



Schools Tune Into Mars lesson plan

Meteorological Analysing Data From Planet Mars

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Abstract

Whereas climate refers to the general, long-term atmospheric conditions at a particular location, [WEATHER](#) refers to the dynamic and quickly changing of atmospheric conditions. Typically, these conditions are characterized in terms of [pressure, temperature, and wind speed](#). Recent computer models and surface observations by NASA missions have provided scientists with enough information to describe and predict weather conditions accurately on Mars.

Keywords

Pressure, temperature, wind speed, Mars, Astronomy

Table of summary

<i>Subject</i>	Physics, Engineering, Mathematics, Technology Astronomy in science and in history (integrated in English language teaching)
<i>Age of students</i>	15-16
<i>Preparation time</i>	Three 50-minute class periods
<i>Teaching time</i>	45'
<i>Online teaching material</i>	http://www.ucl.uchicago.edu/MartianSunTimes/ https://www.europeana.eu/portal/en/record/9200579/yhsfy94v.html?q=what%3A%22oreries%22#dclid=1564744859165&p=1 https://www.europeana.eu/portal/en/record/9200579/qpf7ncwt.html?q=astronomy#dclid=1555011754282&p=4 https://www.europeana.eu/portal/en/search?f%5BREUSABILITY%5D%5B%5D=open&q=what%3A%22Celestial+globe%22&view=grid&f%5BREUSABILITY%5D%5B%5D=restricted https://www.europeana.eu/portal/en/record/9200579/hpw5ee7t.html?q=astronomy#dclid=1555011754282&p=5&rp=1 https://www.europeana.eu/portal/en/record/9200387/BibliographicResource_3000117241538



	http://www.seis-insight.eu/en/public-2/martian-science/internal-models-of-mars
Offline teaching material	<ul style="list-style-type: none"> • Extended WWW access and a printer connected to the computer • Additional On-line Science Resources Available • Classroom Ready Handouts <p>Art paper's, scissors, ruler, marker, whiteboard, cardboards, glue, pictures, stickers</p>
STIM resources used	https://www.seis-insight.eu/en/public-2/martian-science/internal-models-of-mars

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Integration into the curriculum

This LS allows to work several subjects such as:

English: In the curriculum of Middle /Secondary School

Science: In the curriculum of Middle /Secondary School ,(1st /2nd grades)Astronomy and Space educations are included

Technology: Common usage of QR codes, Augmented Reality, ICT tools in learning, smart board, digital education applications integrated with the curriculum.

History: Famous Astronomers in Croatian history , Astronomy in history(general), Astronomic devices in very early times)





Aim of the lesson

Overview

Students compare real-time Earth and Mars measurements for temperature, wind speed, humidity and atmospheric pressure by accessing Internet-data resources from NASA.

The students will be able to answer the following questions :

- How does Mars atmosphere [compare](#) to those of other planets?
- What differences do you see in [NASA's Mars movies](#) compared to [TheWeatherChannel'sEarthMovies](#)?
- What new Martian weather data is available from NASA Goddard's [Global Views](#) from Space.
- Contribute Weather Observations to the [Martian Sun-Times](#).

This will enable the students to...

- develop basic information on Space and Astronomy by discovering and communicating basic knowledge about our Solar System, The Mars Planet, as well as other celestial objects (such as Galaxy, meteors, comets, stars, satellites)
- do fun activities in class creating posters with QR codes that allow the viewer to further expand the info via reading content from the Europeana platform.

Outcome of the lesson

By completing this activity, the learner in grades of 14-15 will:

- access real-time weather data and maps for their school location.
- define the variables of temperature, wind speed, and atmospheric (barometric) pressure.
- describe weather using numerical values of these variables.
- utilize climate models to determine current weather conditions on Mars.
- describe Martian weather by comparing it to Earth's weather.
- access Martian surface probe data to describe Martian surface conditions.

Trends

Project Based Learning and Inquiry based learning. Augmented Reality, Collaborative Learning, Learning by Doing.

