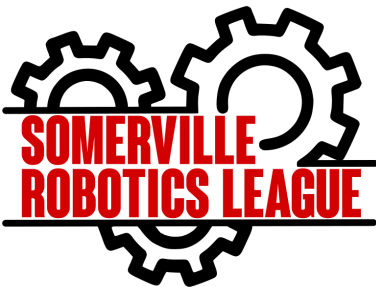




Moon Cheese Chase Game Manual



Somerville Robotics League

The Story:

The year is 2069. The original human moon landing occurred 100 years prior, and so in typical human sentimentalist fashion, it must now be celebrated. The earthly public seize this opportunity to celebrate a new, collaboratively international effort towards space colonization, by sending another mission to the moon. The scientists among us rejoice also, and some more than others: organization Space Y (a company renamed after one of former owner Musk's children grew up quite sane and inherited it) has theories that the moon may not be quite as it seemed, the last time that the human race deigned to visit. They have studied old moon rocks, and found something rather peculiar... Traces of parmesan.

Stranger still, the moon seems to have been able to produce this dairy product in its soil, some sort of planetary growing product- Space Y is incredibly interested in this prospect, as studying the moon rocks could theoretically lead to the development of a new kind of naturally renewing food source, key to an overpopulated planet full of hungry humans.

The anniversary moon mission was carried out by a coalition of 13 countries, on the anniversary date July 16. (America, France, Russia, Japan, China, Brazil, South Africa, the UAE, Egypt, Lebanon, Malaysia, and Chile). It went smoothly, other than a minor hiccup in the launch process postponing the mission by one day. What was surprising, however, was what they found upon arrival.

Now, the Moon Mice (Lunus Mus) were a rather reclusive species by nature. At the time of the first moon landing, lunus mus were able to predict when humans might arrive because the humans used such atrociously big and loud and clunky radios and they were easily intercepted by the intelligent mice. The mice hid for the duration of the first landing, and for a few decades thereafter, expecting returns. But the humans didn't keep coming, and so the mice stopped hiding.

As a far less sentimental people, the mice had no reason to expect the return of homo sapien exactly 100 years later. And unfortunately for the mice who might have been on the lookout, human radios had gotten less screechy to mouse ears and so went undetected (some listening mice got fired from their homeland security jobs that day). When the rocket arrived, the mice were caught by surprise and had no opportunity to disguise signs of their civilization: both species were in for quite a shock.

Mouse met human, and human met mouse: each felt equal parts fear and curiosity, disgust and brotherhood... But the day was too revolutionary, and lunus mus too intelligent to allow the exchange to end in conflict: *and so was formed the Homo-Sapien-Lunus-Mus treaty of August 2069.*

