
The Earth, Sun, Moon and Stars Unit (Planets too!)

An Educator's Reference Desk Lesson Plan

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Endorced By: These lesson plans are the result of the work of the teachers who have attended the Columbia Education Center's Summer Workshop. CEC is a consortium of teacher from 14 western states dedicated to improving the quality of education in the rural, western, United States, and particularly the quality of math and science Education. CEC uses Big Sky Telegraph as the hub of their telecommunications network that allows the participating teachers to stay in contact with their trainers and peers that they have met at the Workshops.

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Grade Level(s): 5

Subject(s):

- Science/Space Sciences

Unit Outline:

- I. Initiatory Activities. (Original)
 - A. Write letters to NASA and other Space Centres (Lang. Arts).
 - B. View films/videos about the Cosmos.
 - C. Read A Wrinkle in Time, (Children's Literature).
 - D. Make a collage of Space pictures for a class bulletin board. (Art)
 - E. Keep a Science Journal throughout the entire unit. (Lang. Arts, creative writing, art and handwriting.)
- II. Introduce Learning Centre Activities, Rules, requirements, etc.
 - A. Each student must complete at least 5 projects from the L.C. during the unit.
 - B. Projects may be worked on in school during "free" time or at home.
 - C. Each student will "show" their projects through display, oral report, class presentation etc.
 - D. Choose from the following activities: (Original)
 1. Make a space shuttle model.
 2. Make a solar system mobile.
 3. Make a satellite from junk.
 4. Do a creative writing project about Space.
 5. Read 2 books about Space, the Earth, the Sun, The Moon or The Stars.
 6. Design a model rocket.
 7. Make a constellation map and use it.
 8. Do one or more "Food For Thought" Activities (problem solving).
 9. Write a report (include illustrations).
 10. Complete at least 4 of the Computer Programs from NASA.

- III. Lesson 1. The Earth, Conservation of our Resources.
 - A. Obj. The Students will understand the need to protect our Earth and will practice energy saving skills and conduct an energy survey.
 - 1. Through Teacher demonstration and Co-Op activities such as "round-robin", Bloomin' worksheets on ecology and "pair and share" activities the students will learn that our Earth is fragile.
 - 2. Game- Energy trip tickets will go on throughout the unit to emphasize energy conservation.
 - B. Students will be evaluated by showing that they understand energy conservation as they don't spend their tickets. A drawing will be held with remaining tickets. Prizes will be given to those who still have tickets.
(original)
- IV. Lesson 2. Ideas about the Earth
 - A. Objective: The students will learn about the ancient models of the earth and create their own models of the earth. They will show and tell about their individual models.
 - 1. Class discussion of the motion of the sun and stars.
 - 2. Jigsaw method of learning the four ancient models.
 - 3. Quiz.
 - 4. Create your own model with explanation on back.
 - 5. Share with the class.
 - B. Evaluate students work.
- V. Lesson 3. The Earth's Shape and Gravity.
 - A. Objective 1: Each child will work in a co-op group to discover about earth's shape and gravity using a globe and a set of questions.
 - B. Objective 2: Each student will fill out the survey sheet individually.
 - 1. Class discussion.
 - 2. Individual and group work.
 - 3. Teacher tally the results of the worksheets and discuss the class level of understanding. Clear-up any misconceptions.
- VI. Lesson 4. Movements of the Earth, Moon, and Sun.
 - A. Objective : Define the terms: rotate, revolve and orbit.
 - B. Objective 2: Demonstrate what motion of the earth causes night and day.
 - C. Objective 3: Describe how the length of the year on the earth is determined.
 - D. Objective 4: Describe how changes in the position of the earth's orbit and tilt of the axis produces the four seasons.
 - 1. Co-op learning groups work together to solve these problems and present the solutions to the class by demonstration. (use globes and other materials).
 - 2. Class discussion.
 - 3. Evaluation by quiz.
 - 4. Do an art project to explain one of the above projects.
- VII. Lesson 5. The Moon Our Closest Neighbour.
 - A. Objective 1: The students will explain what causes the moon to appear in different phases(shapes).
 - B. Objective 2: The students will be able to chart the phases of the moon for one month both individually and in class.
 - C. Objective 3: The students will learn the history of the moon.
 - 1. Show a model of the moon and earth and demonstrate why the shapes change.

