

GEAR 2022

Table of Contents

Game Introduction.....	3
Playing Field	3
Field Diagram	4
Starting/Ending Locations.....	5
Starting Locations.....	5
Ending Locations.....	5
Challenge Rules	6
Team-Provided Spaceship	6
Clear Debris	8
Unload and Deliver Cargo.....	9
Geology Core Samples.....	11
Apollo 11 Landing Artifacts.....	12
Lost Cargo.....	13
Crew Habitat.....	15
Score Sheet	16
Materials list	17
Construction Notes.....	17

NOTE: Please read the General Rules before you read this document.

Game Introduction

In 1969 Tranquility base became the site of the first manned missions to the moon. Since then there have been other missions, but none established a permanent outpost on the moon. Today the ISTC (International Space Transport Corporation) has returned to sea of tranquility with an ambitious project to build a permanent manned outpost on the moon. This outpost will serve as a science and exploration station for the moon and a future launch pad for manned mission to other nearby planets. Due to the cost of the project, the Smithsonian Institute is funding a percentage of the project and requesting retrieval of some of the artifacts left at the Apollo 11 landing site.

Remote controlled progress ships will supply the necessary materials to the construction site. So far, the progress ships have landed on their target, but one of the ships landing skids did not properly deploy. This caused the ship to topple over upon landing, spilling the cargo containers all over the construction site. The ISTC will have to use one of the robots to retrieve the lost cargo containers and deliver them to their proper location on the construction site.

Task objectives:

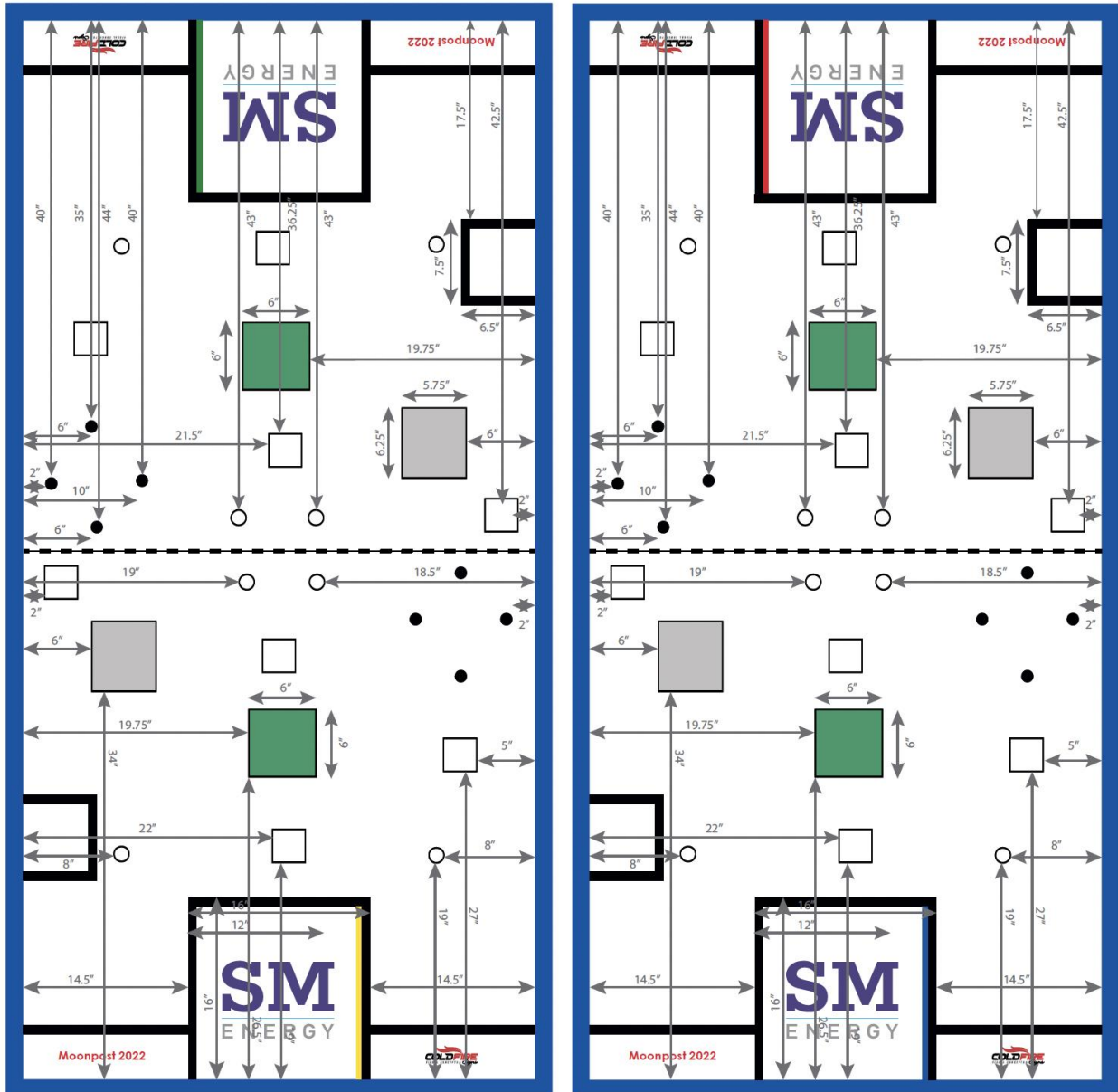
- Construct a spaceship
- Clear new construction sites of debris
- Unloading cargo from the from the spaceship & deliver to construction site
- Collect geological core samples for return to Earth
- Retrieve lost cargo & deliver to construction site
- Retrieve artifacts from the Apollo 11 landing site
- Move newly completed crew habitat to its permanent location
- Load cargo to be returned to Earth

