

**Mars Colony Challenge**

**9-12**

**Activity #3**

# **Objective**

The purpose of this challenge is to create a colony on Mars that is sustainable in the harsh Martian environment. Using the information provided and other research, students must find creative solutions to various problems the colony will face, including how to get food and fresh water and help the people in the colony survive events such as dust storms or Marsquakes. They will then design and make a diorama of their colony using the materials provided and other items they can find at the store or around their homes. Students can then choose to participate in the competition onsite at Emerson (“in-person”) or submit their information from home (“at-home”).

# **Materials**

*Provided*

* Construction paper (5 sheets: 1 green, 1 blue, 1 red, 2 assorted)
* Pipe cleaners (10)
* Popsicle sticks (25)
* Tissue paper (2 sheets: 1 green and 1 other color)
* Toothpicks (50)
* Graph paper (3 sheets)
* Pom poms (20)

*Other Material Ideas (Be Creative!)*

* Cups
* Plastic wrap
* Plastic or Styrofoam bowls
* Plastic cutlery
* Straws
* Shoebox
* Toilet paper/paper towel rolls
* Water or pop bottles
* Coffee filters
* Action figures/dolls
* Aluminum foil
* String
* Rubber bands
* Paper clips

# **Project Specifications**

* All students should read the included factsheets and PowerPoint slides to better understand the conditions on Mars and challenges that will be faced when designing a colony there.
  + The provided information will give students the basics they need to succeed at this project. However, additional research both on the Martian environment and technologies that the students want to use for their colony is highly encouraged.



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* Students participating in both the in-person and at-home competitions should all provide the following with their projects:
  + A blueprint of their Mars Colony on the provided graph paper
  + A diorama of their Mars Colony

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* + Information addressing the questions on the (3) question sheets included in this folder
* Blueprint specifications
  + Students should draw up a blueprint of their colony prior to beginning to build their diorama. Blueprints/planning are a part of the real engineering/design process and are important to avoid mistakes later in the process.
  + Students can use multiple pieces of graph paper for their blueprint if they wish.
* Diorama specifications
  + Students will provide their own base for the diorama. The diorama can be any size that fits in within a 2’ x 2’ square.
* Information specifications
  + Students participating in the **at-home** competition should fill out the attached question sheets with a minimum of 2-3 sentence answers for each question and submit the completed sheets with projects.
  + Students participating in the **in-person** competition will talk directly to the judges about their colonies (more info in the competition section). However, it is highly recommended that the students still fill out the question sheets not only as preparation for their judging session but also so the judges can refer to them as needed during the various parts of the judging process.
  + If students wish to type up the answers to the questions they may. However, they should also include/type up the questions so the judges know which ones are being addressed when.

# **Competition**

* **Both at-home and in-person students must submit their sign-up forms to Sidney.STEM@Emerson.com by no later than July 30th, 2021 if they wish to participate in one of the two competitions. Receiving these forms on time allows the event coordinators to properly plan for the number of students participating in the event.**
* Students cannot compete in both the at-home and in-person competition – one of these options must be circled/selected on the sign-up form. However, if a student who signs up to attend the in-person competition is unable to attend due to extenuating circumstances, they will be allowed to submit their colony as part of the at-home competition.
* Both at-home and in-person students’ colonies will be judged in the following categories which match up with overall project description as well as provided question sheets. These categories and the general attributes by which they will be judged are:
  + *Planning/Blueprint* – How well does the blueprint match the final layout of the diorama? If changes were made, why?
  + *Colony Location* – Students should be able describe the location of their colony on Mars (i.e. in a crater or near the North Pole as examples) and what benefits this location gives their colony.
  + *Technologies Used* – What technologies did you use to ensure your colonists have everything they need to survive? Can you provide background information on this technology?
  + *Event Scenarios (i.e. Marsquake)* – What technologies did you use to ensure your colonist can survive various events that may occur? How are these technologies tied into the other technologies/life support systems?
  + *Diorama* – Dioramas will be judged on creativity and overall appearance/aesthetics, as well as how well they reflect the technologies used by the students to solve the various questions they answered/problems they faced.

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* **At-home competition submission guidelines – Please submit items in one email to Sidney.STEM@Emerson.com**
  + Students must submit at least one or more pictures of their diorama (maximum of five).
  + Students must a picture or photocopy of their blueprint that is readable.
  + Students must submit a completed question sheet.
  + All materials should be submitted to Sidney.STEM@Emerson.com by 3pm on August 13th, 2021.
* **In-person competition guidelines**
  + Students should bring their diorama, blueprint, and filled out question sheets (if they have them) with them to the onsite event.
  + Students will present their colony to a pair of judges on the day of the event. Students should anticipate spending five or minutes talking the judges.
    - Students will initially be asked to spend roughly three minutes describing their colony. It is recommended that during this time period, the students focus on explaining where their colony is located on Mars and summarizing their answers to the Technologies Used questions. They will then be prompted by the judges to talk about their event scenarios. During the judging, students are encouraged to refer back to their completed question sheets if they have them.
  + The onsite event will take place on August 11th, 2021. The event is anticipated to start at 4:30pm and end at 8:00pm. In addition to presenting their colonies, students will be given food, and will also take a tour of Emerson’s labs and learn more about the co-op program. More detailed event information will be provided the week of August 2nd, 2021 after all sign-up sheets have been submitted. Note that this information will not change/affect the project specifications/requirements unless not enough students sign-up for the in-person event, in which case students who did sign-up for the in-person event will be notified that they should now follow the “at-home” submission guidelines for their colony.

**\*\*Prizes will be awarded to the top colonies (3 in-person, 2 at-home). In-person competition winners will be announced at the end of the onsite event. At-home competition winners will be announced in the Sidney Now during the week of August 16th, 2021. \*\***