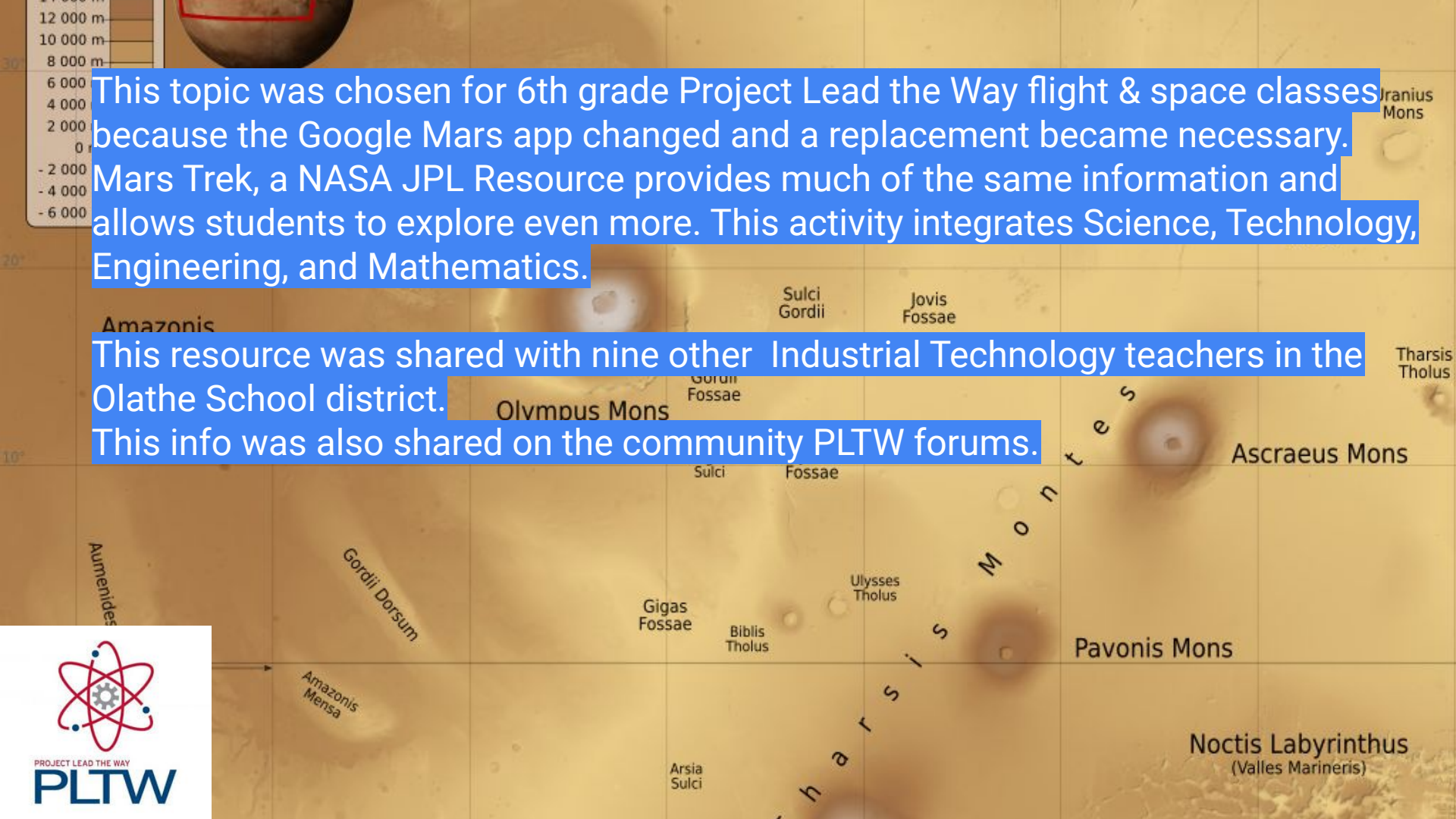
Mars Trek - NASA JPL resource
Choosing safe landing sites on Mars