Playing Field

- The playing field is 8 feet long and 4 feet wide divided into two 4 by 4 foot sections.
- The playing field border is approximately 4 inches in height and two inches thick.
- All markings are done with standard electrical tape ($\frac{1}{2}$ or $\frac{3}{4}$ inch tape).

Field Diagram

NOTE: The diagram below shows two fields connected for illustration purposes. Fields may not be connected at your tournament. The blue border describes the field walls.



All black lines are $\frac{3}{4}$ " in thickness

All colored lines are $\frac{1}{2}$ " in thickness

The field border is 1.50 inches.

The dashed line denotes the dividing line between fields. It is not normally printed on the field.

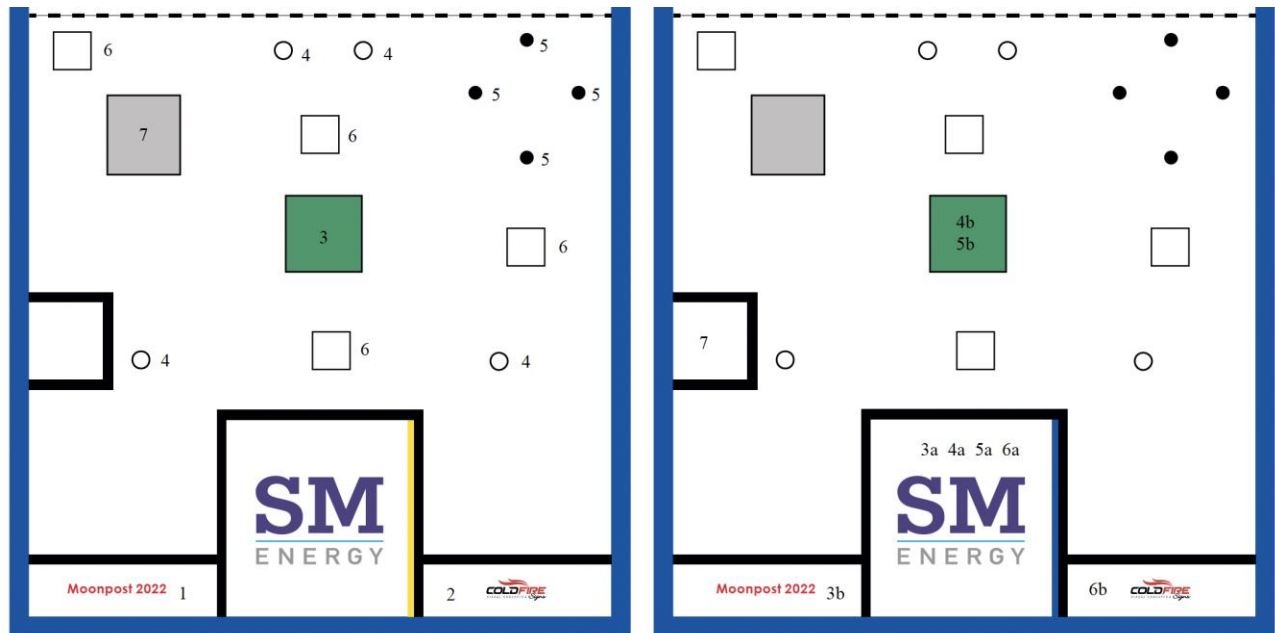
Starting/Ending Locations

Starting Locations

1. Debris Outpost 1 (shower curtain rings)
2. Debris Outpost 2 (split washers)
3. Cargo containers; loaded on team-provided spaceship
4. Geology core samples
5. Apollo 11 artefacts
6. Lost cargo
7. Crew habitat

Ending Locations

1. Anywhere outside Outpost 1 & 2
2. Anywhere outside Outpost 1 & 2
3. Cargo containers
 - a. 10 points each
 - b. 20 points each
4. Geology core samples
 - a. 20 points each
 - b. 40 points each
5. Apollo 11 artefacts
 - a. 20 points each
 - b. 40 points each
6. Lost cargo
 - a. 15 points each
 - b. 30 points each
7. Crew habitat



Challenge Rules

Note: Per the general rules, all scoring is tabulated after the conclusion of the match. Items will be scored based on their final resting location at the conclusion of the match.

