Mars in Reverse
Teacher Version

Adapted from the Athena Mars Exploration Rovers web site located at athena.cornell.edu/kids/home_03.html

Introduction & Purpose
This brief demonstration is a good way to get your students thinking about how people discovered how celestial bodies in the solar system move. One of the larger clues was the retrograde motion of Mars, as viewed from Earth. As Earth passes Mars in its orbit, Mars appears to stop, briefly back up, and then move in the original direction again. This retrograde motion is only possible because the planets move in elliptical orbits around the Sun, instead of in circular orbits as originally anticipated.

Objective
Students will demonstrate the retrograde motion of Mars that is apparent when its orbit is viewed from Earth.

Materials Needed
- Students in pairs with one student in each pair on wheels (bicycle, skates, skateboard, etc.)
- A helmet for the student on wheels
- A place with a clear, long straightaway with few pedestrians and ***no cars!*** (a park, playground, gym, etc.)
- Pen or pencil
- Idaho TECH Lab Notebook

Procedure
The students have a little background information in their Activity Book regarding this activity, as well as an explanation of how the demonstration relates to the retrograde motion of Mars. Every student should get a chance to be on wheels, because it is from this perspective that you can see the retrograde motion. Also, to demonstrate student understanding of the connection to the orbit of Mars, have each pair explain the phenomenon to you after the activity is complete, and comment in their Lab Notebook.

1. Have each pair will establish a start point, end point, and a stationary midpoint along the long straightaway.
2. Both students in each pair will begin at the starting point at the same time. Have the student on foot begin to walk forward in a straight line first, and then have the student on wheels ***(make sure they wear a helmet!)*** begin moving forward a little more slowly than the other, having both students focus on the middle point as they progress forward (this is why it is important that the path be ***clear*** and ***free of pedestrians and cars***).
3. As both students approach the middle point, the student on wheels should speed up and pass their partner, still watching the middle point as long as it is safe. The student on wheels should see their partner go in retrograde motion.
4. Specifically, the student on foot should appear to stop, back up slightly, and then continue forward -- similar to that of Martian orbit as seen from Earth.