2. Class discussion.
 3. Show pictures of the moon and discuss its history.
 4. View a video about the moon.
 5. Place the correct shape of the moon on chart each day (one child is responsible for this.)
 6. Evaluate each child's "moon chart".
- VIII. Lesson 6. Solar and Lunar Eclipses
- A. Objective: Identify factors creating solar and lunar eclipses.
 1. Show model using slide projector (light source) basketball, golf ball, and string.
 2. Questions and discussion.
 3. Have the children draw a solar and a lunar eclipse.
 4. Worksheets about eclipses.
 - B. Evaluate the children's work.
- IX. Lesson 7. The Sun, our nearest Star.
- A. Objective 1: Each Student will be able to tell about the physical properties of the Sun and other stars.(colour, temp. life size etc.)
 - B. Objective 2: Each student will learn about the distances of the stars including our own nearest star.
 - C. Objective 3: Each student will learn the history of the Sun.
 1. Demonstrate how scientists can tell the temperature of a star by using a candle in a dark room.
 2. Class discussion.
 3. Have students discover how to tell the distance of stars. Do Gems Activity "Beyond the Blue".(outside)
 4. Discuss the sun's history. How do we use the sun?
 5. Build solar houses or solar ovens and use them to cook a hotdog.
- X. Lesson 8. Celestial Objects-Black Holes, Galaxies and Nebulas etc.
- A. Objective: The students will learn that certain celestial objects give off radiation other than visible light and must be studied in other energy ranges.
 - B. Objective: The students will learn about some of the more popular celestial objects in the sky and be able to recognize them on overheads.
 1. Demonstrate using the Hertzsprung-Russell Diagram on overhead.
 2. Discuss magnitude, colour, temp, x-ray, ultraviolet, etc.
 3. Each student will colour their own charts.
 4. Evaluate understanding by examining children's work and by quiz.
- XI. Lesson 9. The Stars and Constellations.
- A. Objective: Each student will gain an appreciation for the way the constellations were named by different ancient people.
 - B. Each student will build a star clock and learn how to use it.
 - C. Each student will be able to recognize the more familiar constellations in the night sky.
 1. Read the stories about how constellations were named.
 2. Class discussion.
 3. Show the constellation book and discuss.
 4. Have the children make their favourite constellations on black paper with push pins and have them display them on the overhead. Use the best ones for a quiz later.
 5. Quiz on the constellations.
 6. Have the children build a star clock.

7. Have the children write their own story about a constellation (how they would give it a name.)

XII. Lesson 10. The Planets.

- A. Objective 1: Each student will be able to name the 9 planets of the Solar System and know basic important characteristics that make each one different from the other.
- B. Objective 2: The students will complete the test about the planets with 80% class average or better after studying in Co-Op Groups and class presentations.
 1. The students will receive information folders about the planets and be divided into Jigsaw co-op learning groups to study the materials. They will then return to their own group and teach all the information they learned(as experts). They will make up five different styles of questions about their planet to submit to the teacher(styles should include, multiple choice, true/false, short answer, essay, fill in, etc. and should include the most important information that distinguishes the planet from the others.)
 2. Each co-op group will then give a class presentation about one of the planets. Presenting the questions to the class and the answers.
 3. Students will take notes during the presentations.
 4. Students will evaluate each other's presentations and their own.
 5. The teacher will collect the questions and form a test.
 6. The students will take the test after a study period with their co-op group.

XIII. Culminating Activities: (Original)

1. Sky Watch project: invite members of the Utah Astronomical Society To give a "star party" at the school one evening. (I have done this for two years and it has been very popular with the parents as well as the students.) Have a slide presentation and discussion before going outside to see the real thing.
2. Field trip to Hansen Planetarium.
3. Day trip to Christa McAuliffe Space Ed. Centre for whole class.
4. Overnight trip to Christa McAuliffe Space Ed. Centre for the top 24 Math and Science Students in the fifth grade
5. We did both C. and D. this year and found it to be the most wonderful experience the kids could ever have. It was also a great motivator for kids to "go the extra mile" in both science and math work.