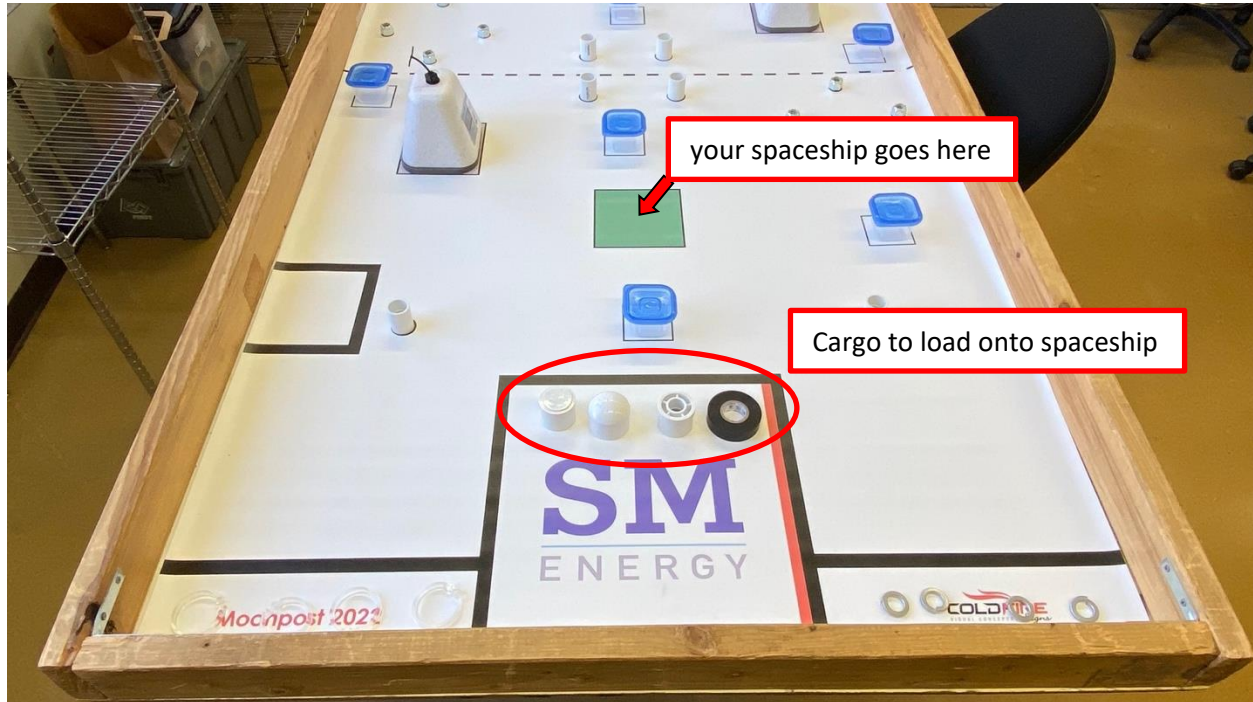
Team-Provided Spaceship

Objective: Place team-provided spaceship in landing zone load cargo prior to start of match and manually load cargo containers


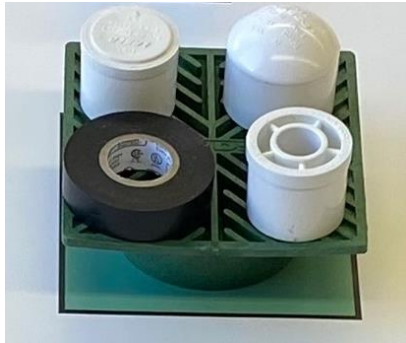
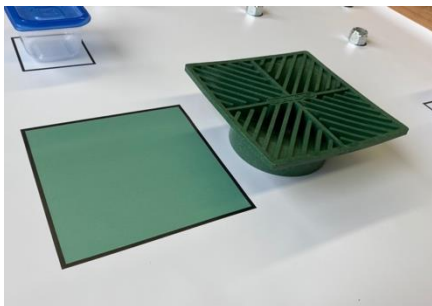
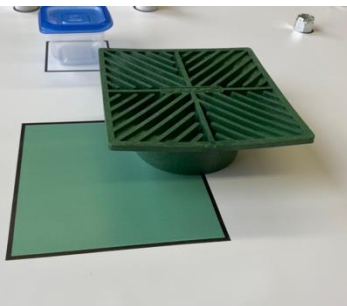
Quantity: 1

Point Value: 30

Starting Location: Green square in robot zone



SPS1	Each team needs to bring its own spaceship to the competition; teams cannot share spaceships since they might play at the same time during the competition. There are no restrictions on materials that can be used to build the spaceship but teams should aim for an inexpensive design.
SPS2	The spaceship needs to have a horizontal loading area at least 2" above the table to carry four cargo containers placed next to each other. The spaceship must fit into the 6" x 6" green marking on the game table. It is placed at its correct location and loaded with cargo containers by the team prior to the start of the match. Teams receive 30 points if the spaceship satisfies above conditions.
SPS3	Teams failing to bring their own spaceship to the competition or bringing a spaceship that does not satisfy conditions stated in SPS2 will be provided the spaceship shown below (left) by the tournament organizer. In this case the table referee will load the cargo containers as shown below (right), where the bottom of the figure points toward the player zone.

