

## Student Worksheet

# Mars Rover Driver Board Game

**Work with your team to drive a rover on Mars! Can you stay within the engineering constraints to collect rocks and do the most science possible?**

**Goal:** Conduct as much science as possible by collecting rock samples while staying within the “engineering constraints.” **Your rover must begin at the START square and end on the FINISH square.**

### Setup:

- Place the colored rocks on the game board in the circles of the matching color.
- Place the rover game piece on the START square facing forward, as indicated by the arrow.

### Team Roles:

- **Scientist (1-2 students)** – Maximize the science return of the mission. In other words, have the rover collect rocks to get as many science points as possible. Work with the Engineer to determine which rocks to pick up and what commands are needed to get them.
- **Engineer (1-2 students)** – Make sure the rover does not exceed the “engineering constraints” while performing the mission. Work with the Scientist to determine which rocks to pick up and what commands are needed to get them.
- **Rover (1 student)** – Receive and execute commands from the Scientist and Engineer. Move the rover game piece to the proper location and retrieve rock samples as commanded.

### Engineering Constraints:

- **Load limitations** – The rover can carry a maximum of three rocks at a time.
- **Power limitations** – The rover only has a certain amount of energy to use each day. Today, the rover has enough energy for no more than 20 commands.






### Points:

Collect rocks to earn science points. Different types of rocks have different scientific value. The most interesting rocks are usually in the hardest to reach places! Which ones will you pick?

- **Silver** – 1 point
- **Blue** – 2 points
- **Red** – 3 points
- **Green** – 4 points
- **Black** – 5 points

**Navigation:** The rover must begin on the START square and end on the FINISH square. The rover must start facing the direction indicated by the arrow. It cannot drive over squares with rough terrain: sand dunes, craters, or hills.

**Commands:**

Forward		(move forward one square)
Reverse		(move backward one square)
Left		(turn left 90° on the current square)
Right		(turn right 90° on the current square)
Collect		(pick up a rock on the current square)

**How to Play:**

1. Rover, you need to leave your team and go to Mars (a designated area in the classroom) where you will learn more about the Red Planet.
2. Science and engineering team, you need to decide which rocks will be collected and which commands must be sent to the rover to accomplish your goal. Use the command symbols to create the sequence of commands that you will later use to direct the rover. Remember your goal is to get the rover to collect as many science points as possible while staying within the engineering constraints. The rover will do the exact commands that you give them, so be very careful and check your work! Use the space below to design your command sequence.

3. When you are finished with your command sequence, call your rover back and have them sit at the game board. Do not show them your command sequence – after all, they are on Mars and you are on Earth!
4. Read the command sequence to your rover, one command at a time, and have them execute the command by moving the rover game piece and picking up rocks accordingly.
5. When the rover reaches the FINISH square, add the points for the rocks the rover collected and compare your total with the other teams.