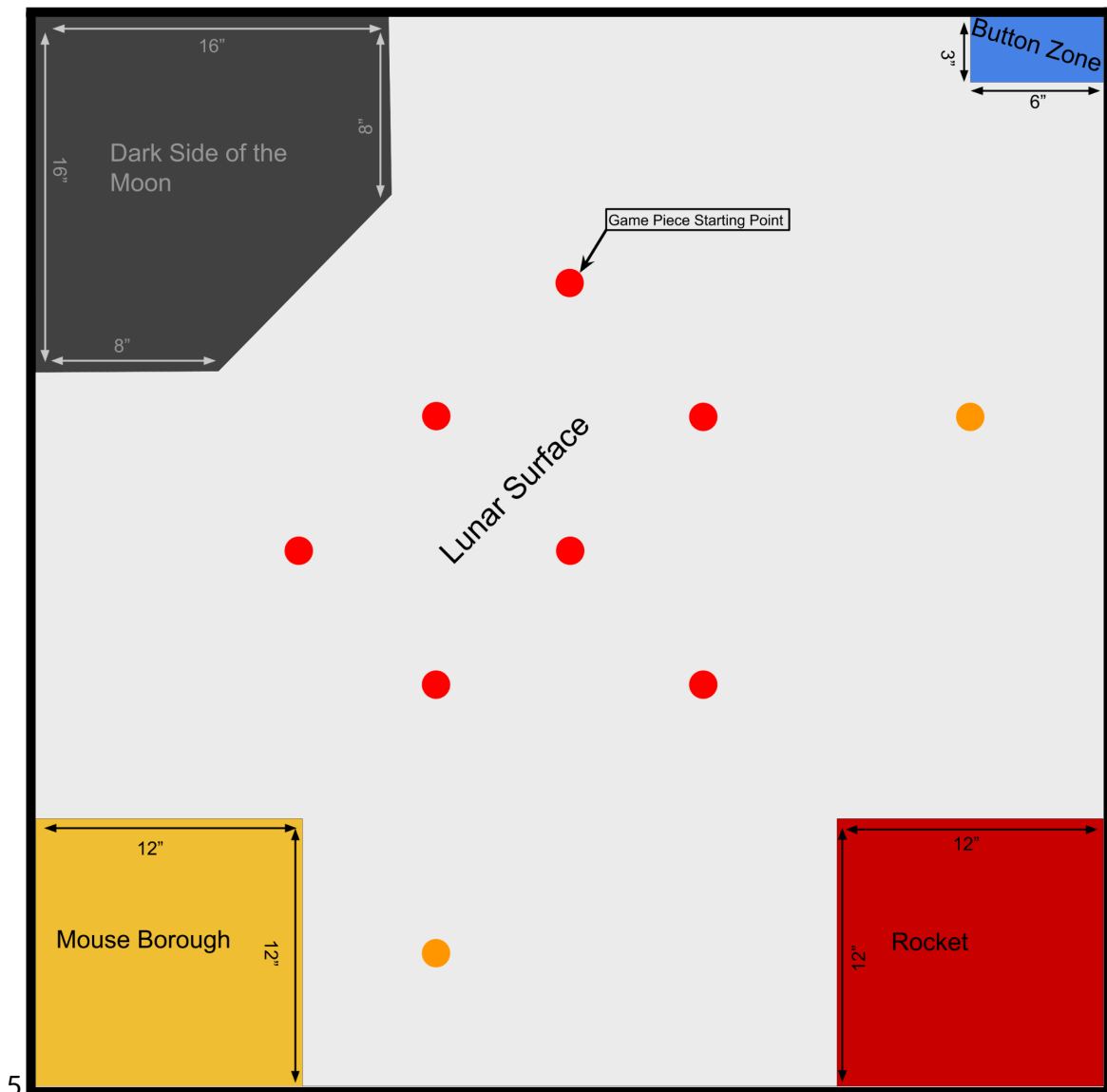
The terms of the treaty were simple. Homo sapien had no interest in living on the moon, so they would leave moon mouse land uncolonized. The interest of the human race, via the interest of Space Y, was to learn about the cheese-infused moon and the race inhabiting it. The mice, too, had something to gain from the relationship: while there was raw cheese essence in moon rocks, the moon also provided almost pure wheels of cheese naturally, but these were hard for mouse space

walkers to mine. The human race had planet roving robots, which hit both birds with one robotic stone: the humans would not inhabit the moon, instead using their robots to ship moon rocks for research off of the moon, and in exchange for the hospitality of the mice, these robots would also separate the pure cheese from the rock as they mined, and deliver the cheese in turn to the mouse leader, Chuck. E. Moon.

So here we are: October 2069. The treaty is fresh and both peoples are happy, but the mouse Prime Mousister has been elected anew: Minnie Moon is now prime mousister, and she has different policy ideas about the mouse-human relationship. She calls them foreign aliens, pillagers, and thieves... She will allow 1 (one) more shipment of rocks off the planet, along of course with one more shipment of cheese. Space Y believes it is incredibly close to unlocking a new renewable food source after studying all kinds of moonrock- it just needs this one last batch to study: any rock will do: light parm or gouda, or especially the sharper cheddar from the dark side of the moon. But according to Minnie Moon, after a time limit, this final rocket must lift off to Earth or else... With or without your robot on it.

