

# Building A Mars Colony

To ensure a Martian colony's success by bringing along enough supplies and tools to create a self-sufficient outpost of human civilization, students must think of traveling to Mars as going camping with the nearest store several million miles away. If you didn't bring it, and can't make it on site, you'll have to do without. To prosper, your Mars Colony will need to "solve" the problems listed below.

## Brainstorm and Build Your Colony

Students will create complex and thoughtful designs beginning with brainstorming and sketching on paper. It's not absolutely necessary to understand every detail of a system's operation to incorporate it into your colony's plan. Students will **divide up** the design work within their groups to create a complete colony that takes care of **all the needs** of the colonists.

## Required to Complete the Project

1. A neatly drawn scale model of the colony on a large piece of chart paper.
2. A written or verbal description of each of the items in your colony and how those meet the needs of the colonists.

## Colony Needs:

**Air:** As Mars' atmosphere is very thin and poisonous, the modules will have to be enclosed or the entire living area must be inside a protective dome. Oxygen can be produced mechanically (from water or certain minerals) or by plants in a greenhouse.

**Food:** There are no grocery stores in space, and it is too expensive to send food from Earth. The colonists will need to grow their own crops; scientists and engineers are investigating the best plants. Crops can also be used to purify water and to produce oxygen from carbon dioxide using photosynthesis. They could be grown in a greenhouse.

**Water:** Colonies will need a great deal of water for many purposes, including drinking, washing, and watering plants. Where will you get the water? How will it be stored? A recycling facility may be needed.

**Energy:** What energy source(s) will power the space colony? Will it be solar or nuclear? What about a back-up system?

**Equipment:** What work will your colonists be doing? Will there be mining? Science laboratories? Telescopes?

**Living Quarters:** Consider whether each colonist needs a private living space. Every square foot of the base requires more resources, but people are happier when they feel they have sufficient space and privacy.

**Working Areas:** Work areas must be designed. Examples include, **Laboratory Modules** – to conduct experiments; **Factories** -- how do you make the thing you need; **Mining Facilities** – to mine and transform resources

**Heat & Cooling:** Mars is very cold. The average temperatures on Mars range from -195 degrees in Winter to a high of only 70 degrees in Summer along the Equator.

**Communications:** How will the colonists communicate with one another, including with explorers using a rover to travel a distance from the colony? How will they communicate with the Earth? On Earth, antennas are used to send and receive signals, and satellites are used to relay signals to other parts of the planet.

**Transportation:** What kinds of trips will the crews need to make? How far will they need to go? What should they use for fuel? What type of vehicles will they use?

**Recreation Facilities:** On Earth, gravity pulls against us when we walk, run, and play ball and helps us stay strong! Colonists will need to exercise more to keep their muscles and bones from losing strength in the lower gravity, which is weaker on Mars (one-third that of Earth). How will the colonists exercise?

**Radiation:** Colonists on Mars would be exposed to dangerous amounts of radiation from the Sun, which can damage body tissues.