	 
SPS4	<p>While the spaceship is not attached to the game table, it is considered too dangerous to move it on the moon surface and the spaceship is supposed to stay in the marked safe landing area. Teams receive a 20-point penalty each time the robot moves the spaceship to a position outside the landing area. The spaceship is considered outside the landing area when it touches a white portion of the mat.</p>
SPS5	<p>The spaceship must be completely cleared of cargo before items can be loaded onto it. Items can only be loaded onto the spaceship while it is still at least partly in its safe landing area. The spaceship is considered partly inside the landing area when it touches the green portion of the mat. No points will be awarded for items loaded onto the spaceship if the spaceship is located outside its landing area during the loading process or at the end of the match.</p> <p>Does it count?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>NO</p> </div> <div style="text-align: center;">  <p>YES</p> </div> </div>
SPS6	<p>The robot may not load more than 4 items onto the cleared spaceship at the same time. Teams will receive a 5-point penalty for each item over the quantity of four that is loaded at the same time.</p>
SPS7	<p>The spaceship is considered a game element, i.e., teams may not touch it once the match has started (see General Rules P2). Manually touching the spaceship during the match results in the spaceship and all the game elements it carries being removed from the table by the table referee. Teams will not receive the 30 points for team-provided spaceship (SPS2)</p>

Clear Debris

Objective: Clear the debris in the two new outpost sites

Quantity: 8 (4 in each site)

Point Value: 5 points each

Game Element: shower curtain rings (4 in outpost 1) and $\frac{3}{4}$ " split lock washers (4 in outpost 2)

Starting Location: Outpost 1 and outpost 2



CD1	The debris will be randomly scattered inside the new outpost areas prior to the start of the match. Debris should not touch the game table walls nor the black line.			
CD2	Teams will receive 5 points for each piece of debris that is located outside the new outpost areas.			
CD3	Teams may move the debris to any area on the field or place them in the player zone. In order for the points to be awarded, the debris must not touch any of the inside white space made by the border of the field and the black markings.			
	Does it count (bottom of the pictures illustrate the inside area white space)?			
	NO	NO	YES	YES

Unload and Deliver Cargo

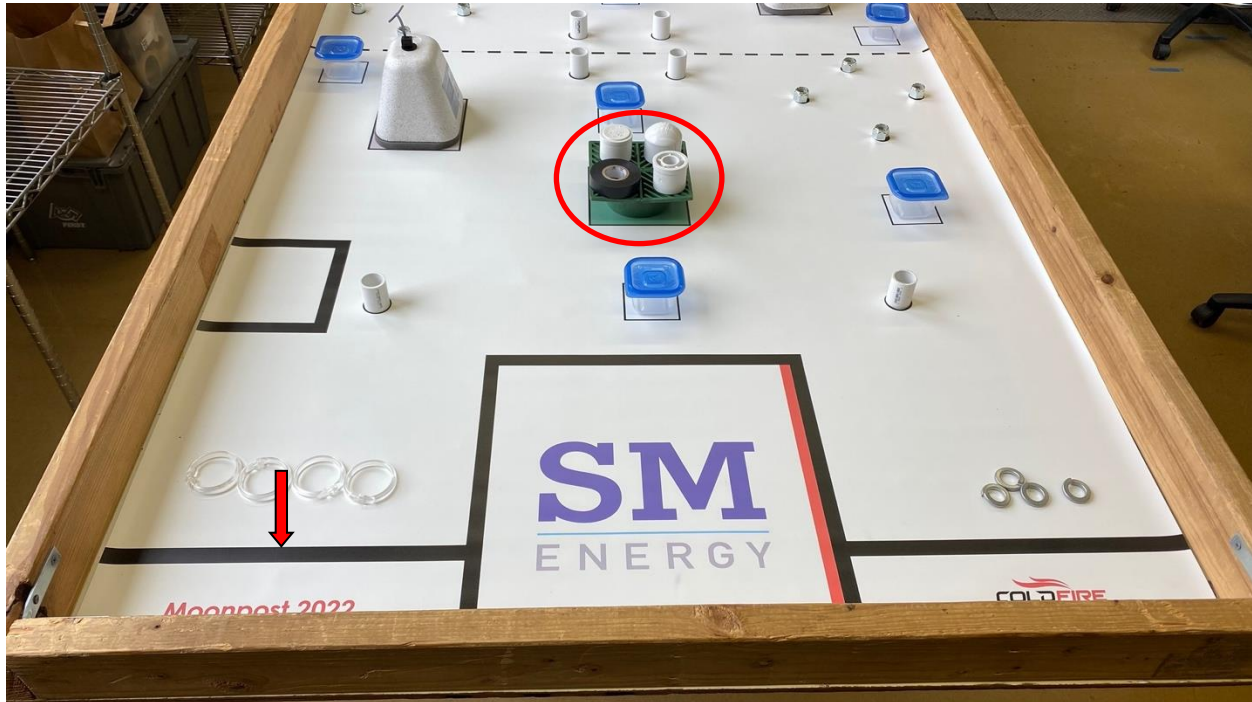
Objective: Unload cargo from the ship and deliver it to Outpost 1 area





Quantity: 4

Point Value: 10 points if delivered to player zone, 20 points if delivered to Outpost 1 area.