21st century skills

- a. Creative thinking: The students will have to come up with effective solutions to the problems that may arise throughout the project
- b. Collaboration: They will be working in groups of 4 ,5 students in each team.

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- c. Communication: Both oral and written communication will be used in the project to present the findings and also to interact with peers
- d. Media and technology literacy: Several ICT tools, digital education applications and AR will be used in the project and the students have to learn how to use them correctly.
- e. Productivity: At the end of the scenario implementation, several products will be delivered, like interactive posters, online books, 3D paintings..

Activities

Describe here in detail all the activities during the lesson and the time they require. Remember, that your lesson plan needs to relate to space education. If you are using any external documents, please scroll to the end of the document and add them to the Annex. Add more rows to the table if needed.

Name of activity	Procedure	Time
Activity 1 (15')	<p>Make predictions about the current weather data in your area. Exploration – Real – Time Weather Data for Your Town</p> <p>Activity 1:</p> <p>Meteorologists often report the temperature, humidity, wind speed and barometric pressure. Make predictions about the current weather data in your area.</p> <ol style="list-style-type: none"> 1. What do you think is the current temperature outside? _____ 2. What do you think the current wind speed and direction is? _____ 3. What do you think the barometric pressure is right now? _____ 4. How do you think the barometric pressure is changing? _____ 	
Activity 2 (15')	<p>Use the WWW to find out what the current temperature, wind speed, wind direction, and barometric pressure is in your area.</p> <p>The Internet is filled with scientific data about cities close to where you live. Use the WWW to find the current temperature, wind speed, wind direction, and barometric pressure in your area. Try the National Weather Service, The Weather Channel or Intellect WWW sites first. You might even like to try Internet Weather-Cams.</p> <ol style="list-style-type: none"> 1. What is the current temperature? _____ 2. What is the current wind speed and direction? _____ 3. What is the current barometric pressure? _____ 4. How is the barometric pressure changing? _____ 5. How does this current map (example map) relate to the observations you recorded above? _____ 	



	<p>6. How well do the Internet data agree with your predictions of what you see outside? _____</p> <p>7. What would you expect the weather to be if the temperature was 85 degrees F, the wind 10 mph from the West, and the barometric pressure is 30.15 inches and rising? _____</p> <p>8. How would you characterize a cloudy, cold, winter day using weather data? _____</p>																													
Activity 3 (15')	<p>Determine the weather conditions on Mars' equator, North pole, and South pole by looking at various maps of Mars. Similar measurements are being calculated for the planet Mars right now (Example Map). Fill in this chart by looking at the on-line maps linked below.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Temperature</td><td></td></tr> <tr><td>Wind Speed & Direction</td><td></td></tr> <tr><td>Barometric Pressure</td><td></td></tr> <tr><td>Other</td><td></td></tr> </table> <p>How do these measurements compare to current conditions where you live? Temperature, Wind Speed & Direction, Barometric Pressure, Other</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Observations</th> <th>Equator</th> <th>North Pole</th> <th>South Pole</th> </tr> </thead> <tbody> <tr><td>Temperature</td><td></td><td></td><td></td></tr> <tr><td>Wind Speed & Direction</td><td></td><td></td><td></td></tr> <tr><td>Barometric Pressure</td><td></td><td></td><td></td></tr> <tr><td>Other</td><td></td><td></td><td></td></tr> </tbody> </table>	Temperature		Wind Speed & Direction		Barometric Pressure		Other		Observations	Equator	North Pole	South Pole	Temperature				Wind Speed & Direction				Barometric Pressure				Other				
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Assessment

SPACE QUIZ

Space is a mysterious place but there are plenty of things we are sure about when it comes to that space that surrounds us here on earth. Challenge what you think you know with our fun space quiz. Perfect for kids, this quiz will get you thinking about the fascinating topics of space and astronomy. Test your knowledge of planets, stars, moons, astronauts, our solar system, galaxy. Try answering this twenty questions on your own and then check your answers.

