Engineering And Robotics Learned Young
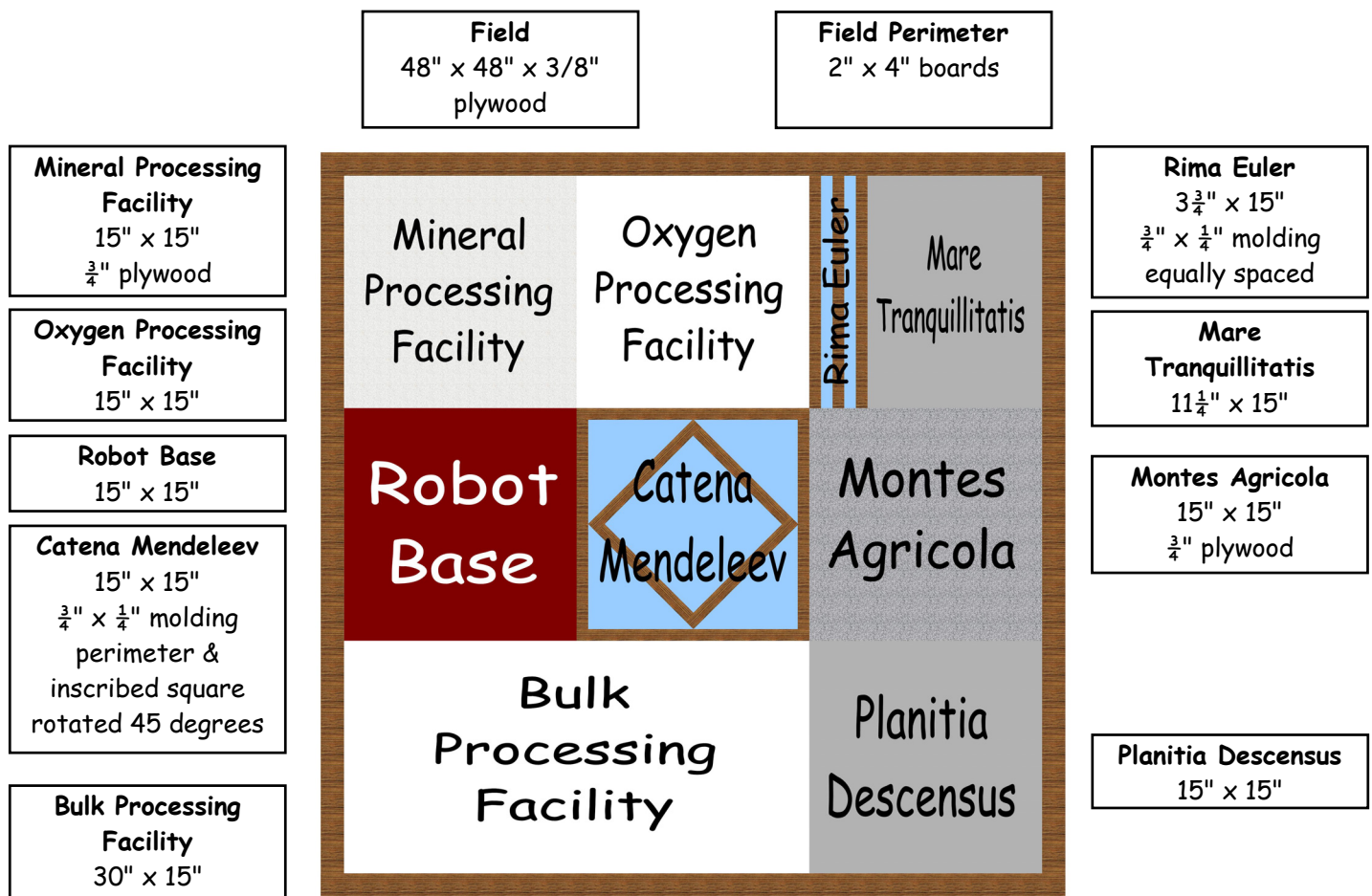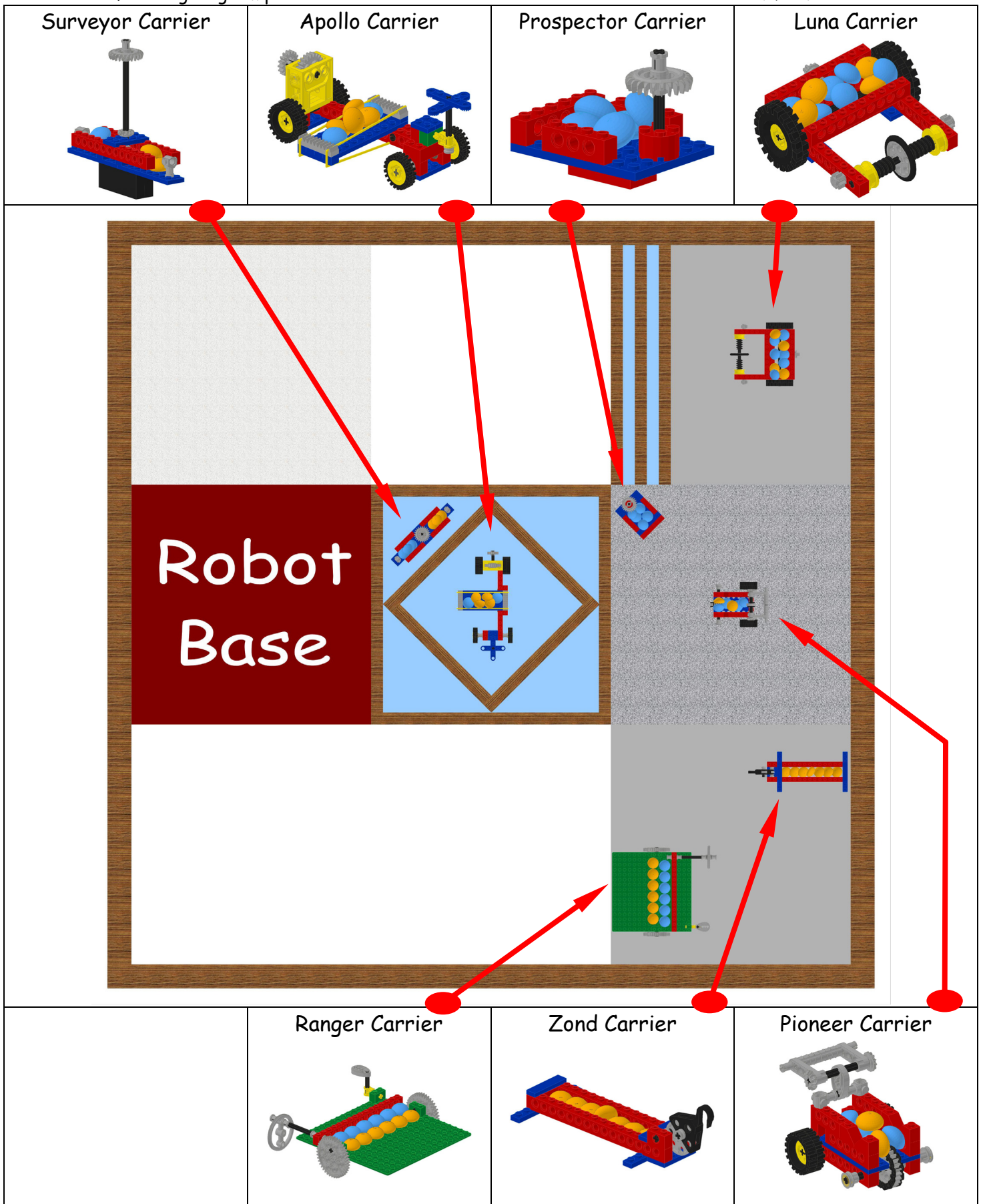## ◈ EARLY ◈
Fall 2005 Robotics Competition

