



# Engineering And Robotics Learned Young

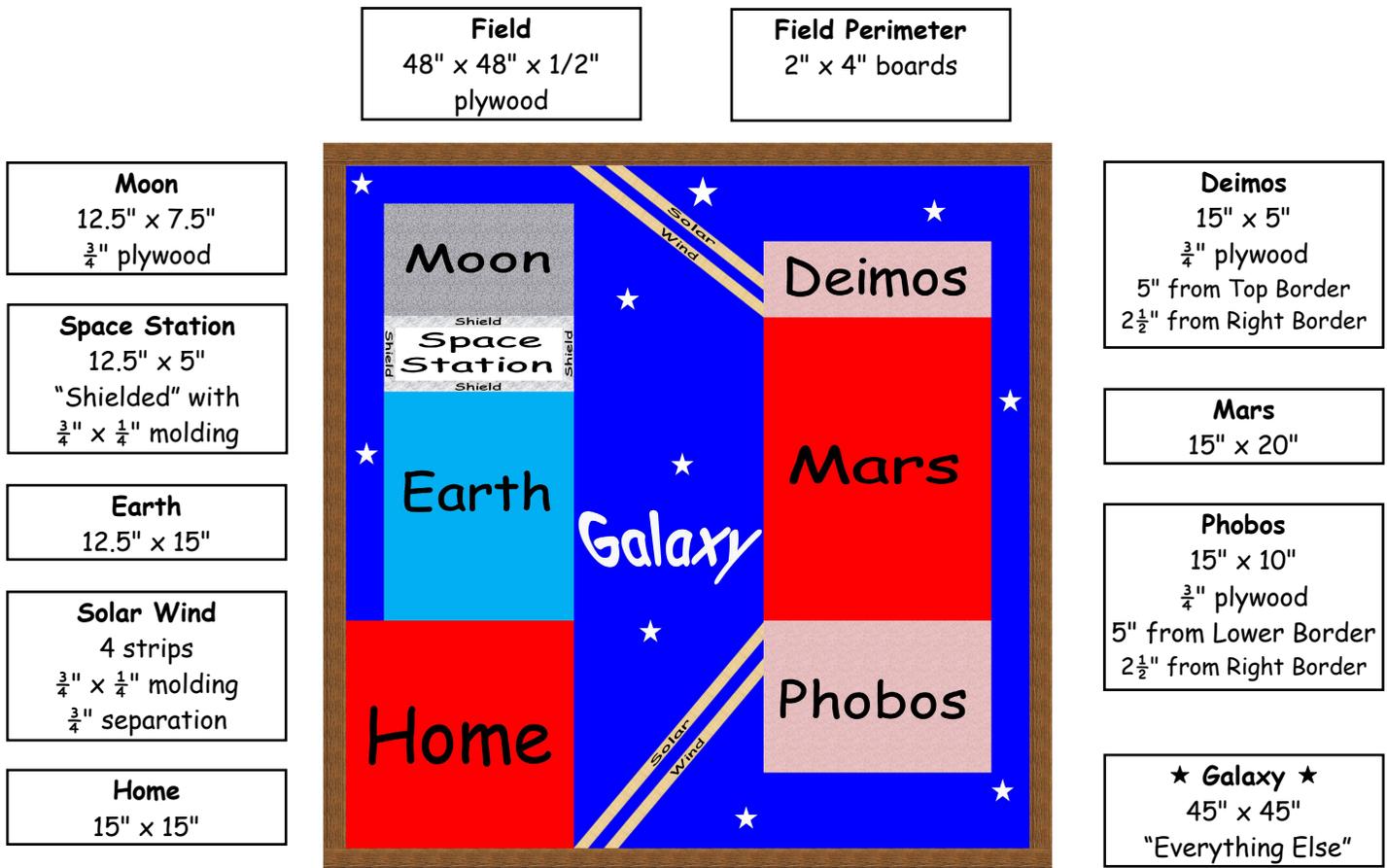
◆ EARLY ◆

## Fall 2011 Robotics Competition

Roboticists, the Global Association of Space Agencies (GASA) needs your help to colonize Mars! Before we can live on Mars, GASA needs your help preparing a suitable atmosphere for humans to live on Mars by building a robot to take Mars Atmosphere Construction Kits (MACKs) to Mars and the moons of Mars, Phobos & Deimos. The MACKs will be used to create an atmosphere so future generations can picnic, bike, hike, and camp on Mars!

