



University of NORTH ALABAMA
STEAM OUTREACH INITIATIVE

presents

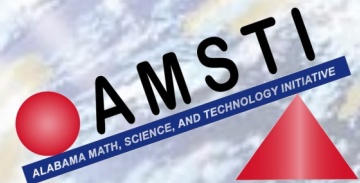
MISSION

to MARS

Robotics Competition



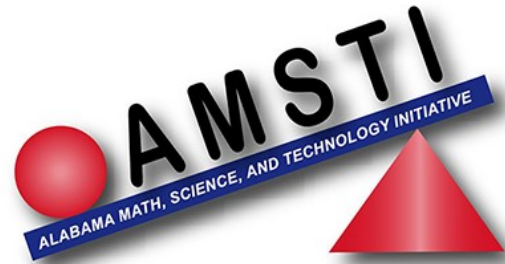
January 26, 2019



UNA STEAM Initiative Sponsors

STEAM Outreach Initiative is pleased to have the sponsors listed below.

The program would not be possible without their support .



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MISSION to MARS

In 2025, Space X will be sending human explorers to Mars. Setting up the first human colony will be difficult. It has been decided that the best way to do this is to send supplies to the Mars surface before the humans leave. Explorer robots will go ahead of the humans in order to prepare the surface and to organize the material.

Since Mars is over 54 million kilometers away at the closest, Driving the explorer using a controller is out of the question. Radio waves that the controller would have to use will take between 8 and 48 minutes round trip. Also, if the explorer is on the side of Mars not facing Earth, we will have no communication. Therefore, the explorer must be autonomous (self-driving).

Satellite photos of the area will allow you to practice driving here on Earth and create a program that can be uploaded to the explorer on Mars. Use your time here to develop the best program to have the Explorer complete each of the three tasks.

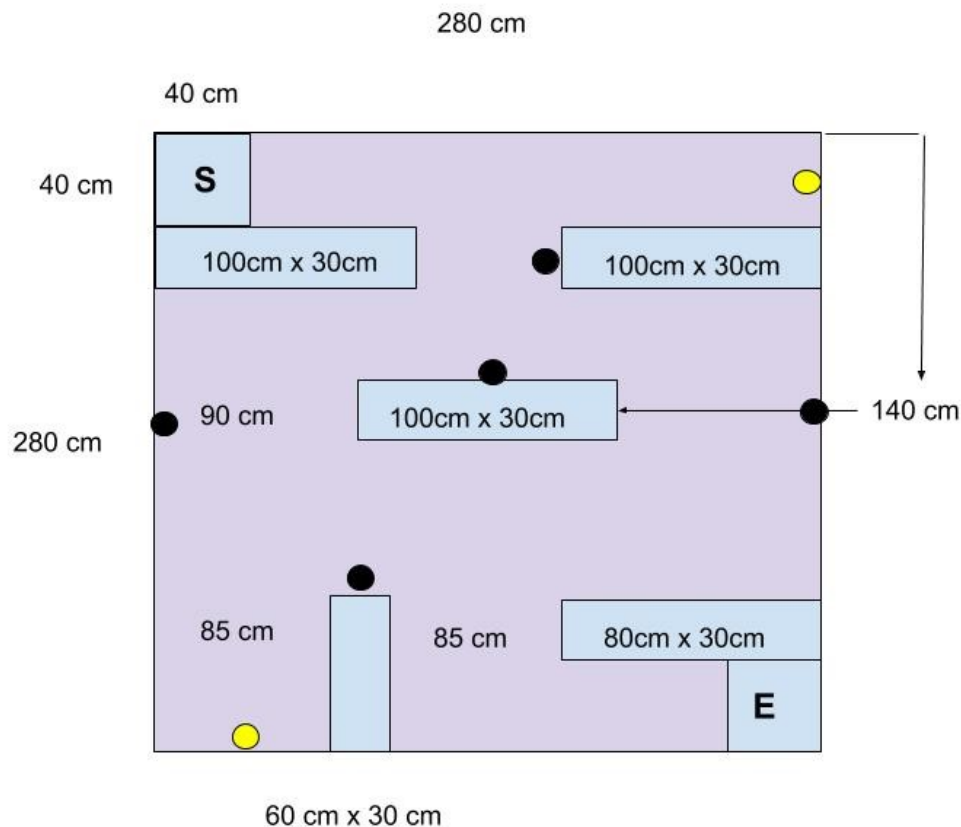
Game Specifics

1. All field dimensions are **280cm x 280cm**.
2. If a robot leaves the field, their turn is over immediately. Team will pick up the robot. No score will be awarded.
3. If the robot leaves the field **AFTER** entering the exit point, they will be given a score.
4. Drawings are not to scale. Dimensions are given to help teams. All measurements are within 3cm tolerance.
5. Cup placement will be approximate (within tolerance). A sticker will mark the position on the field, cups will be approximately centered on those stickers.
6. Crossing the tape means that at least one wheel is completely across the tape and no longer touching the tape.
7. Cups are placed at the same place each time.
8. All fields will be oriented in the same direction.
9. Three fields of each puzzle will be available
10. Teams have exactly **3 hours** to compete. At the end of **3 hours**, any robots on the competition field will be allowed to finish. Teams in line will not get to start.