1. What is the closest planet to the Sun?
2. What is the name of the 2nd biggest planet in our solar system?
3. What is the hottest planet in our solar system?
4. What planet is famous for its big red spot on it?
5. What planet is famous for the beautiful rings that surround it?
6. Can humans breathe normally in space as they can on Earth?
7. Is the sun a star or a planet?
8. Who was the first person to walk on the moon?
9. What planet is known as the red planet?





10. What is the name of the force holding us to the Earth?
11. Have human beings ever set foot on the Mars?
12. What is the name of a place that uses telescopes and other scientific equipment to research space and astronomy?
13. What is the name of NASA's most famous space telescope?
14. Earth is located in which galaxy?
15. What is the name of the first satellite sent into space?
16. Ganymede is moon of which planet?
17. What is the name of Saturn's largest moon?
18. Olympus Mons is a large volcanic mountain on which planet?
19. Does the Sun orbit the Earth?
20. Is the planet Neptune bigger than Earth?

1. Mercury
2. Saturn
3. Venus
4. Jupiter
5. Saturn
6. No
7. A star
8. Neil Armstrong
9. Mars
10. Gravity
11. No
12. An observatory
13. Hubble Space Telescope
14. The Milky Way galaxy
15. Sputnik
16. Jupiter
17. Titan
18. Mars
19. No
20. Yes

AFTER

IMPLEMENTATION

Student feedback

After the implementation, students' opinion on this scenario was motivating for me. It was their first interdisciplinary learning method experience and they realized that they could combine English with Science, Technology, Music and Art lesson. English lesson is funnier in that way rather than usual ones. This is a good example of STEM education in language class. It was a different experience. It was amazing to find so many resources and easier to reach information without going to library. They reached trustworthy data on their own. They improved both their English

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skills by researching data but also learnt Astronomical knowledge at the same time. This was easy for them to keep scientific information and expressions longer, by DIY task, rather than reading. Students created model of Mars Planet and this way they learnt by doing and getting experienced during learning process. All the activities in this scenario enabled students to become active participants in class.

Add here your comments and evaluation AFTER the implementation of his lesson. You can always use a rubric for an assessment.

	Always	sometimes	never
The students have worked collaboratively			
The students have worked self governed			
The students have been engaged			
The outcome has been creative			
Critical thinking has been used			

Teacher's remarks

Each student work should be scored holistically as follows:

- **Strong Indication of Competence:** The student's work is complete with thoughtful answers to questions. Work clearly indicates that the student understands the definitions of temperature, wind speed, and atmospheric pressure, the various processes of determining how they are measured, and can determine the reasonableness of results; i.e. if the weather measure under investigation "makes sense" for the location where it was measured.
- **Weak Indication of Competence:** The student's work is complete but there is little obvious work beyond the required "fill in the blanks." Student does not use complete sentences or work suggests that it has been done by team-mates. Student understands the various weather concepts, but does not know how each is found, nor understands if the result is reasonable.
- **No Indication of Competence:** The student's work is incomplete suggesting that little effort was made.





About the Schools Tune Into Mars project

The overall objective of the Schools Tune Into Mars (STIM) project is to provide pedagogical materials with high-quality inspirational lessons related to planetology. The project's materials are based on the latest developments in space research and pedagogy and meet teachers' needs for opportunities in professional development, making use of particular scientific concepts in planetology and planetary seismology.

Schools Tune Into Mars (STIM) is a project that brings together a network of schools and organizations with an interest in space education and studies related to the planet Mars. Thus, STIM provides adequate guidance and underpins innovative activities that are developed in a co-constructive process between researchers and teachers. Find out more about the Schools Tune Into Mars project: <https://insight.oca.eu/fr/stim-resources>

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Annex

1) This atlas allows you to explore high-resolution color maps of most of Mars

<http://www.roving-mouse.com/planetary/Mars/Atlas/feature-index.html> (Make a Map of Mars)

2) (STEM activity-Design a Mars Colony Project)

<https://www.teacherspayteachers.com/Product/Design-a-Mars-Colony-STEM-STEAM-Project-Guide-4376133> (STEM activity-Design a Mars Colony Project)

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