Driving Over Distances

Robots are the eyes of scientists. They allow scientists to see, sample, and learn about places that scientists can't directly explore yet – like Mars. Directing a robot is challenging; the science team has to decide what they want the robot to do, then upload the commands in the computer, then wait while the commands are transmitted across space. The robot then carries out the command and transmits the result back to the science team. Each step has to be carefully planned. Sometimes surprises happen - the robot gets stuck unexpectedly, or a piece of equipment malfunctions - and the science team has to figure out how to troubleshoot the problem.

Your child will attempt to move a "rover" while watching it on a monitor, and have it go around obstacles to arrive at a destination.

What You Need:

- One remote-control "rover" (a remote-control vehicle can be made to look like a "rover" by removing the vehicle's casing).
- Video camera
- Monitor for video display
- Planet Surface: A area 10x10 or larger for rover to maneuver remotely
- Several obstacles (blocks, boxes, parking cones, thin pillows, etc.)
- Several sheets to cover the obstacles to make the surface look like a planetary surface
- Rocks
- 4 sheets bright cardstock, mark one North, one South, one East, and one West
- Plastic or cardboard displays for standing the cardstock upright
- Mission Control: A separate area where the video monitor and rover remote-control are accessed by the children

What To Do:

- Set up the Planet Surface. Scatter several obstacles for the rover to maneuver around and over on the floor. Cover loosely with sheets. Scatter rocks on the surface. Set up the video camera so that it observes the planet surface area. Place the directional markers on the surface so that they are standing up facing the video camera.
- Optional: create a scoop for the rover front (similar to a bull-dozer bucket) that will allow the rover collect rocks. Place rover on the planet surface.
- Create a mission sheet in which obstacles are named and described (example below) that has directions for the children to go in a particular order from one to another.

- Set up Mission Control so that the video signal displays the planet surface. Install the remote control for the rover.
- Invite your child to watch the "rover" move for awhile on the Planet Surface. Observe the general landscape across which it is moving.
- Invite your child to go to Mission Control. Have them practice using the remote control while watching the rover on the screen.
- Maneuver the rover through the obstacle course from the start to the end point with the remote-control and by viewing the rover on the screen only.

Example Mission Sheet

Goal: Learn about the features on the planet surface. The stationary lander has a video camera that will watch the rover as it moves over the surface.

Command Set 1: Send your rover to the tallest feature on the landscape. How tall is it compared to your rover? (The same height? Twice as high? Other?)

Command Set 2: Move the rover north to the low hill. Mission specialists agree that the slope should be low enough for the rover to go over it. However, they don't know if the hill is firm or soft. Send the rover over the hill. Is it firm enough to support the rover?

Command Set 3: Send your rover to the rock pile to the west. Collect a sample. Return to the lander video camera to get a close-up view of the rocks. What do they look like?

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Parent Prompts:

Is it more difficult to control the rover watching the screen than it would be if you were next to the rover?

What was hard to do? Easy? Were there any problems that the rover encountered?

After doing this, what type of challenges does your child think that scientists face in conducting robotic missions on other planets?