TASK 1: To the Habitation Zone

Your Explorer must make it from the landing area to the habitation zone, where the astronauts will be living. However, the path is dangerous. After we launched the Explorer to Mars, there were several sandstorms and landslides that made the path more dangerous than we planned. Your job is to reprogram the Explorer to travel along the path on your map and arrive safely at the habitation zone.

- Your Explorer must stay on the path
- The taped off area is dangerously loose sand. You can get up to the edge (touch the tape) but your Explorer cannot cross the tape. Crossing the tape ends your turn.
- There are boulders in the path. Hitting the boulders will damage the Explorer. -5 points for each time you hit a boulder. You can only hit each boulder once (score wise)
- Bonus: NASA needs you to check two dangerous areas. Touch the gold cups to receive the +10 point bonus. You may only touch each cup once.
- You only have 90 seconds to make the trek. Your score is 90-time-boulders hit.
- K-2 may enter the hatched area once with no penalty.

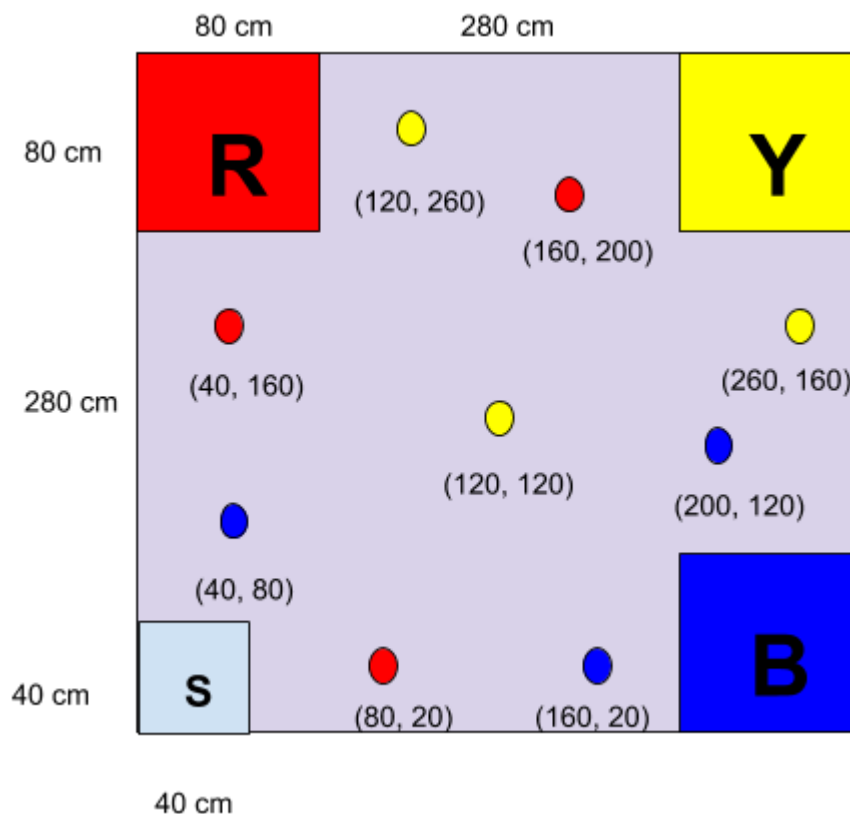


TASK

2: Position the Supply Pods

At the Human Habitation Zone (HHZ), supplies were dropped off, but they are randomly placed around the zone. Your job is to position the supply pods in the correct location. Thankfully, they are color coded so it will be easy for you to sort. The pods are somewhat fragile, so picking them up is not possible. However, the bottom has a heat shield so pushing them along the ground should be simple. Put all the same colored pods in the appropriate location.

- Supplies will be located in the same location each time
- Once a supply is scored, it cannot be, “unscored”, if you happen to push it out of the scoring position.
- To score, all of the pod must be inside the taped area.
- Pods do not have to be standing to score.
- To score, a pod must be in the correct color scoring area. +10 pts for each
- Any pod in the incorrect area is a penalty -10 points.
- Pods may be left in the wrong area during the round, but must be removed by the end of the round.
- Bonus: If all pods are in the correct zone by the end of 90 sec, time ends. Bonus is 90-time.
- K-2 Modification: K-2 Teams may score any color in any zone. Correct pods are +10, Incorrect pods are +5.



TASK 3: Prepare the Human Landing Zone

The Human Landing Zone must be prepared for the human landers. They will arrive in approximately 90 days. You don't have long. All the boulders must be removed. The beacons must be kept clear. The landers use lasers and the beacons to align themselves for safe landing. No boulders should be in the beacons' zone.

- Boulders must be pushed into the crosshatched area.
- To score, the entire boulder must be inside the crosshatched area.
- The Explorer cannot enter the crosshatched area. This is very loose sand and the Explorer will get stuck. Doing so will end your turn immediately. However, touching the tape is acceptable.
- Gold Beacon Pods- Push the gold beacon pods into the beacon zone. One beacon per zone. Any part of the beacon in the zone will score. Beacons do not have to be standing to score. +10 points per beacon
- The beacon area must remain clear. No boulders are allowed in this area. No part of a boulder should be in the beacon zone.
- Scoring: Boulders completely removed +10
- Boulders partially or entirely in the beacon zone -10
- Bonus: Time stops if all the boulders are removed before 90 seconds. Bonus is 90-time.
- K-2 Modification: K-2 teams can enter into the loose sand with no penalty.

