MARS ROVER – TRIAL EVENT (2015-01)

1. **DESCRIPTION:** The students need to determine the best path between experiments for a virtual rover on Mars and answer questions about each experiment's location and/or results.

   A TEAM OF UP TO: 2 IMPOUND: No APPROXIMATE TIME: 50 minutes

2. **EVENT PARAMETERS:**
   a. Participants should bring a protractor, ruler, and pen/pencil and may bring a calculator (non-programmable), one binder of notes, and other non-electronic measuring devices.
   b. The skills required for the event are map readings, basic geometry, trigonometry, observation of experiment location, work flow, and team work.

3. **THE COMPETITION:**
   a. Map
      i. Each team will be supplied with a map of a region of Mars.
      ii. Map coordinates will be supplied indicating the locations of experiments to be conducted by the virtual rover and the starting location of the rover.
      iii. Hazard areas are indicated by shaded areas on the map. The rover must not enter the hazard areas.
   b. Rover Command Sheet
      i. The command sheet will be filled out by the students with the order of operations the rover is to execute. Notes and/or arrows changing the order of commands are a competition violation.
      ii. The commands the rover will accept are listed and defined on the command sheet. Ex: Turn Left 12 degrees, turn right 134 degrees, drive forward 34.5 meters, and execute experiment 'E'.
      iii. State and National competitions could be using a failing rover. Ex: Limited number of left turns due to failing motors, limited continuous forward drives due to overheating motors. Any rover limits would be listed on the supplied command sheet.
   c. Rover Experiments
      i. The students will need to answer questions about the experiment locations and/or results.
      ii. The experiment questions may pertain to the map and/or additional supplied information.

4. **EXPERIMENT QUESTIONS:**
   a. Questions about the Mars landers and orbiter vehicles
   b. The subject material for the questions will come from the following sources
      i. See training material for actual list of material sources.

5. **SCORING:**
   a. The Final Score is Path Score – Experiment Score. Teams are ranked with lowest Final Score first.
      i. Path Score = Total Meters Traveled + (Total Degrees Turned) / 10 + (Total Experiment Position Error) * 5. The Path Score is determined by entering the command list into a scoring program.
      ii. Experiment Score is the total points awarded for correct answers at each experiment location. If the experiment position error is greater than the maximum allowed error on the command sheet, then half points are awarded for that experiment.
   b. Tiers
      i. Tier 1: A path with no violations
      ii. Tier 2: Rover enters a hazard or leaves the supplied map region.
      iii. Tier 3: Rover fails to execute an experiment.
      iv. Tier 4: The command sheet is unreadable or has notes changing order of the commands.
   c. Ties will be broken by highest experiment score, least total experiment position error, least total distance traveled, and least commands.