Game Element: 1 1/2" PVC cap, 1 1/2" - 3/4" PVC bushing slip, electric tape roll, 1 1/2" PVC plug (spigot)

Starting Location: Loaded on spaceship



UC1	The cargo will be located on top of the platform team provided spaceship loading area. The team loads the cargo onto the spaceship prior to the match (SPS2, SPS3)
UC2	<p>Teams will receive 20 points for every cargo container that is located in Outpost 1 (to the left of the player zone) at the end of the match and in an upright position. Cargo containers may be delivered directly to the Outpost 1 area without having to be delivered to the player zone first.</p> <p>Does it count?</p> <div style="display: flex; align-items: center;">     <div style="margin-left: 20px;">NO</div> </div>

MoonPost
GEAR 2022

	 <p>YES</p>
UC3	The Outpost 1 area must be clear of all debris before a cargo container can be delivered. See rule CD3 for more information on clearing this area.
UC3	<p>All cargo containers must be within the inside white space of the Outpost 1 area. Cargo containers may rest against the field border walls and may touch one another.</p> <p>Does it count?</p> <div>  <p>NO</p> </div> <div>  <p>YES</p> </div>
UC4	Cargo containers may not be stacked on top of each other in Outpost 1 in order to receive points for delivery (only the cargo container on the bottom, touching the game mat will score points in this case)
UC5	Teams will receive 10 points for every cargo container that, at the end of the match, is entirely in the player zone. Containers in the player zone are not subject to the orientation or stacking rules in order to receive points.

Geology Core Samples

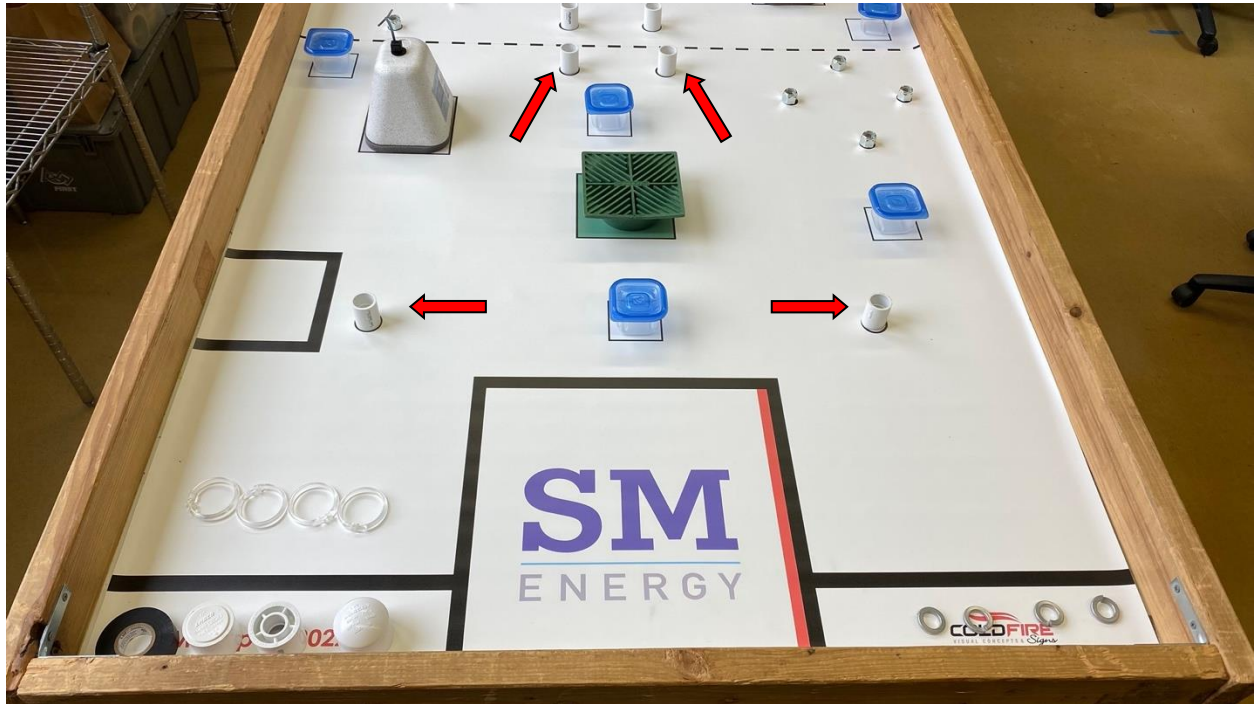
Objective: Retrieve the geology core samples and load on cleared spaceship