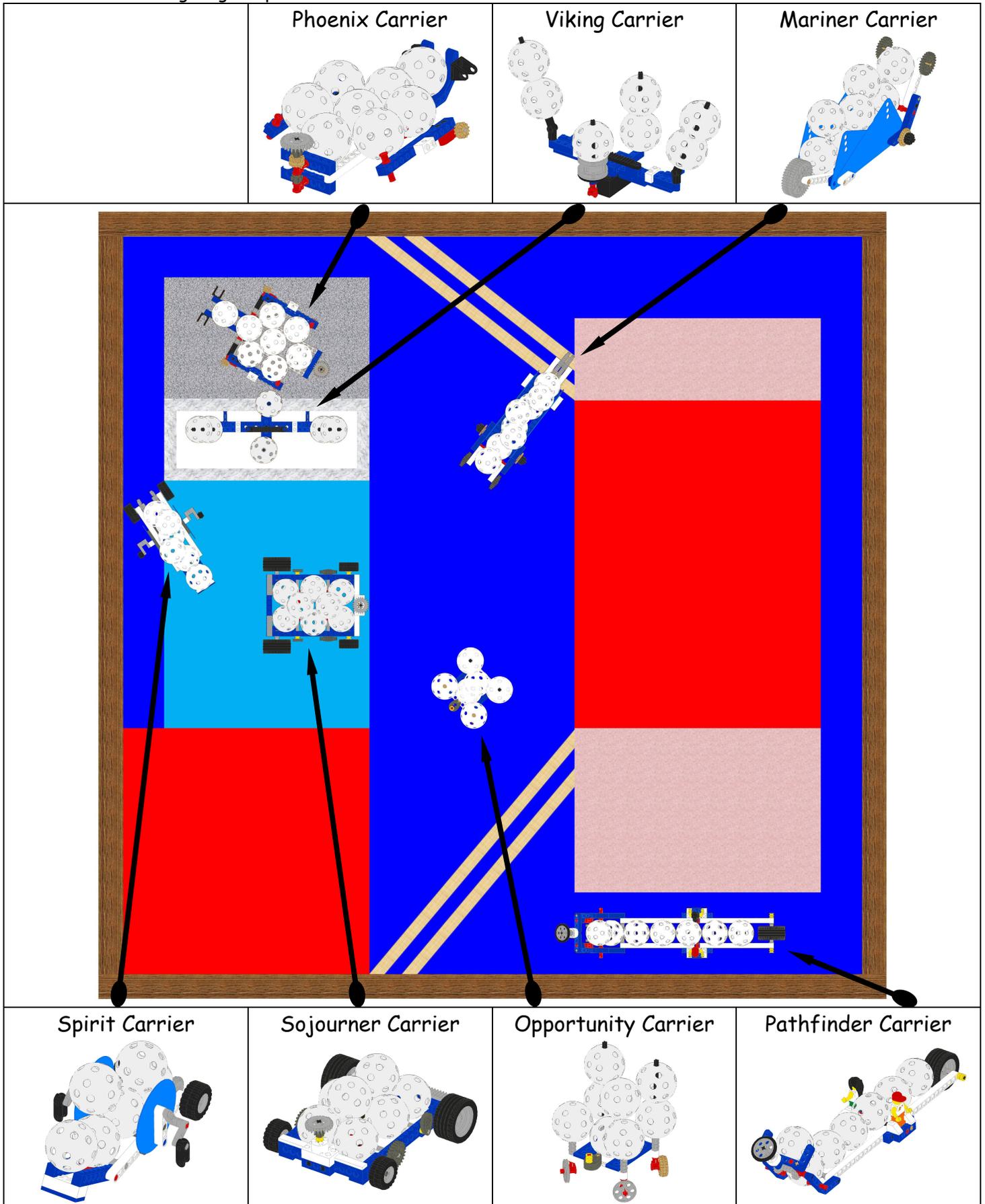
Below is everything that we know about the mission.

- The team must be ready to execute the mission for your EARLY Tournament.
- The equipment available for a team to build a robot is 3 LEGO® Simple & Motorized Mechanisms Kits.
- The following diagram presents the environment that will be encountered.