Roboticists, the Global Association of Space Agencies (GASA) needs your help to colonize the Moon! Before we can live on the Moon, GASA needs you to help prepare the lunar surface by building a robot to transport mined Moon rocks rich with oxygen and minerals to the Lunar Regolith Processing Facility. The Moon rocks will be transformed into several products including oxygen, water, concrete, aggregate, metals, building materials and farming soil. Please help colonize the Moon so future generations can be picnicking, biking, hiking, and camping on Mars and beyond!

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 or robots is 3 LEGO Motorized Simple Machines Kits.
- The following diagram presents the environment that will be encountered.

Field
48" x 48" x 3/8"
plywood

Field Perimeter
2" x 4" boards

Mineral Processing Facility
15" x 15"
$\frac{3}{4}$" plywood

Oxygen Processing Facility
15" x 15"

Robot Base
15" x 15"

Catena Mendeleev
15" x 15"
$\frac{3}{4}$" x $\frac{1}{4}$" molding perimeter & inscribed square rotated 45 degrees

Bulk Processing Facility
30" x 15"

Rima Euler
3$\frac{3}{4}$" x 15"
$\frac{3}{4}$" x $\frac{1}{4}$" molding equally spaced

Mare Tranquillitatis
11$\frac{1}{4}$" x 15"

Montes Agricola
15" x 15"
$\frac{3}{4}$" plywood

Planitia Descensus
15" x 15"

Mineral Processing Facility

Oxygen Processing Facility

Rima Euler

Mare Tranquillitatis

Robot Base

Catena Mendeleev

Montes Agricola

Bulk Processing Facility

Planitia Descensus

- The following diagram presents where the **Moon Rocks** and **Carriers** will be on the Moon.