The Game:

Moon Cheese Chase is a Somerville Robotics League game intended to be played using robots made from up to two SPIKE Prime LEGO Robotics Kits. The Challenge is to harvest Moon Rocks and Moon Cheese from the Lunar Surface, sort them, and bring them to their respective zones, Moon Rocks to The Rocket, and Moon Cheese to Mouse Borough.

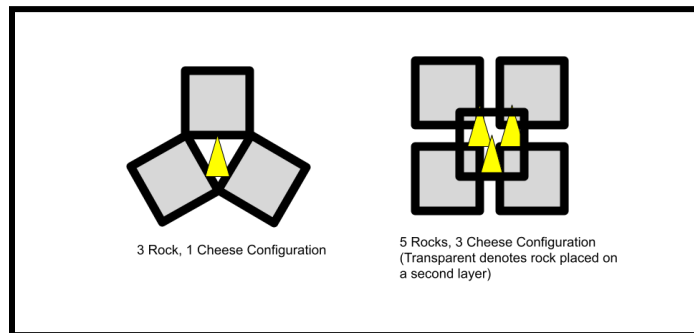


Moon Cheese Chase Game Board

The Game Pieces:

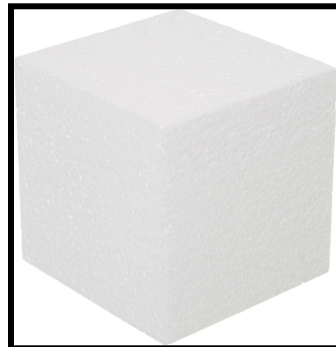
Rock Piles:

A rock pile is a group of Moon Rocks and Moon Cheese clustered around a starting location (either a red or orange dot. The two orange dots will each have 5 Moon Rocks and 3 Moon Cheese. 3 randomly chosen red dots will have 3 Moon Rocks and 1 Moon Cheese. In total, on one game board, there will be 19 Moon Rocks, and 9 Moon Cheese. The Rock Pile Structures are as described below.



Moon Rocks:

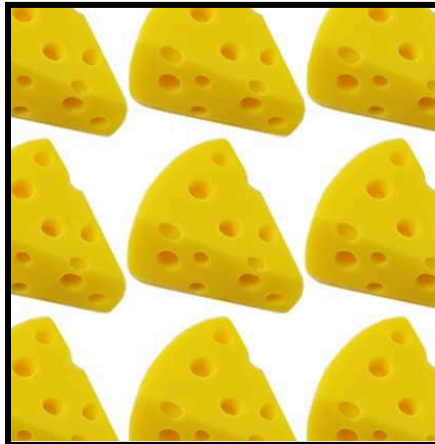
Moon Rocks are 2"x2"x2" foam cubes, placed mostly randomly around the Lunar Surface in the Rock Piles. Moon Rocks in the Rocket when its countdown finishes will be considered scored. Moon Rocks may not be added or removed from the Rocket after the countdown finishes.



Moon Cheese:

Moon Cheese are small 0.7"x0.6" x 0.3" model cheese wedges. They are placed around the Lunar Surfaces in the Rock Piles. They can be scored by being brought to Mouse Borough. They

will be counted at the end of the match, with only the cheese currently in the zone counting for points.



Sharp Cheddar:

Sharp Cheddar is a gold 3D printed “cheese wheel” with a quarter cutout of it. They are sized around 60 mm in diameter and 18 mm tall. There is one placed in the Dark Side of the Moon and can be either taken to the rocket for a points reward or taken to the Mouse Borough for extra time. The Sharp Cheddar starts each match at the point offset from the deepest corner in the Dark Side of the Moon, by 4” horizontally, and 4” vertically.



The Game Zones:

The SRL game field is a 48” x 48” wooden field made for the SRL competitions. For Moon Cheese Chase, the game field is made up of four special zones plus the Lunar Surface. The game zones are: The Rocket, Mouse Borough, The Dark Side of the Moon, and The Button. Each zone is located in a corner, with the Lunar Surface comprising all areas not in another zone.