Quantity: 4

Point Value: 20 points if retrieved to player zone; 40 points if loaded on cleared spaceship

Game Element: 3/4" PVC fittings of varying height

Starting Location: Robot Zone



CS1	Teams will receive 20 points for each geology core sample brought back to the player zone and located there at the end of the match.
CS2	Teams will receive 40 points for each cargo element loaded on the cleared spaceship. Robots may deliver geology core samples directly to the spaceship.
CS3	While all geology core samples have the same diameter, they may vary in height and the robot needs to be able to handle both heights. 

Please refer to SPS5 and SPS6 with respect to loading the spaceship.

Apollo 11 Landing Artifacts

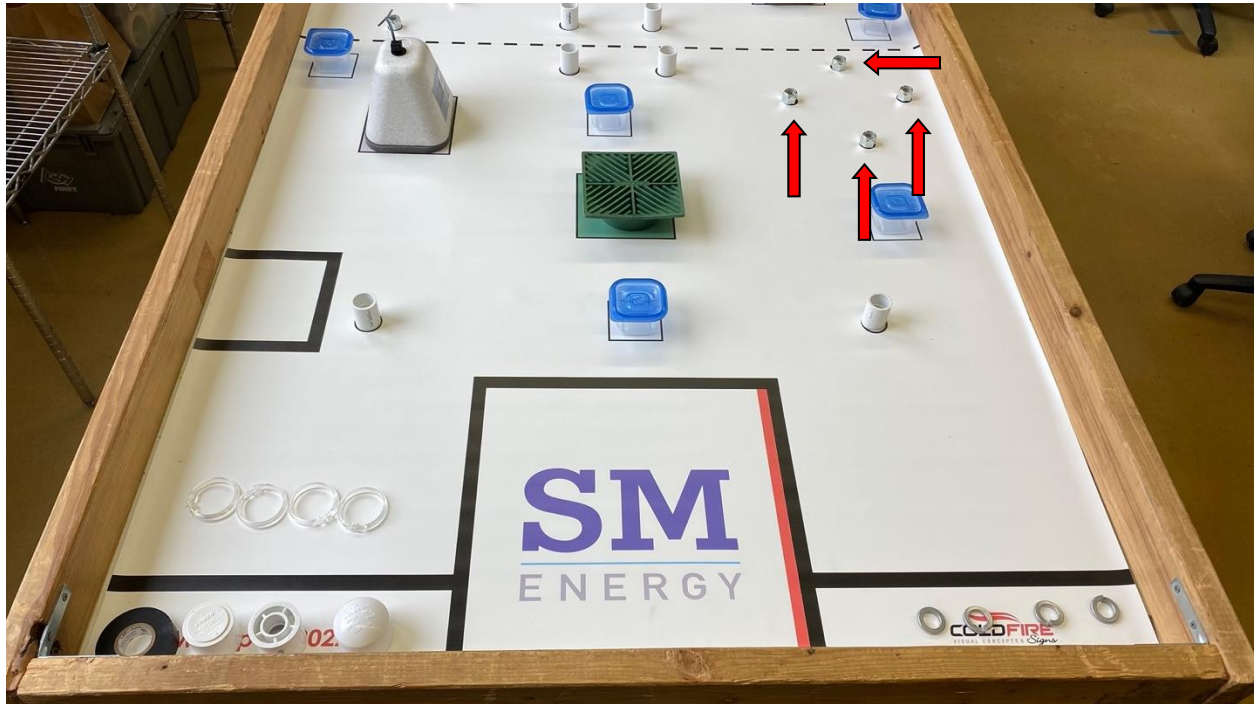
Objective: Retrieve the Apollo 11 artifacts and load on cleared spaceship

Quantity: 4

Point Value: 20 points if retrieved to player zone; 40 points if loaded on cleared spaceship

Game Element: 5/8" hex locknuts

Starting Location: Robot Zone



A1	Teams will receive 20 points for each artifact brought back to the player zone and located there at the end of the match.
A2	Robots may not retrieve more than two artifacts at a time. Teams will receive a 5-point penalty for each additional artifact over the quantity of two. The robot is retrieving artifacts when it is moving it from their starting location either to the Player Zone or directly to the cleared spaceship.
A3	Teams will receive 40 points for each artifact loaded on the cleared spaceship. Robots may deliver apollo artifacts directly to the spaceship.
A4	If delivering artifacts to the spaceship from the player zone, there is no restriction on how many artifacts the robot may deliver.

Please refer to SPS5 and SPS6 with respect to loading the spaceship.

