can just use any sensor as a test for mounting purpose.

5- Create your rescue kit.

   This can be anything which can dispense one object at a time. Be creative. It can use some rotating actuator (like a rotating disc allowing to drop one at a time) or linear actuator (like pushing mechanism to push one out at a time).

6- Traction! Depending on your robot's weight, you might need a set of wheels which give more friction.

Robot CheckList for Rescue Line

The following list is for both Primary (age 14 and below) and Secondary Division (age 15-18):

1- Need to go up 25 degrees incline.
... So watch out for the center of gravity of your robot. Also, whatever mounted in front of the front wheels must not obstruct its path going up the 25 degrees uphill.

2- Need to see curved line on the field:
Measured about 2cm thick… basically equivalent to a standard electrical tape from hardware store. Can use 2 light sensors pointing down. However, this may vary from year to year. You should first review the rules carefully first. I'll go thru that with you in the winter term again. Or,
Ideal locations and mounting for the Light sensors:
   a) Vertical to the field will be much more accurate than pointing in an angle.
   b) About 1cm off the ground, and should be shielded from ambient light. This allows more consistent light source.
   c) Should not stick out far from front wheels, as it will stop your robot from going 25^{o} uphill. Unless it is on a movable hinge system.

3- Need to recognize 20cm gap on the line. Read the rules online, http://rcj.robocup.org, carefully about this one.

4- Watch out the 1cm bumper. Clearance is importance. Also, location of the light sensor should not come into too close to the bumper.

5- Need to see obstacle. Most will use an ultrasonic sensor, pointing forward. Some even mount it on a mobile head.

6- Watch out for the condition at landing during the transition from 25 degree uphill to flat ground.
   a. distance of the light sensors to the ground
   b. loss of traction.

7- Watch out the location of the ultrasonic sensor. It should not extrude out from your robot. As a matter of fact, it is best to at align with the location of the light sensor or even farther back. Why? Think about when you are turning on a corner where measures only 10cm from the wall.

8- Think about how to sweep the victims, and deliver to a safety zone marked by a black piece of paper on the field. However, again, this may be different from year to year. Since this is the hardest and the last part of the game, you may skip this portion of the game especially if this is your first time participation.

9- You may start using compass to localize yourself too. You do not have to purchase this extra sensor until you are ready for it; as you may not even end up using it. Just to mention here for your future reference.

10- The 8cm skinny wheel is not a good idea if it is by itself, as it has less friction comparing to other 4.96 or 5.6cm balloon tires. The key in this case is the 'traction". Bigger wheels do not give more traction, nor gives you more force (torque).

The following list is for Secondary Division only:

1- You may be able to get away with only one light using PID algorithm. You may use the light array panel from HiTechnic for gap recognition as well. For others, you should just stick with 2 light sensors.
2- Your will need a gripper which is capable of lifting at the same time closing & opening. It is a 3D movement. If you have an idea, please share with others. I have a model at the center, but a bit too bulky.
3- You most likely will run out of ports. Therefore, you will learn how to use a sensors multiplexer. If you want to get a head start, you will find sample tutorial and sample codes at http://learn.stormingrobots.com. Look for "I2C" tutorial.
4- You will need to learn how to do datalogging as well. Again, samples are online at http://learn.stormingrobots.com.