LUNAR ROVER NAVIGATION SIMULATION

Setup

1. The class will be split into 3 groups: Mapping, Pathing, and Coding.
2. The teams will be separated and not allowed to communicate with each other.
3. The class will be allotted \_20\_ Power Points to use (may change to adjust the difficulty).
   1. Any action that moves the rover will cost a Power Point.
   2. If the class uses all Power Points, the rover will run out of power and the attempt will end.
4. The course will be laid out on a grid and will be populated with several obstacles.
5. The class will be told the coordinates of the starting location and the Mining Zone (end position).
6. The class will also be told the starting direction.
7. The teams will take turns operating, starting with Mapping, then Pathing, and finally Coding. One attempt will more than likely require multiple cycles of operation.

Mapping

1. Will receive a paper with a grid (empty map), writing utensils, and a video feed from the rover.
2. Will use the video feed to mark obstacle locations onto the grid paper.
3. May ask the rover to pan 90 degrees to the left or right to get a better view of the course. However, each pan will cost 1 Power Point.
4. When ready, the map will be passed on to the Pathing team.
5. The team may use the same map for each turn. (The Pathing will return the map after each turn). The team may also choose to make a new map each time.
6. Note: Visibility will be limited, so it may not be possible to make a complete map in one turn. It may be a good idea to mark your blind spots.
7. Note: Your goal is only to create a map. Do not worry about pathing.

Pathing

1. Will receive a paper with a grid (empty map), writing utensils, and the map created by the previous team.
2. Will use the map to determine the best path towards the mining zone.
3. This path will be drawn on the blank grid paper.
4. Each square the rover travels will cost 1 Power Point.
5. The paper with the path will be passed on to the Coding Team when ready.
6. When finished, the map should be returned to the Mapping team.
7. Note: This team will likely receive an incomplete map, so be mindful of this when planning.

Coding

1. Will receive a laptop with Scratch and the path created by the previous team.
2. Will translate the path into code in Scratch. (Or another language chosen by the instructor.)
   1. This can be done with the built-in movement commands.
3. The side length of a square in the grid scales to 50 steps.
4. When ready, this code will be sent to the rover, which will be moved accordingly.