Mars Rovers

What do you mean roving on Mars?

> Read ***Mars Rover Driver’s License***

<https://docs.google.com/document/d/18BYngEHPvvu6tiTgmJS3tIQTUKKXEkUGmsQHwMSMBCE/edit?usp=sharing>

*-> Can be morning work, homework, read in groups, as a whole group, whatever works best!*

> Watch ***Spirit: Six Years of Roving Mars*** video clip (4:56)

*\*Let it buffer first or download*

<https://www.jpl.nasa.gov/video/details.php?id=886>

Team Selection

-> Divide your class into groups of **3-4**.

-> Using the descriptions below, assign roles or allow students to pick their role.

* **Rover Driver (1)** - can see the surface and send coded directions to the rover

Can NOT change directions once the rover has started

* **Rover (1-2)** - can NOT see and must follow ALL driver’s instructions
* **Official (1)** - Records group data

Purpose

* **SEL** - Teamwork/Collaboration
* **Language Arts** - Mars Rover Drivers’ License
* **Math** - Timing and comparing statistics
* **Engineering** - Problem Solving
* **Earth & Space** - Mars -> high-interest and real-world connection
* **Computer Science** - Basic Coding
* **Social Studies** - History of Space Exploration

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| Student Mission Objectives:* Safely navigate your rover as fast as possible on the Martian surface (avoid poly spots aka craters)
* Return rock samples (cones) to Earth for research
* Design a unique mission patch to represent your journey
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Lesson Flow

> Building Background in class (see above)

> **Day 1 Mars**

* Students will learn more about why we’re exploring Mars, how we get there, how to land and challenges associated with these.
* I will set up the courses, explain the process, roles, and provide materials to all students.

Goal : All groups to complete the course once.

**> Day 2 Roving**

* You will work with drivers. They will explore the course and write coded directions for their Rover.
* As drivers are coding, I will give rovers and officials background about designing mission patches.
* After all drivers have coded, I will work with rover groups on the course (1 group/course at a time).
* After completing the course, groups will complete an evaluation.

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| Course Rules* No yelling at the Rover.\*
* No guiding the Rover. \*
* No changing your directions, once your rover starts.
* Return the course as you found it. \*\*
* ONLY 1 Rover team on the course at a time! \*\*\*
* Check-in with Mission Control BEFORE AND AFTER!

\*There is a ~14-minute communication delay each way from Earth to Mars.\*\*Retrieved rocks will be carried by the official. Craters and mountains CANNOT be moved.\*\*\*When completing the course. More than one driver may be on the course to code.  |

Student Tasks to Complete

* Mars Rover Races (all students)
* Mission Patch (all students)
* Course Coding (Driver - 1/group)
* Team data & Reflection (Official - 1/group)

Teacher Options

* Students can complete the course ONCE or twice.
* Mission patches can be graded using a rubric.
* Follow up activities/investigations can be assigned:

**Mission Debrief** - Student & Team Reflections

*What did you learn? What went well? What do you need to work on?*

**ELA**

* Read Newsela articles about the Rovers
* Writing about the experience - Write from the Rover’s Perspective
* Write a how-to guide - Driving on Mars

**Math** Create data tables and graphs to display:

a) groups’ times

b) number of rocks retrieved

c) number of foot faults

d) changes from first attempt to second attempt

**Science**

* Mars Survival - What we would need to survive on Mars?
* Planet Comparison -What are similarities and differences between Earth? *(atmosphere, terrain, temperature, etc)*
* How long would it take to get there?
* What would the communication delay be fromt his planet to Earth?
* How difficult would the landing be?
* What research/investigations could be done on this planet?

\*Engineering Design Challenge -> Build a Mars Rover

**Technology**

* Using Excel or Google Sheets to create graphs
* Typing journal entry or creating how-to-guide
* Reading Newsela articles
* Planetary Research

Planet Sizes <http://www.messenger-education.org/Interactives/ANIMATIONS/Planet_Size_Comparison/planet_size_comp.php>

Planet Masses

<http://www.messenger-education.org/Interactives/ANIMATIONS/Planet_Mass_Comparison/planet_mass_comp.php>

The next 4 pages are recording sheets for your whole class.

Class Data Record (1/class)- to keep track of each of the group’s names, roles times, number of foot faults and rocks retrieved

(3 pages)

Team Comparison Chart (1/teacher)- Comparing Data from all of your groups (1 page)

Mars Rover Races\_\_\_\_\_\_\_\_\_\_\_\_\_’s Class Data Record

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| **Group 1:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 2:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 3:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 4:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 5:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 6:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 7:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** |  \_\_\_:\_\_\_\_.\_\_\_ |  |  |

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| **Group 8:** |
| **Driver** (1) | **Official** (1) | **Rovers A** (1) | **Rover B** (1) |
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| **Course** (circle one) | **Time** | **Foot Faults x** | **Rock Samples ✔** |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |
| **Spirit Oppy** | \_\_\_:\_\_\_\_.\_\_\_ |  |  |

**Mars Rover Races Team Comparison Chart**

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| **Rover Driver**  | **Course Name** | **Total Time** | **Craters Hit (Foot Faults)** | **Rock Samples Retrieved** |
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