Mars Travel Advisory

Scenario: Your students have been hired to provide a travel advisory to potential travelers about the realities of a journey to Mars. These travelers are not professional astronauts. There are many interesting sites on Mars, so consider showing some of the more spectacular images on the Powerpoint presentation that has been provided.

They will keep a journal of useful information as they progress through the activities of the unit. The journal is a documentation of their efforts to complete this challenge. It may be a record for a team or an individual, depending on your class requirements. The documentation should include ideas, activity reflections, sketches, graphs, brainstorm ideas and summary information related to the challenge. Students have been given instructions and a form to complete during each day's activities. You will need to copy multiple pages of page 3 below for students to use.

The journal will formally document, in chronological order, all of their work including:

- Clear and detailed description of each day’s tasks
- Show evidence about turning your ideas into a solution
- Provide a record of learning to the instructor

Their journal should include:

- Key Ideas learned that day
- Information about Mars that you want to remember in order to meet the challenge
- Brainstorm ideas that you might want to consider in the future
- Questions that you have about either the day’s tasks or the challenge
- Sketches or drawings with labels and descriptions
- Graphs of important concepts that help you make decisions about solutions.
- Calculations and figures are clearly labeled

In typical journals that engineers use (also called an engineering notebook) when they make a mistake, they draw a line through it, enter the correct information, and initial the change. They never erase or remove anything. Let your students know whether they should do this or just erase and move on.

Here are some ideas that should be included in the advisory:

1. Include some interesting information about the history of Mars exploration.
2. Inform about the physical aspects of space travel at the start of the flight and during the trip.
3. Warn about the dangers of the space environment (radiation) and the effects of long flights on the body. Provide ideas about what travelers can do to minimize the effects.
4. Explain the useful aspects of a typical spacesuit.
5. Provide information about the environment of Mars (day length, daily temperature ranges, yearly temperature ranges.)
6. Provide information about the rocket used including its speed and what travelers can expect on the flight as they rocket off Earth for orbit and Mars.
7. Describe the habitat that will be used while on Mars. (This might be a useful design that others have created or students can use their own ideas.)
8. Describe some of the attractive features that travelers might find on Mars.

A word about STEM notebooks: Communicating understandings and solutions through STEM notebook writing offers a powerful strategy to help students collect ideas, reflect and collaborate with others. Journals
allow teachers to assess students’ understanding and provide the feedback students need for improving their performance.

STEM notebooks contain information about the students’ classroom experiences. Students are encouraged to use them as scientists and engineers would, before, during, and after all investigations. They are a place where students formulate and record their questions, make predictions, record data, procedures, and results, compose reflections, and communicate findings. Most importantly, notebooks provide a place for students to record new concepts they have learned.

A STEM notebook can provide students who are uncomfortable with writing a safe place to practice and develop their skills and see that writing is used in all STEM fields. This tool can assist English language to develop facility with writing. A notebook also makes the link between multiple representations of the same idea (drawing, graph, equation, and text) more explicit. You can find out more about STEM notebooks and scoring rubrics at this website.  

https://www.wastatelaser.org/science-notebooks/

Answers to the chart in the Student Journal.

Earth vs. Mars

<table>
<thead>
<tr>
<th>Planet Facts</th>
<th>Earth</th>
<th>Mars</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average distance from the sun</td>
<td>149,597,891 km</td>
<td>227,936,637 km</td>
<td>Mars is 7,833,874 km farther away from the Sun; light will be dimmer.</td>
</tr>
<tr>
<td>Diameter</td>
<td>12,756 km</td>
<td>6,787 km</td>
<td>Mars is much smaller than Earth.</td>
</tr>
<tr>
<td>Atmospheric composition</td>
<td>N₂ 77% O₂ 21% Ar 1% CO₂ 0.4%</td>
<td>CO₂ 95% N₂ 3% Ar 1.6% O₂ 0.1%</td>
<td>There is very little oxygen on Mars.</td>
</tr>
<tr>
<td>Average High and Low Temperatures</td>
<td>14 °C (57°F)</td>
<td>-63°C (-81°F)</td>
<td>Mars is much colder.</td>
</tr>
<tr>
<td>Length of Day</td>
<td>24 hours</td>
<td>24 hours, 7 minutes</td>
<td>similar</td>
</tr>
<tr>
<td>Length of year</td>
<td>365 Earth days</td>
<td>687 Earth days</td>
<td>Year takes much longer on Mars.</td>
</tr>
<tr>
<td>Available Water</td>
<td>Liquid; abundant</td>
<td>Ice; small amounts on surface</td>
<td>There is water on Mars, but not in liquid form.</td>
</tr>
<tr>
<td>Gravity</td>
<td>2.66 times greater than Mars</td>
<td>0.375 times that of Earth</td>
<td>Gravity is much stronger on Earth.</td>
</tr>
<tr>
<td>Number of moons</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>