

Comparing the Earth to an Exoplanet

Grade: 6-8

Subject Integrated: Science

Rationale:

In this lesson, students will compare Earth to one of the many exoplanets found by the Kepler spacecraft.

Objectives:

Students will be able to compare Earth's characteristics to those of a specific exoplanet.

Materials:

- Computer
- Google Slides
- Notebooks
- Pencils
- Whiteboard
- Worksheet (Appendix 2)

Learning Activities:

a) Instructional Materials and Resources

- <https://www.nasa.gov/kepler/discoveries>

b) Procedure

- Teacher asks the class if they have heard of any exoplanets and what they are.
- Teacher will write what the students have heard of on the board.
- Teacher should have previous knowledge on Kepler exoplanets, their characteristics, and how they are similar to and different from Earth (research websites beforehand).
- Students are given time to turn to a neighbor and talk about exoplanets.
- Teacher will re-ask the questions about exoplanets.
- Students will be given an opportunity to research on chromebooks or computers to see what they can discover.
- After 15 minutes of researching, students are to choose a specific exoplanet to research.
- To limit competition and encourage a breadth of learning, students should not choose the same exoplanet unless they are working collaboratively.

- Students are responsible for researching what is known (or estimated) about the mass, location, host star, constellation, distance, temperature, orbit of the exoplanet.
- Once information is found and recorded, students are to create a class combined Google Slide for each for each of the exoplanets researched to use to learn about each one.
- OPTIONAL EXTENSIONS:
 - Students might discuss how we would plan for a trip to visit one of these exoplanets.
 - Learners might write about a mission to explore one of their exoplanets.
 - The class could create a skit about visiting exoplanets and perform it for younger students.
 - The class could have a costume party, dressing up as exoplanet residents and banqueting on brainstormed exoplanet foods.

c) Instructional Groups

- Lesson will be taught to the class as a whole.
- One Google Slide per planet, per student or small group.

d) Discussion

- What is an exoplanet?
- What is the Kepler spacecraft?
- What is a habitable zone?
- What can we compare and contrast between Earth and your selected exoplanet?

e) Assessment

- Summative assessment will be used.
- Teacher will guide students to resources and/or plausible answers if they are having trouble.
- Teacher will take notes on students with trouble with the skills for further assistance.
- The teacher will assess the students' based on their completion of the assignment and participation in the discussion.
- Optional: Rubrics can be made to score the completion of the requirements on the Google Slide as summative assessment.

Closure:

a) Ending the Lesson

- Google slide presentation can be presented slide by slide.
- Google slide can be posted on class webpage for study purposes.

b) Evaluating and Reflection of the Lesson

- Evaluation of lesson will be done by thorough summative assessment.
- Teacher will observe to make sure each student understands the concept introduced in the lesson.
- Teacher will make sure all requirements and guidelines are met by giving specific instructions to students who struggle with the skills.
- Teacher will self-critique on what worked well and what did not work well in the lesson.
- Optional: Rubrics can be used for evaluation of oral presentation.

Standards:

- NGSS: MS-ESS2-2. (supportive fit) Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Teacher References:

- Dr. Nicolle Zellner (nzellner@albion.edu)
- Dr. Melissa Mercer-Tachick (melissa@museconsulting.info)
- <https://www.nasa.gov/kepler/discoveries>: This is a website about how many exoplanets Kepler has discovered.
- <http://kepler.nasa.gov/>: This is a website about the Kepler spacecraft.
- <http://www.nasa.gov/ames/kepler/nasa-keplers-hall-of-fame-small-habitable-zone-exoplanets>: This is a website about small exoplanets in their star's habitable zone.
- <http://exoplanetarchive.ipac.caltech.edu/>: This is a website with an exoplanet archive.
- <http://kepler.nasa.gov/Mission/discoveries/candidates/>: This is a website with exoplanet candidates found by the Kepler spacecraft.