Surveyor Carrier	Apollo Carrier	Prospector Carrier	Luna Carrier

Robot Base

Ranger Carrier	Zond Carrier	Pioneer Carrier

Mission Rules

1. The team has 2 minutes to complete the mission.

2. There will be 52 **Moon Rocks** on the playing field at the beginning of each mission, represented by blue and amber flat marbles. The 26 blue flat marbles are **Oxygen Rich Moon Rocks** and the 26 amber flat marbles are **Mineral Rich Moon Rocks**.

3. The team's score is determined at the end of the 2-minute mission.

4. If a **Moon Rock** is moving when time expires, the referee will wait until the **Moon Rock** has stopped moving before determining it's scoring position.

5. The team scores **1** point for each **Moon Rock (Oxygen Rich & Mineral Rich)** in the BULK PROCESSING FACILITY.

6. The team scores **3** points for each **Mineral Rich Moon Rock** in the MINERAL PROCESSING FACILITY.

   The team scores **NO** points for each **Oxygen Rich Moon Rock** in the MINERAL PROCESSING FACILITY.

7. The team scores **4** points for each **Oxygen Rich Moon Rock** in the OXYGEN PROCESSING FACILITY.

   The team scores **NO** points for each **Mineral Rich Moon Rock** in the OXYGEN PROCESSING FACILITY.

8. A **Moon Rock** counts as in the BULK PROCESSING FACILITY if it is breaking the plane of the BULK PROCESSING FACILITY.

9. A **Mineral Rich Moon Rock** counts as in the MINERAL PROCESSING FACILITY if it is breaking the plane of the MINERAL PROCESSING FACILITY.

10. An **Oxygen Rich Moon Rock** counts as in the OXYGEN PROCESSING FACILITY if it is breaking the plane of the OXYGEN PROCESSING FACILITY.

11. Only the parts that are contained in three Motorized Simple Machine kits may be used to construct the robot (i.e. no other materials such as glue may be used on the robot). The kit parts may not be altered.

12. The team's robot/robots and all parts must start inside of the ROBOT BASE at the beginning of the 2-minute mission(i.e. no part of the robot may be off the playing field when the mission starts). However, the parts do NOT have to be assembled together. Parts can be removed and returned to the field during the 2-minute mission.

13. The ROBOT BASE is the 15" x 15" boundary extended vertically (i.e. the robot can not hang over the line at the beginning of the mission).

14. The team can touch their robot without penalty when the robot is partially inside the ROBOT BASE but after touching, the robot must be completely inside the ROBOT BASE to continue the mission.

15. Any **Moon Rock** or **Carrier** that remains with the robot when the robot is retrieved without penalty remains in play. This rule is intended to eliminate the need for the referee to determine if a **Moon Rock** or **Carrier** is completely in the base when a robot is retrieved after entering the ROBOT BASE. It is NOT intended to allow teams to retrieve their robot in such a way as to drag Containers into the base; **Moon Rocks** that are dragged into their base will be removed from play by the referee.

16. The team's robot/robots must start inside of the **ROBOT BASE** every time it is returned to the **ROBOT BASE** during the mission (i.e. no part of the robot can be breaking the plane of the **ROBOT BASE** line after being touched by a team member).

17. A penalty of 10 points will be assessed if a team touches their robot, including parts that have become separated from the robot, which is outside of the **ROBOT BASE**.

18. If a robot is touched, the robot must be returned to the **ROBOT BASE** to continue the mission.

19. The controllers and wires are NOT considered part of the robot.

20. 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 base but elastic stored energy can be generated from activating a motor.

21. The controller and wire can ONLY be used to provide electrical power to robot motors (i.e. it can not be used to drag the robot, corral *Moon Rocks* or *Carriers*, etc.).

22. If a controller or wire is used illegally (referee's call), the team will be required to immediately place the robot back in the **ROBOT BASE** to continue the mission.

23. A team may touch any *Moon Rock* or *Carrier* COMPLETELY inside the **ROBOT BASE** without penalty.

24. If a *Carrier* is illegally touched, the *Carrier* along with any *Moon Rocks* it is holding will be removed from play for the remainder of the mission.

25. A *Carrier* is NEVER considered part of the robot.

26. *Moon Rocks* are very valuable. A penalty of 10 points will be assessed for each *Moon Rock* that leaves the playing field.

27. All referees' rulings are final and may not be appealed.

Please visit the EARLY Neighborhood Forums at www.EARLYrobotics.org or contact Mission.Control@EARLYrobotics.org with any questions or comments.

Thank you for maintaining the spirit of the game!