Galacticville

- The following diagram presents where the *MACKs* and *Carriers* will be in Galacticville.



# Mission Rules

1. The team has 2 minutes to complete the mission.
2. There are 52 *Mars Atmosphere Construction Kits (MACKs)* on the playing field at the beginning of each mission, represented by practice golf balls.
3. There are 7 *MACK Carriers* on the playing field at the beginning of the mission constructed from one LEGO® Simple & Motorized Mechanisms kit.
4. The team's score is determined at the end of the 2-minute mission.
5. If a *MACK* is moving when time expires, the referee will wait until the *MACK* has stopped moving before determining the *MACK's* scoring position.
6. There are three scoring zones: **MARS**, **PHOBOS**, and **DEIMOS**.
7. The goal of the mission is to place the *MACKs* in **MARS**, **PHOBOS**, and **DEIMOS**.
8. The team scores 2 points for each *MACK* in **MARS**.
9. The team scores 3 points for each *MACK* in **PHOBOS**.
10. The team scores 4 points for each *MACK* in the **DEIMOS**.
11. A *MACK* breaking the plane of a scoring zone is considered in the scoring zone.
12. A *MACK* in multiple zones simultaneously (scoring zone & non-scoring zone, scoring zone & penalty zone, penalty zone & non-scoring zone, etc.) is considered in the zone that results in the highest points.
13. Only the parts that are contained in three LEGO® Simple & Motorized Mechanisms kits along with nine 20" controller extension wires may be used to construct the robot and attachments (i.e. no other materials such as glue may be used on the robot). The kit parts may not be altered.
14. The robot and all attachments must begin inside the **HOME** at the beginning of the 2-minute mission (i.e. no LEGO parts may be off the playing field when the mission begins). The parts do not have to be assembled together and the parts may be removed from and returned to the field during the 2-minute mission.
15. The **HOME** is the 15" x 15" boundary extended vertically (i.e. the robot may not extend over the "line" at the beginning of the mission or the continuing of the mission after touching the robot).
16. The team may retrieve their robot without penalty when the robot is partially inside the **HOME** by lifting the robot vertically. After retrieving, the robot must be returned to the **HOME**. If a *MACK* or *Carrier* remains with the robot when the robot is retrieved without penalty, the *MACK* or *Carrier* remains in play.
17. If a team touches their robot, including parts that have become separated from the robot, which is completely outside of the **HOME**, a penalty of 10 points will be assessed.
18. If a robot is touched, the robot must be returned to the **HOME** to continue the mission.
19. The controllers and wires are NOT considered part of the robot.

20. The robot must start completely inside of the **HOME** every time it is returned to the **HOME** (i.e. after retrieving the robot, no part of the robot may be breaking the plane of the **HOME** when continuing the mission).
21. The robot shall not have any elastic stored energy (i.e. stretched rubber band) when the mission begins or when the robot is returned to the **HOME**, but elastic stored energy may be created with a motor.
22. The controller wire can only be used to provide electrical power to robot motors (i.e. it can not be used to drag or corral a robot, **MACKs** or **Carriers**). If a controller wire is used illegally (referee's judgment), the team will be required to immediately place the robot back in the **HOME** to continue the mission.
23. The team may touch a **MACK** or **Carrier** without penalty if the **MACK** or **Carrier** is COMPLETELY inside the **HOME**.
24. If a **Carrier** is illegally touched, the **Carrier** along with any **MACKs** it is carrying will be removed from the field.
25. A **Carrier** is never considered part of the robot.
26. **MACKs** may only leave **HOME** by using the robot or by "letting go" of either a **MACK** or something carrying a **MACK**. For example, a team member may not roll, push, or throw a **MACK** but a team member may put a **MACK** on a 'LEGO slide' and "let go" of the **MACK**.
27. Because **MACKs** are very valuable, if a **MACK** is ejected from the playing field, a penalty of 10 points will be assessed. No penalty will be assessed for **MACKs** that are removed by a referee.
28. A score of zero will be awarded if penalties result in a negative score.
29. All referees' rulings are final.

Please contact [Mission.Control@EARLYrobotics.org](mailto:Mission.Control@EARLYrobotics.org) with any questions or comments.  
Thank you for maintaining the spirit of the game!