

## GED 2002 Teachers' Handbook of Lesson Plans

Area/Skill - Science	Cognitive Skill Level - Comprehension	Correlation to Science Framework - 03.03/03.06/03.07	Lesson Number - 02
<p><b>Activity Title - When Day Turns to Night ... A Solar Eclipse</b></p> <p><b>Goal/Objective</b></p> <p>To interpret scientific information through reading and visual aids.</p> <p><b>Lesson Outline</b></p> <p><b>Introduction</b></p> <p>In the past, a solar eclipse has often been seen as something of which to be afraid. However, now that people know what causes solar eclipses, there is less confusion about the event. Although the fear of a solar eclipse is not as great as in the past, the health hazard is still a danger. Through this lesson, students will be able to become informed about the causes and phases of an eclipse and become familiar with the hazards of this event.</p> <p><b>Activity</b></p> <p>Provide students with copies of the information on solar eclipses that is provided in the handout and the eclipse glossary. You will also want to print copies of the phases of an eclipse from one of the listed websites or have the students access the websites if your classroom has Internet access. Discuss with students the causes of the solar eclipse and the phases of the event. Use charts and diagrams to provide students with visual information about the solar eclipse. After viewing different types of charts and diagrams, have students make and label their own diagram of a solar eclipse.</p> <p><b>Debriefing/Evaluation Activity</b></p> <p>Familiarize students with background information on solar eclipses. Discuss the causes and phases of a solar eclipse and the students' need to become familiar with them. Have the students identify the stages of a solar eclipse in their own drawings.</p>		<p><b>Materials/Texts/Realia/Handouts</b></p> <ul style="list-style-type: none"> <li>• Handout - Eclipse Glossary</li> <li>• Handout - Solar Eclipse</li> <li>• Paper, pencils and markers</li> <li>• Computer/Internet connection and printer</li> <li>• Websites on Eclipses</li> </ul>	
		<p><b>Extension Activity</b></p> <p>Have students visit a library or access websites that will provide information on eclipses. Have students conduct a search for information about other types of eclipses and discuss with the class the differences between eclipses. Have students include visuals or diagrams to show what occurs in each type of eclipse.</p>	
<p><b>Real-Life Connection</b></p> <p>Discuss the hazards to people if they look directly look at an eclipse when it is happening. Have students discuss how they can be responsible citizens when events, such as solar eclipses, are occurring. For additional information on eclipses, you may wish to access such Internet resources as the:            NASA Eclipse Home Page – <a href="http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html">http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html</a>            Museum of Science, Art and Human Perception– <a href="http://www.exploratorium.edu/eclipse/why.html">http://www.exploratorium.edu/eclipse/why.html</a>            Earth View ECLIPSE Network – <a href="http://www.earthview.com/tutorial/causes.htm">http://www.earthview.com/tutorial/causes.htm</a>  <i>Eclipse</i> by Bryan Brewer, 1991, 2<sup>nd</sup> edition, ISBN 0-932898-91-2, published by Earth View, Inc. 6514 18<sup>th</sup> Ave. NE., Seattle, WA 98115</p>		<p><b>ESE/ESOL Accommodations</b></p> <ul style="list-style-type: none"> <li>• Use cooperative learning techniques to have students review key points.</li> <li>• Provide a dictionary to look up unfamiliar terms.</li> <li>• Highlight important concepts.</li> <li>• Prepare a summary of important information from the passage and discussion with blanks to be filled in or questions to be answered by the student.</li> </ul>	

