Hangin' Out on Mars!?!
Teacher Version

Some questions are adapted from an activity from the American Museum of Natural History, entitled "Martian (and Other Extraterrestrial) Math" located at www.amnh.org/rose/mars/mathact.html

Introduction & Purpose

An excellent way to introduce your students to Mars is through comparison. Since the students are most likely familiar with some of the basic characteristics of the Earth and know what it's like to be on the Earth's surface, your students can learn a lot about Mars by comparing its characteristics to those on Earth. Your students should then be able to begin to imagine what it is like to be on the surface of Mars. Their ideas about the Martian surface may be useful as they begin to design and construct their Rover, so have them write down their ideas in their Lab Notebook. This activity will also exercise the students' mathematical abilities by prompting and guiding them to convert various units of measure into others. Your primary role during this activity will involve assisting with mathematical conversions and encouraging creativity while brainstorming.

Objective:

Students will work as a group to answer a series of questions about basic Martian characteristics by performing mathematical conversions. Students will compare these characteristics to those of Earth, and imagine what it is like to be on the surface of Mars. Finally, students will brainstorm ideas as to how these characteristics of the Martian surface may impact their Rover design.

Materials Needed:

- Pen or pencil
- Calculator
- Scratch paper
- Road atlas or Google Maps
- Idaho TECH Lab Notebook

Procedure:

The Student Version contains all the information necessary for the students to perform this activity. The students will perform mathematical conversions and answer twelve questions about Mars and the Earth. Provide assistance as necessary, and check that your students are correctly calculating the conversions *(the answers are included below)*. If the students are having trouble with the conversions, gather them as a group and walk them through the first couple of conversions, thinking out loud. They should be able to pick up how to perform the conversions from your modeling. You may need to encourage creativity on questions 12 and 13. Have them write down their ideas in their Lab Notebook, especially the answers to questions 12 and 13!

Answers to Questions

1. The letters indicate what standard unit of measure the number was measured with
2. See Table Below

Measurement	Convert both Earth & Mars data to:
Average Distance from the Sun	Earth = 92,750,692 miles Mars = 141,320,717 miles
Equator Diameter	Earth = 7909 miles Mars = 4324 miles
Polar Diameter	Earth = 7885 miles Mars = 4181 miles
Mass	Earth = 1.31 x 10^{25} pounds Mars = 1.4 x 10^{24} pounds
Maximum Surface Temperature	Earth = 58 degrees C Earth = 136 degrees F
	Mars = 20 degrees C Mars = 68 degrees F
Minimum Surface Temperature	Earth = -89 degrees C Earth = -128 degrees F
	Mars = -140 degrees C Mars = -220 degrees F
Rotational Period (in next table)	How many hours for Earth? 24 hours For Mars? 24.5 hours
Orbital Period	How many years for Earth? 1 year For Mars? 1.88 years

3. Scientists use the metric system because it is based on units in sets of ten, which makes converting between units simple

4. 1.5 AU - the orbit of Mars is one and a half times larger than the orbit of Earth

5. 40 AU - Pluto's orbit is 40 times larger than the orbit of Earth

6. 3 hours - the answer is in hours because the speed was in kilometers per hour

7. 2 hours

8. About 22,000 days or 60 years -- of course, no airplane can fly through empty space….but rockets do, and they are also much faster!

9. 647 seconds, or about 11 minutes -- so you are not able to have a quick "conversation" between Mission Control and the Pathfinder!

10. Student responses will vary

11. Student responses will vary

12. Student responses will vary

13. Student responses will vary