The Rocket:

The Rocket is the 12"x12" zone located directly opposite from the Dark Side of the Moon, to the left of The Rocket is Mouse Borough, and to the right is the Button Zone. The Rocket is defined by a red painted zone. The Rocket is the starting location for a Robot, and the optional ending location. Placing Moon Rocks in The Rocket Zone scores points. These points are added at the end of a match, so Moon Rocks that leave the zone prior to being scored will not be counted. When the Button is pushed, a 10 second countdown will begin, and after that point, the rocket will "take off" meaning the rocks in it are scored, and no more can be added. Additionally, if the robot is not in the rocket at the end of the countdown, it cannot score the end of match return points.

Mouse Borough:

Mouse Borough is the 12"x12" zone located directly opposite the button, with the Dark Side of the Moon on its left, and The Rocket to its right. Mouse Borough is defined by a yellow painted zone. Mouse Borough is the scoring location for Moon Cheese, with any Moon Cheese pieces inside the zone at the end of the match being scored for points.

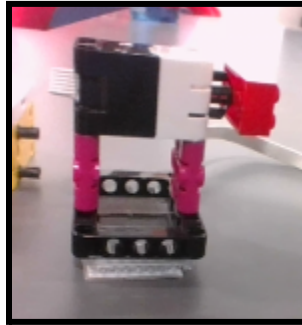
The Dark Side:

The Dark Side of the Moon is a pentagonal shaped, black painted zone in the corner of the field opposite to The Rocket. Two sides of the Dark Side of the Moon are along the edge of the field, running for 16". Two sides of the Dark Side of the Moon stretch inwards perpendicularly from the ends of the 16" sides, for 12". The final side connects the two 12" sides, closing the shape. The Dark Side of the Moon is the starting location for the Sharp Cheddar game piece. *The Dark Side of the Moon is an autonomous-only zone, any robots in the zone for significant amounts of time, may not be actively controlled by humans, operating manually in the Dark Side of the Moon will incur a points penalty.*

The Button:

The Button is a button that you must press to activate the rocket launch countdown sequence. Once the button is pressed, the 10 second countdown begins. At the end of the countdown, when the rocket takes off, all rocks are scored and additional points are scored if the robot is inside of the Rocket Zone or if the Sharp Cheddar is inside the Rocket Zone. After the 10 seconds, no additional points can be scored in the Rocket Zone. If The Button is not pressed before the end of the match, no rocket related points will be scored. If the Button is pressed within the last 10 seconds of the match, the countdown is reduced to 0 at the end of the match and all rocket

related points will be scored. The Button is constructed of legos and placed with its back to the Game Board wall, halfway along the long edge of The Button Zone.



The Lunar Surface:

The Lunar Surface is the zone between all the other zones, and comprises all of the space on the game board not part of another zone. The Lunar Surface is the starting location for the Rock Piles, which are randomized in location among the dots located in the center of the field (see game map on page 4). There are 5 Rock Piles placed in the field, being chosen randomly from the 9 dots in two blocks. Two Rock Piles will be placed on the two dots located directly between The Rocket and Mouse Borough, and The Rocket and The Button Zone (shown in orange). The remaining three Rock Pile locations are randomly chosen from the remaining seven red dots.

Scoring Points:

Points are scored when the following criteria are met. Scoring Methods involving placing game pieces in a location may be earned multiple times (once per game piece). Points scored from Game pieces placed in zones will be evaluated at the end of the match (Any pieces not in the zone at the end will not be scored, regardless of if they had been). Game pieces will be considered as being in a location if they are wholly contained within or any part of the game piece is touching the taped border lines.