## GED 2002 Teachers' Handbook of Lesson Plans - Script

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<p data-bbox="58 215 905 248"><b>Activity Title - When Day Turns to Night...A Solar Eclipse</b></p> <p data-bbox="58 280 233 313"><b>Introduction</b></p> <p data-bbox="58 345 2011 443"><i>Ask:</i> Has anyone ever seen an eclipse before? Answers should include things that the students have experienced or happenings that they have heard about regarding an eclipse. Discussion should lead to old time fears of the solar eclipse and how people today no longer have that fear because they are familiar with what is really happening.</p> <p data-bbox="58 475 243 508"><b>Main Activity</b></p> <p data-bbox="58 540 1990 605"><i>Say:</i> Today, we are going to learn more about what happens during a solar eclipse. A solar eclipse occurs when the moon gets in the way of the sun as seen from the earth.</p> <p data-bbox="58 638 2032 768">Pass out the handouts that provide basic information on a solar eclipse and the glossary of terms. You will also need to print copies of the different stages of solar eclipse from one of the websites listed. Have the students read and interpret the information. Have the students identify both the causes and the phases of the eclipse. Next, have the students use the information from the charts and diagrams to create their own diagram of the different stages of a solar eclipse.</p> <p data-bbox="58 800 338 833"><b>Closure/Conclusion</b></p> <p data-bbox="58 865 1961 898"><i>Ask:</i> Now that you know what happens in a solar eclipse, why was it such a scary event for the people of the past? Chart the students' answers.</p> <p data-bbox="58 898 1640 930"><i>Ask:</i> How will this information enable you to act more responsibly during the next eclipse? Discuss the student's answers.</p> <p data-bbox="58 963 470 995"><b>Follow-Up Lessons/Activities</b></p> <p data-bbox="58 1027 1940 1092"><i>Ask:</i> How many times does a solar eclipse happen? Is it an occurrence that happens often? Search for the answer to these questions either on the Internet or through materials that you have located at the library. Bring the information in and present your findings to the class.</p>			

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**Science Lesson Plan 2 Handout**

**Eclipse Glossary**

**altitude** -- the angle (in degrees) above the level horizon where an object in the sky appears.

**annular eclipse** -- a solar eclipse that occurs when the apparent size of the Moon is not great enough to completely cover the Sun. A thin ring of sunlight can be seen around the black disk of the Moon.

**annular-total eclipse** -- a solar eclipse that has both annular and total phases. (Also called a central eclipse.)

**anomalistic month** -- the time it takes for the Moon to travel from apogee to perigee and back again (about 27.6 days).

**aphelion** -- the point in the Earth's orbit that is farthest from the Sun. Currently the Earth reaches aphelion in early July.

**apogee** -- the point in the Moon's orbit that is farthest from the Earth.

**ascending node** -- the point in the orbit of the Moon where it passes from below the ecliptic plane to above. (See node.)

**Aubrey holes** -- the 56 chalk-filled holes (named for John Aubrey) that mark the outer ring of Stonehenge. These holes may have served as "counters" to help in marking the cycles needed to predict eclipses.

**azimuth** -- the compass direction (in degrees) where an object in the sky appears. (The object's altitude is also needed to pinpoint its position.)

**Baily's beads** -- the effect seen just before and just after totality when only a few points of sunlight are visible at the edge of the lunar disk.

**canon** -- in ancient times, an historical record of events. In modern astronomy, a canon is a listing of celestial events, such as eclipses, over a period of time.

**central eclipse** -- in some references, a central eclipse refers to an eclipse that has both annular and total phases. (See annular-total eclipse.)

**chromosphere** -- the lower atmosphere of the Sun that appears as a thin rosy ring around the edge of the solar disk during a total eclipse.

**corona** -- the upper atmosphere of the Sun that appears as a halo around the Sun during a total eclipse.

**contact** -- one of the instances when the apparent position of the edges of the Sun and the Moon cross one another during an eclipse. They are designated as first contact, second contact, third contact and fourth contact.

**descending node** -- the point in the orbit of the Moon where it passes from above the ecliptic plane to below. (See node.)

**draconic month** -- the time it takes for the Moon to return to a node (about 27.2 days).

**eclipse** -- the alignment of celestial bodies so that one is obscured, either partially or totally, by the other.

**eclipse season** -- the period of time when the Sun is near alignment with a lunar node, during which eclipses may take place. For solar eclipses, this time window of 37-1/2 days occurs every 173 days.