Stem Leadership Project by Melissa Eker

Endeavor
STEM Teaching Certificate Project


12 000 m
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This topic was chosen for 6th grade Project Lead the Way flight & space classes because the Google Mars app changed and a replacement became necessary. Mars Trek, a NASA JPL Resource provides much of the same information and allows students to explore even more. This activity integrates Science, Technology, Engineering, and Mathematics.
This resource was shared with nine other Industrial Technology teachers in the Olathe School district.
This info was also shared on the community PLTW forums.
Iranius Mons
Sulci Gordii
Jovis Fossae
Amazonis
Tharsis Tholus
Olympus Mons
Fossae
Sulci
Fossae
Ascraeus Mons
Tharsis Montes
Aumenides
Gordii Dorsum
Gigas Fossae
Biblis Tholus
Ulysses Tholus
Pavonis Mons
Amazonis Mensa
Noctis Labyrinthus
(Valles Marineris)
Arsia Sulci
PROJECT LEAD THE WAY
PLTW

Standards

Science Standards (NGSS)

Engineering, Technology and Applications of Science

MS-ETS1-2

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Engineering, Technology and Applications of Science

3-5-ETS1-2

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Engineering, Technology and Applications of Science

K-2-ETS1-3

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Task 4: Cleared for Landing

One of the biggest decisions for a Mars mission is where to land on the planet's surface. In this task, you are responsible for that decision.