Lost Cargo

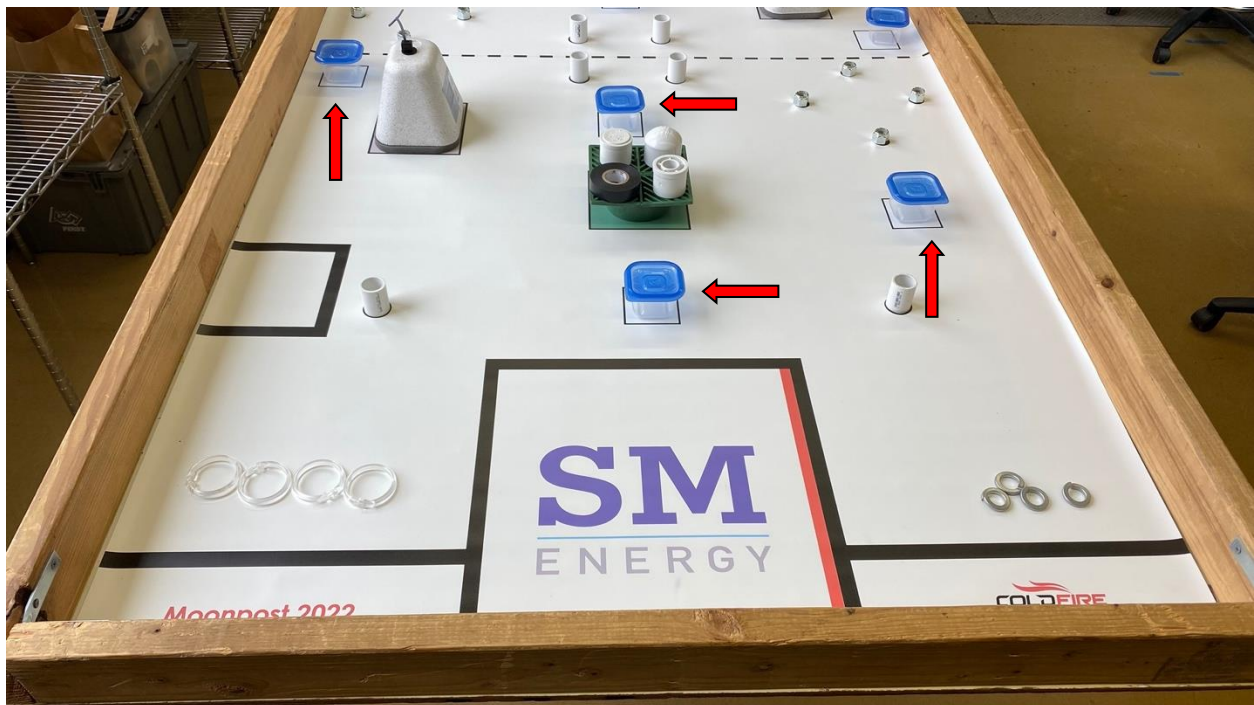
Objective: Retrieve the lost cargo and deliver it to Outpost 2 area

Quantity: 4

Point Value: 15 points if retrieved to player zone; 30 points delivered to Outpost 2



Game Element: Zip Lock Extra Small Square containers

Starting Location: Robot Zone



LC1	<p>Teams will receive 30 points for every cargo container that is located in Outpost 2 (to the right of the player zone) at the end of the match and in an upright position. Cargo containers may be delivered directly to the Outpost 2 area without having to be delivered to the player zone first.</p> <p>Does it count?</p> <div data-bbox="289 1528 506 1749"> </div> <div data-bbox="527 1528 756 1749"> </div> <div data-bbox="397 1753 443 1787">No</div> <div data-bbox="605 1753 657 1787">Yes</div>
LC2	<p>The Outpost 2 area must be clear of all debris before a cargo container can be delivered. See rule CD3 for more information on clearing this area.</p>

MoonPost
GEAR 2022

LC3	<p>All cargo containers must be within the inside white space of the Outpost 2 area. Cargo containers may rest against the field border walls and may touch one another. Only the portion of the lost cargo containers that touches the playing field surface should be used to determine if the luggage is in scoring position.</p> <p>Does it count?</p> <div></div> <p>No Yes</p>
LC4	<p>Cargo containers may not be stacked on top of each other in Outpost 1 in order to receive points for delivery (only the cargo container on the bottom, touching the game mat will score points in this case)</p>
LC5	<p>Teams will receive 15 points for every cargo container that, at the end of the match, is entirely in the player zone. Containers in the player zone are not subject to the orientation or stacking rules in order to receive points.</p>

