

# FROM LOOKING AT STARS TO LIVING ON MARS



## HAZARD 3: DISTANCE FROM EARTH

### INTRODUCTION

A human journey to Mars, at first glance, offers an inexhaustible amount of complexities. To bring a mission to the Red Planet from fiction to fact, NASA's Human Research Program has organized hazards that astronauts will encounter on a continual basis into five classifications. Pooling the challenges into categories allows for an organized effort to overcome the obstacles that lay before such a mission.

For more information on the hazard of distance from Earth, watch the following video:

"Hazards of Human Spaceflight | Hazard 3: Distance From Earth" (Length 2:48)

<https://safeYouTube.net/w/BhPX>

For students unable to access Safe YouTube links, the video is also available here:

[https://www.youtube.com/watch?v=0\\_pbs8dG1oM&list=PLiuUQ9asub3RRA-BMh7wLsU7V6gUUSRwH&index=3](https://www.youtube.com/watch?v=0_pbs8dG1oM&list=PLiuUQ9asub3RRA-BMh7wLsU7V6gUUSRwH&index=3)

### PROCEDURE

Read the description, in the first column below, of your group's assigned hazard. Then, brainstorm possible solutions to avoid or mitigate this hazard, and identify STEM skill sets that will likely be necessary to develop and implement these solutions. Record your ideas in the appropriate columns, and be prepared to share with the class.

Hazard Description	Possible Solutions	Necessary STEM Skill Sets
<p>The third and perhaps most apparent hazard is, quite simply, the distance. Mars is, on average, 140 million miles from Earth. Rather than a three-day lunar trip, astronauts would be leaving our planet for roughly three years. While International Space Station expeditions serve as a rough foundation for the expected impact on planning logistics for such a trip, the data isn't always comparable.</p>	<p><i>Planning and self-sufficiency are essential keys to a successful Martian mission. Facing a communication delay of up to 20 minutes one way and the possibility of equipment failures or a medical emergency, astronauts must be capable of confronting an array of situations without support from their fellow teammates on Earth.</i></p>	<p><i>Math Biology Physiology Psychology Engineering</i></p>

<p>If a medical event or emergency happens on the station, the crew can return home within hours. Additionally, cargo vehicles continually resupply the crews with fresh food, medical equipment, and other resources. Once you burn your engines for Mars, there is no turning back and no resupply.</p>	<p><i>Planning ahead could involve sending supply ships ahead so that the astronauts had an opportunity to dock with the supply ship and obtain supplies. These autonomous ships could be stationed at various points along the route to Mars, and they could be a refuge in case the primary ship is unable to continue its mission. A back-up ship, while expensive, could be sent ahead.</i></p>	
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PROPRIETARY