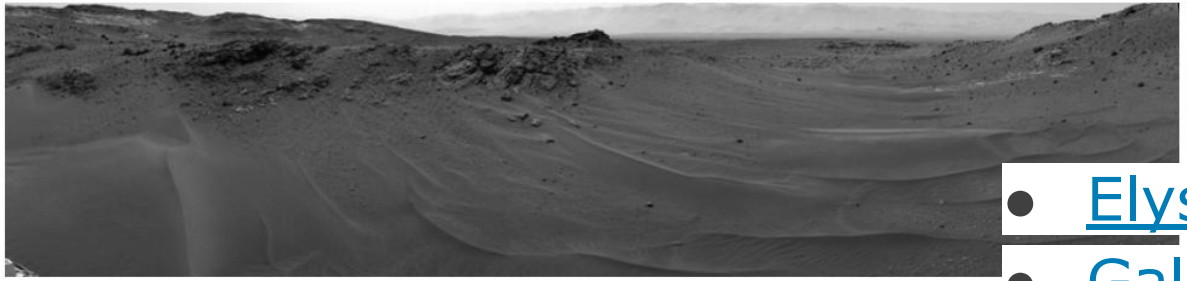


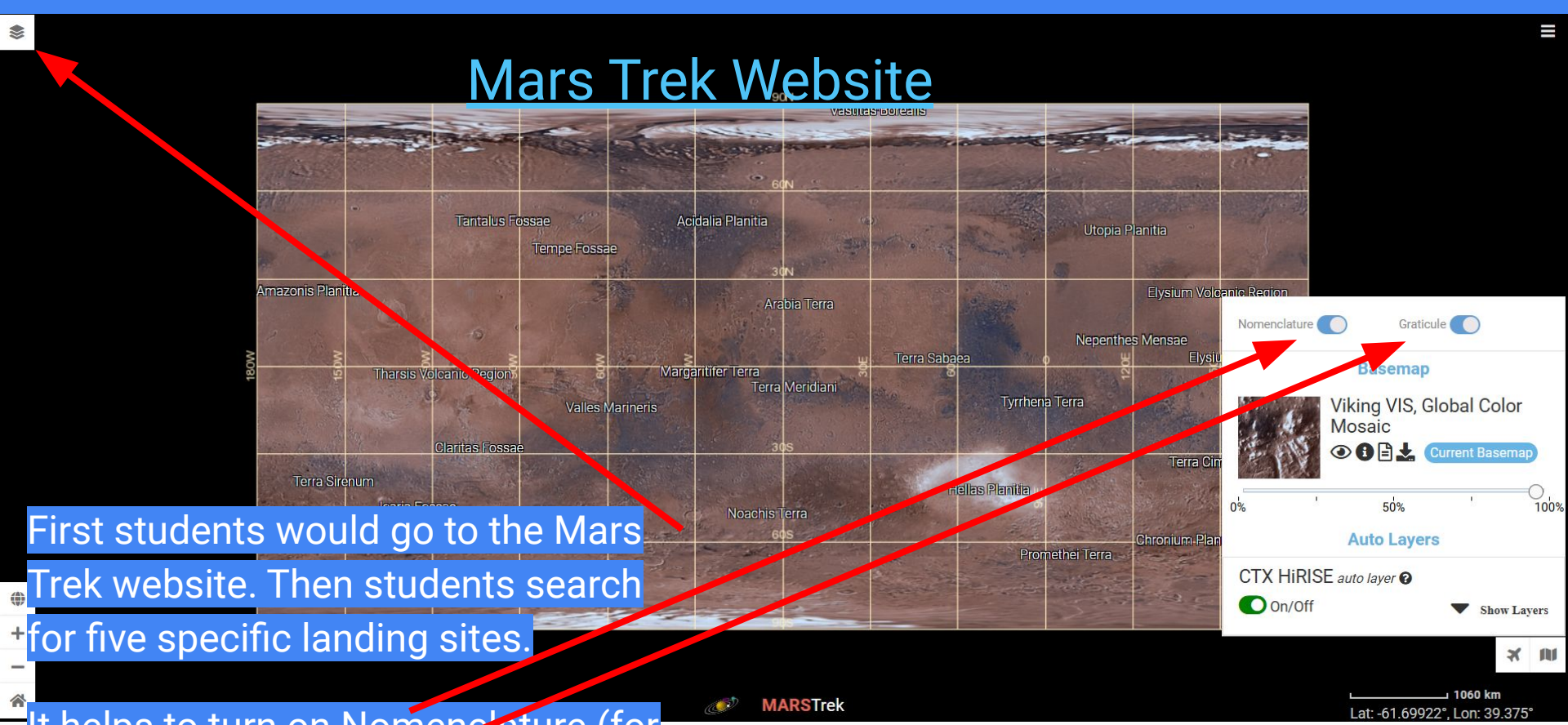
Figure 1. Surface of Mars

Source: NASA/JPL-Caltech

Students explore several different landing sites on Mars, looking at the latitude and longitude.

- Elysium Planitia
- Gale Crater
- Gusev Crater
- Syrtis Major Planum
- North Pole

