

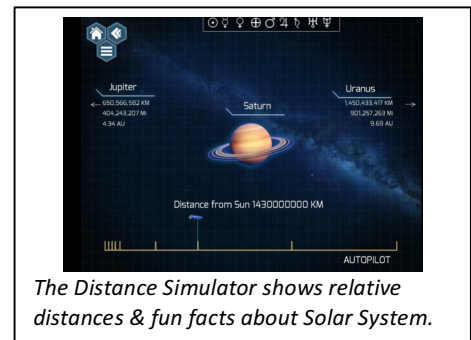
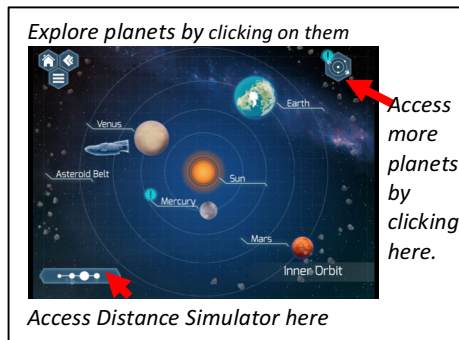
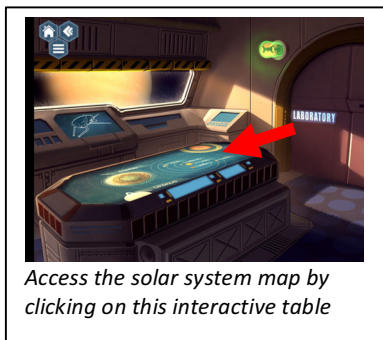
Exotrex Lesson 2.1: Exploring the Solar System

Objectives:

- Identify the features of the Solar System Map in Exotrex2
- Describe the relative distances between planets using the Solar System Map in Exotrex2

Materials: This lesson is an exploration of the features of the Solar System map in Exotrex2 and students will need access to the game in order to complete this lesson.

Preparation: You will need to project the opening screen of Exotrex2 and show students how to get to the Solar System Map as well as the Distance Simulator. Be sure to become familiar with these two features of Exotrex2 and be ready to demonstrate how to navigate towards these two features of the game for this lesson.



NCSS Standards: This lesson is exploratory. The following standards can be incorporated if you wish to ask students to take notes specifically on gravity, orbits and the scale of the solar system.

MS-ESS1-2 Earth's Place in the Universe

Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3 Earth's Place in the Universe

Analyze and interpret data to determine scale properties of objects in the solar system.

Warm Up (5 minutes): Ask students to draw a quick model of the solar system and to label planets with any distinguishing characteristic they can think of for each item included. After 2 minutes ask students to share their work and take stock of these mental solar system maps. Explain that they will be exploring the solar system in detail today using the game Exotrex2.

Guided Discovery (10 minutes): Show students how to navigate to the Solar System map in Exotrex2, access information about each planet in the map and also navigate to the Distance Simulator. Set your expectations on the types of information that students should be collecting and the amount. The accompanying handout is purely exploratory in nature. Feel free to modify it to fit your needs.

Independent Practice (30 Minutes): Pass out student handouts and have students explore the solar system! Be sure to remind students to not click on the "Travel Now" button that is available on Titan, Venus and Mercury. That will take them into full game play.

Review and Conclude (5 minutes): Ask students to share new insights or discoveries about the Solar System and to reflect on how they would change the map that they drew at the beginning of the lesson.

Name: _____ Date: _____

Directions: Use the Solar System map and Distance Simulator in Exotrex2 to complete observations about planets, asteroids and their relative distances between each other on this handout.

1) What is one fact that you learned or surprised you about each of the following planets and asteroids?

a) Sun:
b) Mercury:
c) Venus:
d) Earth:
e) Mars:
f) Asteroid Belt:
g) Jupiter:
h) Saturn:
i) Uranus:
j) Neptune:

2) What is one fact that you learned or surprised you about each of the following moons?

a) Luna (Moon of which planet? _____):
b) Phobos (Moon of which planet? _____):
c) Deimos (Moon of which planet? _____):
d) Io (Moon of which planet? _____):
e) Europa (Moon of which planet? _____):
f) Ganymede (Moon of which planet? _____):
g) Ariel (Moon of which planet? _____):

2) What is one fact that you learned or surprised you about each of the following moons? *(Continued)*

a) Miranda (Moon of which planet? _____):
b) Umbriel (Moon of which planet? _____):
c) Titania (Moon of which planet? _____):
d) Titan (Moon of which planet? _____):
e) Iapetus (Moon of which planet? _____):
f) Dione (Moon of which planet? _____):
g) Rhea (Moon of which planet? _____):
h) Triton (Moon of which planet? _____):

Use the Distance Simulator to answer the following questions:

3) Which planets are relatively close together? _____

4) Which planets are separated from others by the greatest distances? _____

5) What are three interesting fun facts that you discovered while exploring the Distance Simulator?

a) _____

b) _____

c) _____

Extension Discussion

Exotrex2 challenges students to test the equipment provided by Dr. Burke in preparation for finding a new planet for humanity. In lesson 2.1, students should have explored the solar system and gained a deeper awareness of the diversity of the planets and its sheer vastness. The following question prompts are designed to debrief lesson 2.1 and set students up for playing the Exotrex2 at length. Each discussion prompt is accompanied by a goal for student understanding.

Prompts:

- 1) As you explored the planets of the solar system what did you learn that was new or surprising to you?
Goal: *Carefully build on student observations to highlight that there are so many places to explore in the solar system. Students will be exploring moons of planets and this may be the first time that they may have considered that a moon may be an acceptable place to live.*
- 2) In your exploration so far, have you found a place that you think might be suitable for humanity to call home?
Goal: *Treat these answers as hypotheses that will be revisited. Write down the locations and document student justification. Require students give evidence for their proposals (both pro or con) based on facts that were learned while exploring the solar system map. While playing Exotrex2, students will learn about different planets but ultimately will not find a new home for humanity. The main point of the game is for students to show that they can test the onboard equipment, deploy rovers and analyze planetary composition successfully. Once they have successfully completed the training exercises in Exotrex2 they will be challenged to find a new home among Exoplanets outside of our solar system.*
- 3) What did you notice about the solar system while using the Distance Simulator?
Goal: *We want students to understand the vast size of the solar system. This will help them realize why having a specialized ship with a B.E.A.K.E.R. engine is necessary for traveling such long distances. If the solar system is so large, what does that mean for the size of the universe and the galaxy? These questions are important for laying the groundwork of understanding that the existence of an inhabitable Exoplanet may very well be possible.*