Classroom Organization:

Co-Operative Learning Groups.

Instructional Approach:

Class Discussion, co-op activities, group discussions, demonstrations, inquiry learning presentations by teacher and students, lecture, Children's Literature, video and film presentations, computer programs, field trips and many "hands-on" activities through Learning Centre and class activities.

Student Assessment:

Intermittent quizzes throughout the unit, student-made test on planets. Evaluation of reports and projects as they are done. Self-evaluation by students on presentations. Evaluation of co-op group projects. Evaluation of class demonstrations(visual).

Sources:

Project Wild, "Learning Magazine", Earth, Sun, Moon, and Stars, Teacher's Guide, Utah State Core Skill guide, Utah Geographic Alliance, Seeing in a New Light, NASA Ed. Affairs Book. Popular Science Books, World Book and Childcraft Books. The Universe, Planets and Stars, A Book about Planets and Stars, Space Shuttles. Fifth Grade Science Text Books.

Activity 1:

Building a Solar Oven.

Materials:

1. 1-gallon plastic milk container
2. aluminum foil
3. coat hanger
4. hot dog
5. plastic wrap

Procedure:

1. Cut away one side of the plastic milk container (the side with the handle.)
2. Carefully line the insides of the container with aluminum foil so that the foil is as smooth as possible-try to avoid crinkles. You need only line the sides, not the bottom or around the mouth.
3. Untwist the coat hanger and cut off a one-foot piece.
4. Place the container on its back, then push one end of the wire through the container, opposite the mouth.
5. Skewer a hot dog, then bring the wire out through the mouth of the container.
6. Put plastic wrap around the open part of the oven, and you are ready to cook!
7. Place your oven in a spot that receives a lot of sunlight. You'll need to prop the oven so that it is at an angle perpendicular to the rays of the sun. In this way the sun will hit the oven head on, and not at an angle. As the sun's rays hit the curved, reflective surfaces inside the oven, they will be deflected and concentrated on the hotdog.
8. Depending on where you live and the time of year, the hotdog should be ready in about 10-30 minutes. (Don't forget the bun and the mustard!)

Activity 2:

Make a Star Clock

Materials:

1. One large sheet of black construction paper
2. One box of large gold stars or round yellow labels.
3. One box of small gold stars or round yellow labels.
4. One roll of masking tape.
5. One single hole paper punch.
6. One copy of the "instruction Sheet" for each student
7. One paper fastener for each student
8. Scissors for each student or share.
9. One star clock already made for demonstration.

Procedure:

1. Introduce this activity by asking your students how people could tell time before clocks were invented. Discuss. Explain pouring sand, slow-burning candles, etc. Explain that a long time ago, people discovered that the stars slowly changed position, so they could also use the stars to tell time. After this activity, your students will know how to tell time using the stars.
2. Give an "Instruction Sheet" and scissors to each student.
3. Show the students how to cut out the two circles and the notch in the smaller circle. Help individuals as needed.
4. Punch holes only in the center of the small circles. The punch will reach the center if inserted at the notch. You can punch the holes for the students or assign the job to a student who finishes cutting circles early.
5. When the students have their circles cut out and a hole punched in the center of the small circle, show the students how to insert the fastener from the front of the Star Clock. Spread open the fastener on the back.
6. Give each student one paper fastener, and help individuals as needed.

Activity 3:

Colour and Temperature

Materials:

1. Wax candle
2. Matches

Procedure:

1. Turn room lights down or off.
2. Light the candle. Without getting too close look carefully at the candle flame.
3. Questions:
 1. What colors do you see there?
 2. Where are the different colors found?
 3. Describe their location in the flames.
 4. Where would you guess that the hottest part of the flame would be?
 5. What color would the hottest stars probably be?
 6. The cooler stars?