Scoring Method	Point Value
Cheese in Mouse Borough	3pts
Rocks in Rocket	3pts*
Cheese in Rocket	0pts
Rocks in Mouse Borough	0pts
Sharp Cheddar removed from Dark Side of the Moon	5pts
Sharp Cheddar in Rocket	8pts*
Sharp Cheddar in Mouse Borough	+0:30 seconds
Robot returns to Rocket	3pts*
Mouse Borough has no Rocks	2x pts for "Cheese in Mouse Borough"
Rocket has no Cheese	2x pts for "Rocks in Rocket"
In Dark Side of the Moon, without Autonomous (after a short period)	-1 pt/sec

* signifies points are only scored **IF** The Rocket is successfully launched

Team Format:

Teams are made up of a maximum of two kits worth of pieces, limit one hub. All students on one team are from the same school. **Schools may enter multiple teams.** Teams are named with the three letter abbreviation of their school plus a number (Eg. KDY-1, AFA-2, HLY-3, KDY-4, WSN-5, ESC-6, WHC-3).

Robot Rules:

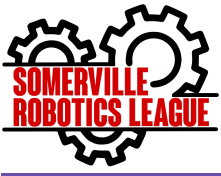
- Robots can only be made of parts from up to 2 kits (maximum 2 big motors 4 small motors, 6 sensors [2 ultrasonic sensors, 2 force sensors, 2 color sensors], 8 wheels, 1 hub).
- Robots may not contain any non-Lego pieces, other than the following exceptions:
 - Approved decals such as stickers, etc.

Match Format:

Each match lasts 2 minutes and 30 seconds. Before the last 10 seconds, a sound will be played and the competitor will be warned that they have 10 seconds remaining. If a competitor enters the *Dark Side of the Moon* game zone for an extended period of time, they will be asked to put down their controller and run their robot autonomously for 30 seconds. If a robot presses the *Button* in the *Button Zone*, their time will automatically decrease to 10 seconds unless already below 10 seconds. The match will end after either the game timer (2:30) runs out or the 10 second countdown timer after pressing the *Button* runs out. No points can be scored after either timer runs out. After the game is finished, the assigned field referee will count up points and penalties, which will be input into a running spreadsheet. All referee calls are final whether that be before, during, or after a match.

Competition Format:

On the day of the competition, each team will submit a team name (as referenced in the *Team Format* section of the game manual). Each team will play up to 5 matches with no “redos” unless absolutely necessary (deemed by the referee and coaches). Certain statistics such as total points will be added into a spreadsheet and awards will be given out based on these statistics. Similarly, awards will also be given out for creativity, ingenuity, and other more subjective matters, by a judge.



Moon Cheese Chase: INNOVATION PROJECT

Would you like a different type of challenge? Why don't you consider the *Moon Cheese Chase: INNOVATION PROJECT*! Choose **ANY** type of space-themed project that you can build using the **LEGO SPIKE** prime kits! *INNOVATION PROJECTs* will be showcased at the final *Moon Cheese Chase* competition event.

Here are some examples of projects you could make for your *INNOVATION PROJECT*:

Real World Project Idea:

- **Space Junk** is a massive problem for the Earth. As junk piles up in orbit, it will become harder to launch rockets into space. Build a robot that can help **remove Space Junk!**

Creative Project Ideas:

- Build a **Spaceship** that has some moving parts with motors and some cool changing lights!
- Build a **Moon Rover** that drives around!
- Build a moving **Solar System Model!**
- Build a Robot that makes **Space Themed Art!**
- Build some **Space Themed Moving Art!**
- Anything else that you can think of!

Remember, your *INNOVATION PROJECT* can be anything that you want!

Here are some guidelines for how you can create your *Moon Cheese Chase: INNOVATION PROJECT*:

- (Required) Use your LEGO SPIKE prime kit to build something for your *Moon Cheese Chase: INNOVATION PROJECT*
- (Required) Write at least 2 sentences about what your *INNOVATION PROJECT* does (Here is a sentence starter: *My innovation project does __ by...*)
- (Optional) Write a story about your *INNOVATION PROJECT*
- (Optional) Create a piece of art about your *INNOVATION PROJECT*