**Mission to Mars Briefing:** Your mission is to complete the first human Mission to Mars. You can take up to 3 crewmates for the mission. Choose carefully because not everyone can be on the Mission. You need to make sure that you can safely complete the entire Mission. You will need to properly pack for your trip to Mars and take all of the necessary skills and people needed to complete your Mission. Like all trips into outer space your spaceship has a limited size. NASA estimates that you will need at least 6,000 pounds of food per person and about 1,100 gallons of water as well as lots of oxygen and personal supplies (clothes etc.). You will also need to carry your “habitat” which is the house where your crew will live on Mars. The habitat contains living space, a repair bay to fix broken equipment like the rover if it breaks, and a greenhouse to grow food and perform experiments on how to best grow food on Mars. Space on your ship will be limited.

**Select your crewmembers**: On the Crew List Handout you will see the five crewmates you can pick from. For your mission to be a success it is **very important** that you have at least one person with a **medium** rating in all 5 essential skills which are (1) piloting, (2) engineering, (3) geology, (4) biology, and (5) medicine. If you don’t have at least a medium rating in all 5 skills your team cannot blast off for Mars. Pick a team that is balanced so that you have at least one person with a “medium” for each skill.

**Emergencies**: Mars is very far from Earth. NASA estimates that a roundtrip to Mars will take about three years. If an emergency happens to someone on the team they will have to fix it. Only someone with a **strong** rating in that skill, and the correct emergency kit, can actually succeed in an emergency. You can’t be strong in every area so make sure to discuss which emergencies you think are most important to handle. An emergency can happen in any area like piloting, engineering, geology, biology, or medicine. During your mission you will likely encounter one or more emergencies.

To **succeed** against an emergency you need two things:

1. a crewmember who is **strong** in that skill
2. the correct emergency kit

For example if you have a “medical emergency” then you will need the **doctor** (who has a strong medical skill) and the **emergency medical kit**.

**Failure** occurs when:

1. There are no crew members that are **strong** in a skill who also have the **correct emergency kit**.

**Equipment:** Each Astronaut will need a minimum of 1 food container, 1 water container, and 1 oxygen container (this is the astronaut kit). You will also need to take your habitat as well as your robotic rover. You can also take emergency kits to deal with emergencies. You can only use an emergency kit once. Any extra kits will help you in case you have more than 1 of the same emergency.

**Mission goals:** NASA would like to accomplish many goals with a Mission to Mars. Here are five major goals. You can decide which are most important and which are least important. Put a number in front of each goal showing how important it is. Put a 1 for the goal your team thinks is the most important and a 5 next to least important.

\_\_\_\_\_ Fly to, land on, and return from Mars safely.

\_\_\_\_\_ Keep your spacecraft, habitat, rover, and other equipment in good condition.

\_\_\_\_\_ Make sure all crew stay healthy and free of disease.

\_\_\_\_\_ Conduct science experiments about the rocks and soil of Mars.

\_\_\_\_\_ Conduct science experiments about how to grow crops in the greenhouse.

Describe why you think your “1” is the most important: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Describe why you think your “5” is the least important: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Select your Team**

**Do the following**:

1. Discuss the best people you can take to Mars and prioritize them from most important to least important.
2. Write down your choices and explain why you chose those crewmates for your team.

First put a number showing the importance of each person. Put a 1 for the person your team thinks is the most important and a 5 next to the least important person. Then circle who went to Mars and who stayed on Earth:

\_\_\_\_ Pilot: Went to Mars Stayed on Earth

\_\_\_\_ Engineer: Went to Mars Stayed on Earth

\_\_\_\_ Geologist: Went to Mars Stayed on Earth

\_\_\_\_ Biologist: Went to Mars Stayed on Earth

\_\_\_\_ Doctor: Went to Mars Stayed on Earth

How will the crew members you selected help you accomplish the mission goals you think are most important?

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**Hazards**: Now that you have your team selected you will roll the die to see what hazards happen on your trip. Roll the die five times. Each time you roll look up the event in the table below. For example if you roll a “1” that is the Piloting Emergency. You will need the pilot and the pilot’s emergency kit to fix the emergency.

|  |  |
| --- | --- |
| 1. **Piloting Emergency**: The navigation system breaks on the way to Mars.

**Success**: The crew fixes the navigation system.**Failure**: The crew misses their landing site and cannot explore all of the parts of Mars they need to. | 4. **Biological Emergency**: The crew discovers that the greenhouse plants are not germinating in the Martian soil.**Success**: The crew finds a new mixture of soil and fertilizers to help the plants grow.**Failure**: The crew leaves Mars early because they were planning to use food from the greenhouse in addition to the food they brought from Earth. |
| 1. **Engineering Emergency**: The crew has discovered that the oxygen system is broken.

**Success**: The controls are repaired.**Failure**: The crew have to abandon the habitat and live in the space capsule as a backup plan. | 5. **Medical Emergency**: One of the crew members is sick.**Success**: The crew member gets better.**Failure**: The crew member gets worse and the crew have to leave Mars early. |
| 1. **Geological Emergency**: The crew has discovered perchlorate contamination in the soil and dust that has been tracked into the habitat from their boots. Perchlorates cannot be cured with a medical kit.

**Success**: All perchlorate contamination is removed.**Failure**: The perchlorates make the crew sick. | 1. **No emergency**: The crew can relax.
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Write down how many successes and failures you had:

Success: \_\_\_\_\_ Failure: \_\_\_\_\_

Finally: Discuss what went well and what didn’t go well and try again!

**Crew List Handout**

**Pilot**: No human has ever flown to, and landed, on Mars. The pilot is specially trained to handle this part of the mission and can help out with repair and engineering work as well. The pilot is weak in geology, biology and medicine.

Piloting: Strong

Engineering: Medium

Geology: Weak

Biology: Weak

Medicine: Weak

**Engineer**: The engineer has very strong skills for repairing the spacecraft and any other mechanical system (like oxygen supplies or water filtration). The engineer has also been trained to fly and land the craft although this is not their area of specialty. The engineer is weak in geology, biology and medicine.

Piloting: Medium

Engineering: Strong

Geology: Weak

Biology: Weak

Medicine: Weak

**Geologist**: The geologist is strong at identifying rocks and dealing with chemicals in the soil. The geologist also has some skill in engineering. The geologist has weak skills in piloting, biology, and medicine.

Piloting: Weak

Engineering: Medium

Geology: Strong

Biology: Weak

Medicine: Weak

**Biologist**: The biologist is very good at growing plants in the greenhouse to learn more about how future space colonists can farm in Mars. The biologist also has some training in medicine and helping sick or injured crewmates. The biologist has weak skills in piloting, engineering, and geology.

Piloting: Weak

Engineering: Weak

Geology: Weak

Biology: Strong

Medicine: Medium

**Doctor**: The doctor is very good at helping injured crewmates and can do some, but not all, of the biology work on the mission like running parts of the greenhouse. The doctor has weak skills in piloting, engineering, and geology.

Piloting: Weak

Engineering: Weak

Geology: Weak

Biology: Medium

Medicine: Strong