Mars Trek Website



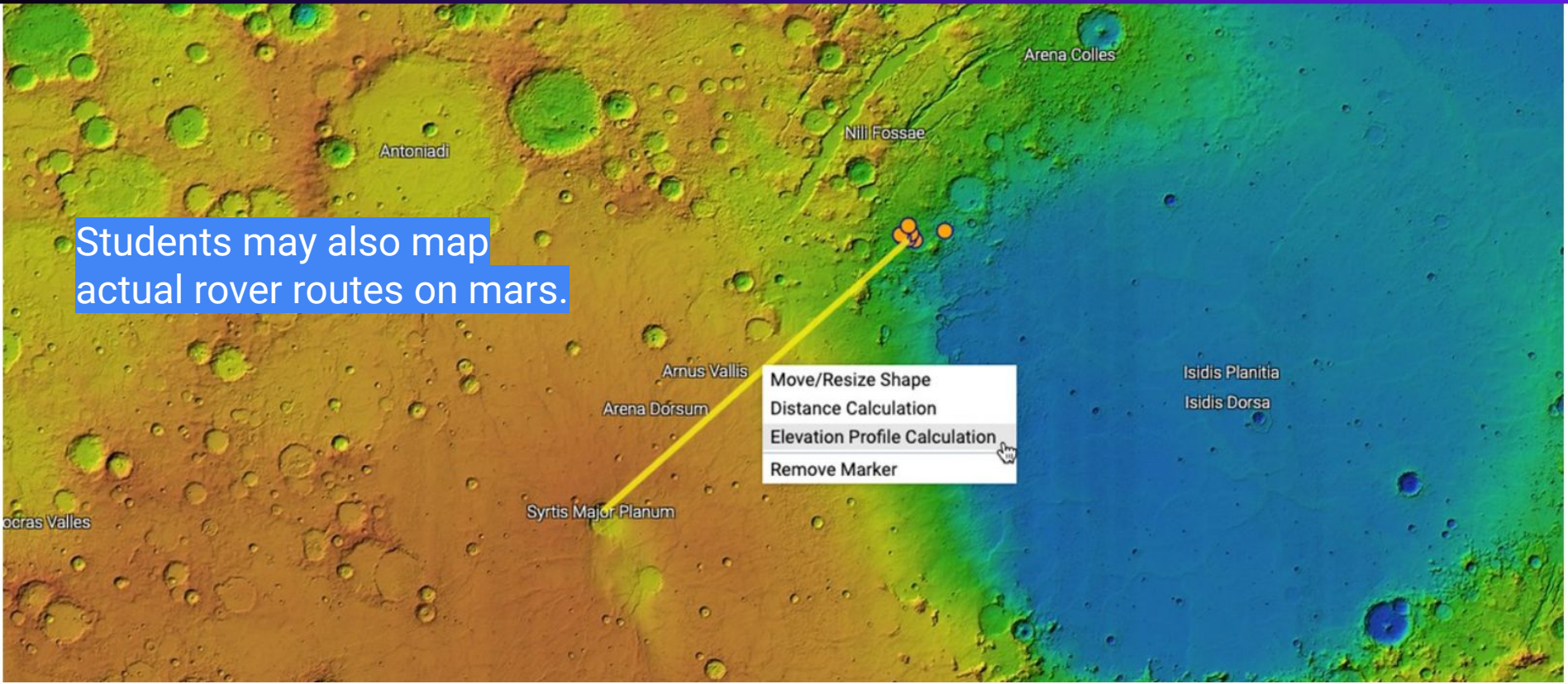
First students would go to the Mars Trek website. Then students search for five specific landing sites.

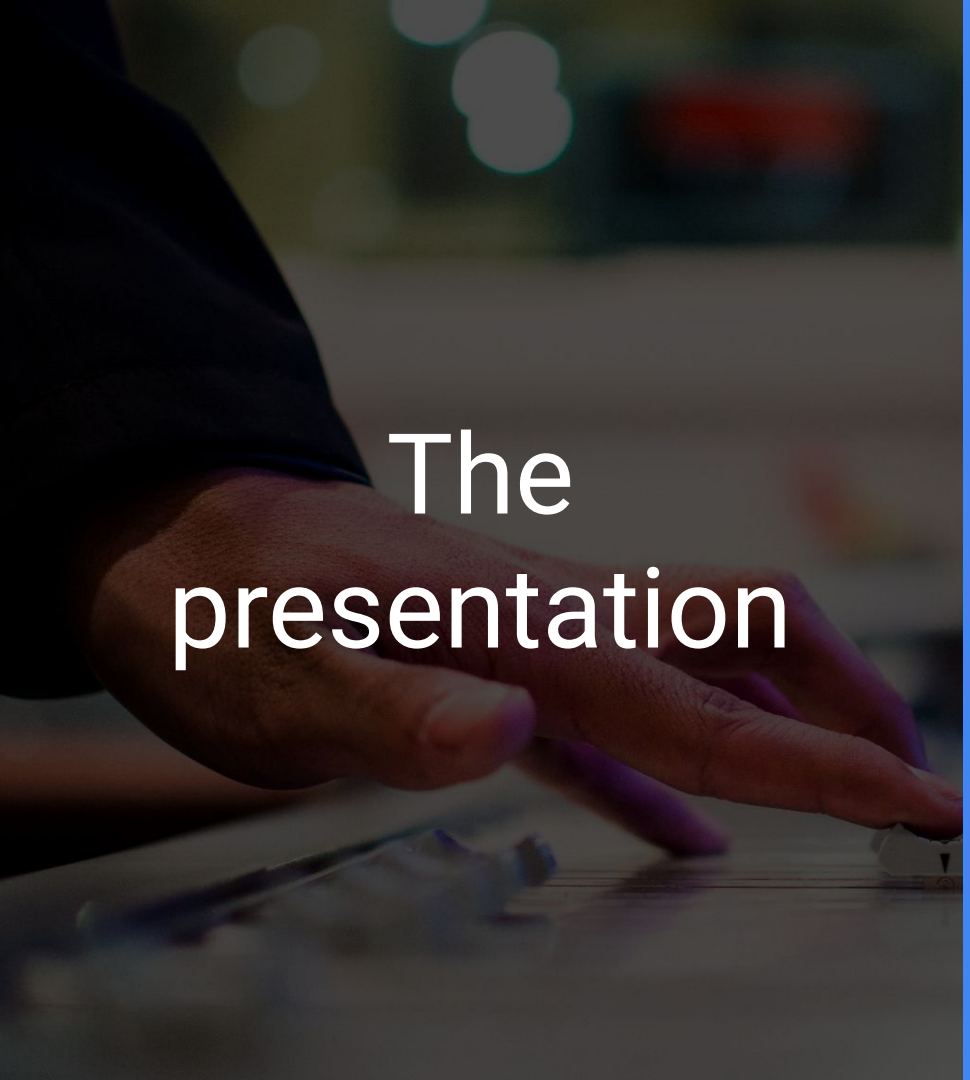
It helps to turn on Nomenclature (for names) and Graticule (for longitude & latitude)

