

V3 - Experiment Procedure “Rover Games”

GENERAL INFORMATION

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SHORT EXPERIMENT DESCRIPTION

Inspired by a real Analog Mission Experiment, students use communication to get from point A to point B. In this case the task is indoors: Navigate a “Mars” obstacle course while blindfolded, just like a rover on Mars! You'll follow instructions from a teammate to reach the end of the course, collecting samples along the way – thus playing a Rover on Mars. To add to the difficulty and realism, note instructions beforehand, then only read the instructions to the students going through the course, imitating the time delay in communication to Mars, since the commands cannot be altered in real time.

HARDWARE CHECKLIST

| | |
|--|--|
| | Chalk (for marking the path) |
| | Rope (for marking the path, and boundaries) |
| | Chairs (as obstacles) |
| | Tables (as obstacles) |
| | Rocks (alternative: water bottles, pencil cases, etc.) |
| | Blindfolds |
| | Optional: small award (candy, trophy, etc.) |

PROCEDURE

BUILD COURSE

| Step | Action | NOTES | Duration | Check |
|------|--|---|----------|-------|
| 1 | Use chalk or rope to outline a clear path for the course: Draw a path with chalk | Optional: lay down path with rope | 5min. | |
| 2 | Set up chairs and tables as obstacles | Arrange chairs and tables creatively along the course to simulate Mars terrain. | 6min. | |
| 3 | Hang rope | Use rope to mark additional boundaries or pathways. | 3 min. | |

PROCEDURE “ROVER GAMES”

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|---|---|---|--------|--|
| 4 | Be creative and have fun | | | |
| 5 | Lay out rocks as samples on obstacle course | Place "samples" (rocks or substitutes) strategically on the course. | 2 min. | |

BUILD TEAMS

| Step | Action | NOTES | Duration | Check |
|------|--|---|----------|-------|
| 1 | Divide students into teams of 5 | | 5min. | |
| 2 | Divide each team into 1 mission commander, 1 official and 3 student rovers | 1 Mission Commander (guides team with instructions) 1 Official (records points and monitors penalties) 3 Rovers (navigate course blindfolded) Roles can be exchanged between game runs | 5 min. | |
| 3 | Blindfold rovers | Ensure the 3 rovers in each team are securely blindfolded. | 1 min. | |
| 4 | Rovers form a “train” i.e. put their hands on the shoulders of the teammate in front. | | 10 sec. | |
| 5 | Rovers walk the course and pick up samples | | ~10 min | |
| 6 | Commander guides rovers through the course using verbal instructions only . | Staying on course . Rovers must collect as many samples as possible without stepping out of bounds or bumping into obstacles. | ~10 min. | |
| 7 | Official times group, notes points when samples get picked up and deducts points when rovers overstep bounds, bump into obstacles or cheat | Stays at course | ~10 min. | |

AFTER COMPLETING COURSE

| Step | Action | NOTES | Duration | Check |
|------|---|--|----------|-------|
| 1 | Stop timing when all 3 rovers cross the finish line. | | 4 sec. | |
| 2 | Official notes duration of run | Official records the time, number of samples collected, and penalties (e.g., stepping out of bounds or hitting obstacles). | 30 sec. | |
| 3 | Official calculates points considering duration, out-of-bound errors, obstacle collisions and sample collection | Time taken Penalty points (deducted for errors) Bonus points for collected samples e.g. +10 points for each sample collected, -5 for each bump into obstacle or move out of path. | 5 min. | |
| 4 | Let each group repeat and compare times | Teams rotate roles and repeat the task to compare results across runs. | ~20 min. | |
| 5 | If wanted, give out award to group with most points | | 5 min. | |

PROCEDURE “ROVER GAMES”

NOTE:

Role Rotation: Allow participants to switch roles between rounds for fairness and inclusivity.

Advanced Version: For added complexity, use actual rover kits. Resources are provided in the document for potential rover builds.

Rover games can also be played with actual rovers, possible resources for rover kits are as followed:

- [Project Raspberry](#)
- [Video of How to command Arduino Rover](#)
- [Amazon link for ELEGOO ROVER](#)