

Planets and Space

Summary

Students conduct independent research on one of the planets in our solar system, specifically discovering a planet's composition, weather, atmosphere, and satellites. Using information on equilibrium and levers, students create their own mobiles containing planets and satellites. Finally, they will teach the class about the planet they researched via oral presentations.

Time Frame

2 class periods of 45 minutes each

Materials

Example of a mobile (prepared by teacher following procedures outlined in the Instructional Plan)
Wooden skewers or dowels of differing lengths
Markers
Cardboard
Scissors
Fishing line
Notebook paper

Instructional Procedures

Explore the Planets Review information about levers, equilibrium, and Alexander Calder, including Vocabulary, which students explored in the previous lesson in this unit. Tell students that they will be making a mobile using a process similar to Alexander Calder's. Show them the mobile created in preparation for this lesson as an example.>p Review the nine planets of the solar system with students. Tell students that they will conduct research in pairs on one of the planets (except for Earth), either assigned by the teacher or chosen by the students. They will then create a mobile depicting how the size of the planet compares to its largest satellite, as well as to Earth. Since neither Mercury nor Venus has a satellite, if students decide to pick one of these two planets, they must depict both in their mobiles. Mention that while planets seem to float in space--much like the objects hanging from Calder's mobiles appear to float in space--the planets are kept in orbit around the sun due to gravity.>p Students should research the physical features of the planet, including its composition, weather, atmosphere, and satellites. In pairs, students should decide how to equally divide who will research which properties of the planet. They should take notes on the information they find, and will write a report on the planet, which they will present to the class later. Tell students that it will be helpful to incorporate visual aids in their presentations, using pictures they can print off of suggested Web sites.>p Students may use the following Internet resources to research information on their planet:>p The Nine Planets: A Multimedia Tour of the Solar System NASA: Solar System Our Solar System: The Planets and Their Motion>p Demonstrate how to make planets to scale using NASA's Athena site. Students should first cut out their models of Earth, the planet(s) of their choice, and the planet's satellite (where applicable) using notebook paper. They can spend time in class and/or at home researching their planet's properties.,/p> >p Make Your Own Mobile Using the paper cut-outs created using NASA's Athena site, students will trace the paper planets and satellites onto heavy cardboard, and cut out all pieces. These will be the objects hanging from the mobile. Students can color their planets with markers, based on photographs they have seen on Web sites.>p Pass out the dowels or skewers and fishing line. To make the mobiles, students should follow the procedure below:>p Tape the end of each piece of fishing line to each of the cardboard cut-outs.>p Take the Earth cut-out and tie the loose end of the fishing line to one end of a long wooden dowel or skewer. Take a short dowel or skewer, and tie the planet they researched to one end of the short dowel. Tie the satellite (or other planet in the case of Mercury or Venus) to the other end of the short dowel. Tie fishing line to connect the short dowel to the end of the long dowel opposite of the Earth cut-out. Tie fishing line near center (according to how the mobile balances) of the long dowel. This will be used to

hang the mobile, so make sure that students have an adequate amount of fishing line.>p Tell students they should problem solve in pairs to create a mobile that is in equilibrium. Remind students that the length of the fishing line, the distance between objects, and the weight of the objects are all factors that will affect the equilibrium of the mobile, so they should adjust each of these factors until they find proper equilibrium. Students should write their observations on notebook paper, so that they know which combinations produced certain results.>p Explain to students that they will have to use trial and error to figure out the correct balance. Tell them that even Alexander Calder acknowledged how this process could be difficult. In his own mobiles, Calder had to make constant adjustments in order to find the perfect balance.>p Of his process for making mobiles, Calder stated:> I used to begin with fairly complete drawings, but now I start by cutting out a lot of shapes.... I arrange them, like papier collé, on a table, and "paint" them--that is, arrange them, with wires between the pieces if it's to be a mobile, for the overall pattern. Finally I cut some more of them with my shears, calculating for balance this time.>p I begin at the small ends, then balance in progression until I think I've found the point of support. This is crucial, as there is only one such point and it must be right if the object is to hang or pivot freely. I usually test out this point with strings to make sure before bending the wires.>p --Alexander Calder (From the NGA's Alexander Calder: Vertical Constellation with Bomb)>p Class Presentations Pass out the Our Solar System handout. Students will present the planet they worked on to the rest of the class, explaining the planet's composition, weather, atmosphere, and satellites, particularly the satellite represented in the mobile (where applicable). Each student in the audience should pay careful attention to their classmates' presentations in order to complete their handouts. Presenters should also explain any difficulties they experienced creating the mobiles, making sure they use the vocabulary they learned about levers (i.e., "I had difficulty finding the right place for the fulcrum on the long lever to find equilibrium.").>p Assessment:

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