Engineering decision matrix

Landing Site	Safe Landing	Potential Water	Safe Elevation	Sunlight	Temp	Radiation Shielding	Other
	Yes/No	Yes/No	Yes/No	*Little/ Some/ A lot*	*Frigid/ Moderate/ Unknown*	*None/ Some/ A lot/ Unknown*	
1. Elysium Planitia							
2. Gale Crater							
3. Gusev Crater							
4. Syrtis Major Planum							
5. North Pole							

Using the criteria to the left, students compare and rank the safest landing sites on Mars


Arena Colles
Antoniadi
Nili Fossae
Students may also map actual rover routes on mars.
Arnus Vallis
Arena Dorsum
Move/Resize Shape
Distance Calculation
Elevation Profile Calculation
Remove Marker
Isidis Planitia
Isidis Dorsa
Syrtis Major Planum
ocras Valles



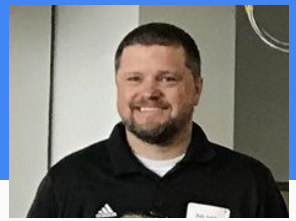
The presentation

The resources for the lesson were presented during a morning Zoom with nine district industrial technology teachers.

Teachers especially expressed interest in the detailed terrain photos and search options.

Teacher Feedback

Collective feedback for the new resource was positive overall.



Jeff Laflen

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Jeff didn't realize that the Google Mars site had now changed and was not searchable.

Kari Shamet

kshametit@olatheschools.org

Kari is looking forward to trying out this new resource.

Greg Hammons

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Greg explored Mars Trek and its resources

References

1. *Map a Mars Rover Driving Route | NASA Jet Propulsion Laboratory (JPL)*. (2024, October 11). Jet Propulsion Laboratory. Retrieved November 11, 2024, from https://www.jpl.nasa.gov/edu/resources/project/map-a-mars-rover-driving-route/
2. (2024). Project Lead the Way Gateway Course. Flight & Space. https://pltw.read.inkling.com/a/b/40112202236e4de798dfe6c3b828c245/p/0fa485148a354b848ea0a96bfcc72a04
3. (n.d.). Mars Trek. Retrieved November 11, 2024, from https://trek.nasa.gov/mars/#v=0.1&x=0&y=0&z=1&p=urn%3Aogc%3Adef%3Acrs%3AEPSG%3A%3A104905&d=&locale=&b=mars&e=-269.999994963537%2C-122.167966471131 66%2C269.999994963537%2C122.167966471131 66&sfz=&w=