Crew Habitat

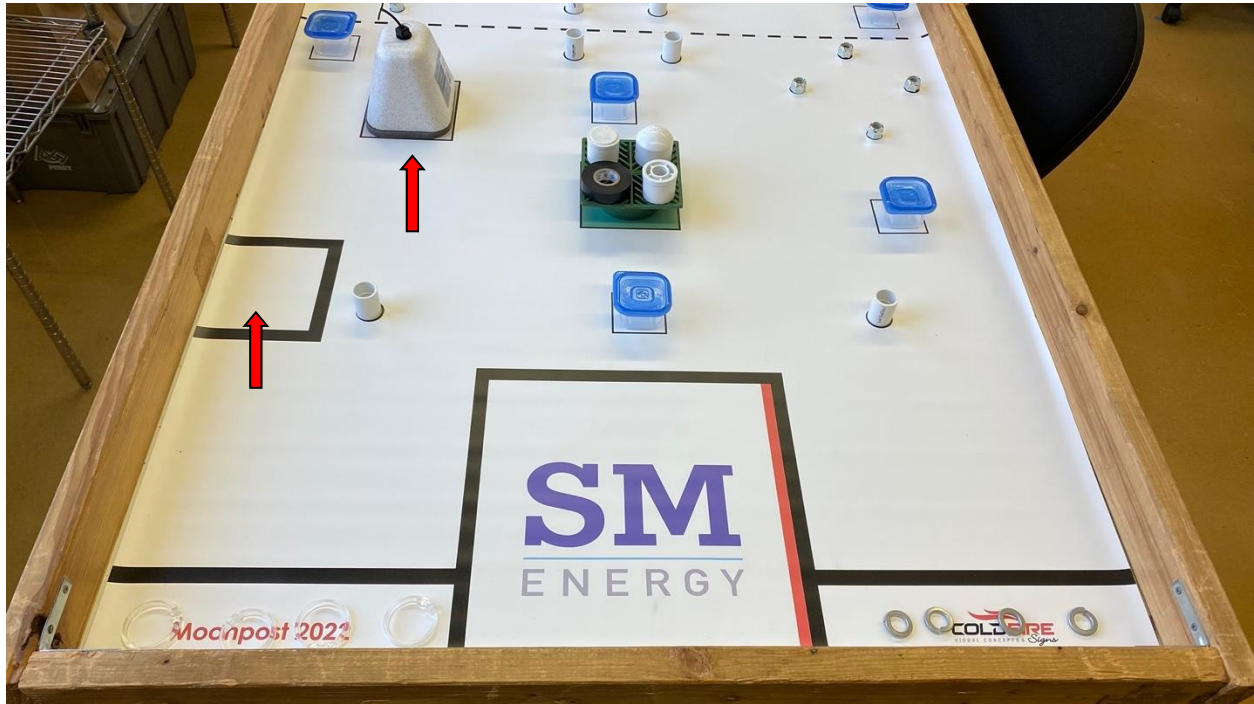
Objective: Move the crew habitat to the permanent location



Quantity: 1

Point Value: 30 points

Game Element: Outdoor faucet protector

Starting Location: Robot Zone



CH1	Teams will receive 30 points for moving the crew habitat to the permanent location. The permanent location is defined as the area created by the line markings on the field (see arrow pointing to the square on the photo above).
CH2	<p>The crew habitat is considered in its permanent location when no part of the habitat is touching the outside white space around the line markings.</p> <p>Does it count?</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; align-items: center;"> No Yes </div>

Score Sheet

Task		Point Value	Number Scored	Total Points
Team-provided spaceship (according to SPS2)		30		
Clear debris, max. 8		5		
On ship cargo, max. 4	in player zone	10		
	upright in debris-free outpost 1 area (left)	20		
Lost cargo, max. 4	in player zone	15		
	upright in debris-free outpost 2 area (right)	30		
Geology core samples, max. 4	in player zone	20		
	on cleared spaceship	40		
Apollo 11 artifacts, max. 4	in player zone	20		
	on cleared spaceship	40		
Crew habitat in permanent location, max. 1		30		
Penalties				
Move spaceship (touches area outside green square) O O O O		-20		
Load more than 4 items at a time onto spaceship (per item)		-5		
Picking up robot in robot zone and return to player zone (team member or referee, per occurrence) O O O O O O O O O O		-5		
Touch Game Element outside of player zone (game element will be removed)		-10		
Grand Total				

Materials list

Links to order all game materials are available at: <https://linktr.ee/gear22/>

+NOTE: The following list is for building one 4'x4' field.

Image	Quantity	Element Name	Material	Vendor
	4	Debris, Type 1	2-inch plastic shower ring	Home Depot
	4	Debris, Type 2	3/4-inch split lock washer	Fastenal
	4	Apollo 11 Landing Artifacts	5/8-inch nylon lock hex nut	Fastenal
	4	Geology Core Samples	3/4-inch PVC coupling	Home Depot
	1	Crew Habitat	Outdoor faucet cover	Home Depot
	1	Ship Cargo, Type 1	1 1/2-inch PVC cap	Home Depot
	1	Ship Cargo, Type 2	1 1/2-inch PVC bushing	Home Depot
	1	Ship Cargo, Type 3	1 1/2-inch PVC plug	Lowes
	1	Ship Cargo, Type 4	3/4-inch electrical tape (unwrapped)	Home Depot
	4	Lost Cargo	Ziplock mini square container	Target
	1	Spaceship	<i>team supplied game element</i>	N/A

Construction Notes

No alteration is needed on the game elements.