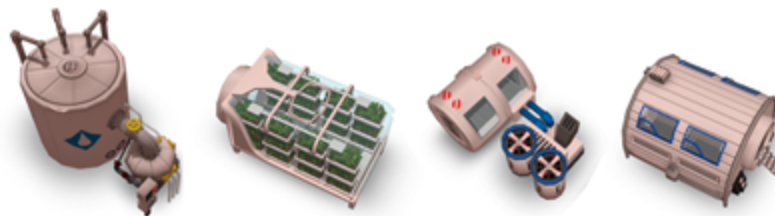


## Activity 1.1.2a Intro to Sol-0



### Survival Essentials



*Water cryotank, greenhouse, oxygen generator, and habitat*

The basic survival needs for humans can be distilled to air, water, food, and shelter. In Sol 0 each of these requirements must be managed. The Martian environment is cold and hostile, and it is essential to carefully plan ahead. There is not a river flowing by with free water, and there is no air to breathe outside the hallways of the colony. In the early days of the colony life is very fragile. If the colony runs out of water or food, colonists will perish. If an air leak causes the oxygen levels to drop too low, colonists will perish. As the colony grows it will become more resilient and accumulate a reserve of resources.



*Solar panel, geothermal plant, and nuclear plant*

To keep everything running smoothly the colony needs a source of power. There are three sources of power in Sol 0, starting with the solar panel. Solar panels are less efficient on Mars than Earth, due to the reduced solar flux, but they are lightweight and cheap. Solar panels will accumulate dust over time, and must be regularly cleaned. Geothermal plants are a step up from solar panels, and may be constructed once a geology lab has been built. Late-stage colonies can develop nuclear power. The only thing to worry about is the radiation, but if we've developed the technology to survive the radiation environment on Mars we can probably handle a nuclear power source.

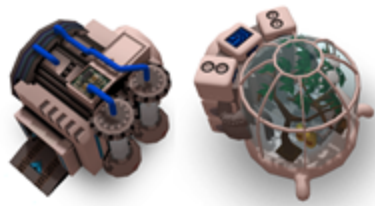
## Colonists, Astronauts, and Robotic Machinery



*Colonists, astronaut, rover, forklift, dozer, and miner*

Sol 0 allows the player to control a variety of units. Generally, the bigger the unit the heavier it is, and with rocket's mass is everything. The larger heavier units like the dozer and miner can only be brought to Mars after the colony sets up a launchpad to allow larger rockets to land. That means some careful colony planning is needed initially to build around Mars boulders until the dozer can clear space for unimpeded construction.

## Scientific Research on the Martian Surface



*Geology lab and biology lab*

One of the primary motivations for starting a Martian colony is to conduct scientific research! In Sol 0 research occurs at the geology lab and biology lab. The goals of research are to increase the survival of the colony, and include developing armor for habitats and hallways to survive micrometeorites and dust storms, and cross-breeding bacterial strains to allow farming on the Martian surface.

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There are more features that have not been discussed, and more buildings including radar arrays, ore mines, 3D printers, and terraforming projects. Sol 0 in a few cases strays into concepts that might be considered science fiction, but most of the game is grounded in our current understanding of how the first humans will survive on Mars. Someday there may be Martian cities with tens or hundreds of thousands of inhabitants, but Sol 0 is about the first few hundred and the challenges they face to survive and become self-sustaining.

Before launching your first rocket, there are some questions that you need to answer.

- 1) What do you use a rover for?
- 2) Why would you need a methane extractor?
- 3) How much food and water do you need to provide for each astronaut?
- 4) Why might it be important to send an unmanned lander with food and supplies before you send up an astronaut?
- 5) Why do people want to send a forklift after they get started with their astronauts?
- 6) Why do you need colonists? What are they good for?
- 7) They make 3 suggestions to first launch. Work with your team to determine which elements you think are good ideas. What are you going to include in your first launch?
- 8) Why do you think that it is always important to completely fill every rocket with the maximum amount of supplies it can hold?
- 9) What robots can you send to Mars? What robots can be made on Mars?
- 10) What structures can your astronaut build?

Should your computer ever lock up, or if you have a really long load time, please find out this information online:

- 1) If you weighed 100 pounds here on Earth, how much would you weigh on Mars?
- 2) Using that same proportion, if a 100 pound person were to be able to jump 24 inches, how far would they be able to jump on Mars? (You might have to do the math by hand)
- 3) How long does it take to send a signal from Mars to Earth at its closest point?
- 4) How long does it take to send a signal from Mars to Earth at its furthest point?
- 5) How long could a human live on the surface of Mars without a spacesuit?
- 6) What would happen to a human that went outside on Mars without a spacesuit?
- 7) How much water would a human need per Sol on Mars?
- 8) How much food would a human need per Sol on Mars?
- 9) How long would it take to get food to grow on Mars once we get there?