**eclipse year** -- the length of time it takes for a lunar node to return to its original alignment with respect to the Sun (about 346.6 days).

**ecliptic** -- the plane of the Earth's orbit around the Sun. As seen from the Earth, the Sun appears to move across the ecliptic during one year.

**equinox** -- either of the two days when the periods of daylight and darkness are of equal length. The vernal equinox is usually March 21; the autumnal equinox is usually September 23.

**first contact** -- the beginning of a solar eclipse marked by the edge of the Moon first passing across the disk of the Sun.

**fourth contact** -- the end of a solar eclipse marked by the disk of the Moon completely passing away from the disk of the Sun.

**G.M.T.** -- Greenwich Mean Time. The time at Greenwich, England, which is used as the basis for standard time throughout the world.

**heel stone** -- the large upright boulder (or menhir) at Stonehenge that is aligned with the summer solstice sunrise.

**latitude** -- distance on the Earth (measured in degrees) north or south of the equator.

**longitude** -- distance on the Earth (measured in degrees) east or west from a reference line, usually the line running between the poles passing through Greenwich, England.

**lunar eclipse** -- the passage of the Moon into the shadow of the Earth, always occurring at a full Moon.

**negative shadow** -- the extension of the umbra of an annular eclipse that delineates the path from which observers may see the ring of Sun of the annular eclipse.

**node** -- the two points where a tilted orbit intersects a geometrical plane. The Moon's orbit intersects the ecliptic plane at the ascending node and the descending node.

**partial eclipse** -- an eclipse during which only the partial shadow touches the Earth (for a solar eclipse) or the Moon (for a lunar eclipse).

**path of totality** -- the path (up to 200 miles wide) that the Moon's shadow traces on the Earth during a total solar eclipse.

**penumbra** -- the part of a shadow (as of the Moon) within which the source of light (the Sun) is only partially blocked out.

**perigee** -- the point in the orbit of the Moon that is closest to the Earth.

**perihelion** -- the point in the orbit of the Earth that is closest to the Sun. Currently the Earth reaches perihelion in early January.

**prominence** -- a large-scale gaseous formation above the surface of the Sun.

**regression** -- the movement of points in an orbit in the direction opposite from the motion of the orbiting body. For example, the Moon travels from west to east, but its nodes are regressing from east to west.

**saros** -- the eclipse cycle with a period of 223 synodic months, or 6,585.32 days (18 years and about 11 days).

**second contact** -- the beginning of the total phase of a solar eclipse marked by the leading edge of the Moon first completely obscuring the Sun.

**shadow bands** -- faint ripples of light sometimes seen on flat, light-colored surfaces just before and just after totality.

**solar eclipse** -- the passage of the new Moon directly between the Sun and the Earth when the Moon's shadow is cast upon the Earth. The Sun appears in the sky either partially or totally covered by the Moon.

**solstice** -- the day when the noontime Sun is either highest in the sky (summer solstice is June 22) or lowest in the sky (winter solstice on December 22).

**spectroscope** -- a scientific instrument that breaks light into its component wavelengths for measurement.

**sunspot** -- a magnetic disturbance on the Sun that appears as a dark blotch on its surface.

**synodic month** -- the time from one full Moon to the next (about 29.5 days).

**third contact** -- the end of the total phase of a solar eclipse marked by the trailing edge of the Moon first revealing the Sun.

**total eclipse** -- an eclipse during which the umbra touches the Earth (for a solar eclipse) or completely engulfs the Moon (for a lunar eclipse).

**totality** -- the period during a solar eclipse when the Sun is completely blocked by the Moon. (Totality for a lunar eclipse is the period when the Moon is in the complete shadow of the Earth.)

**umbra** -- a complete shadow (as of the Moon) within which the source of light (the Sun) is totally hidden from view.

**zodiac** -- the division of the ecliptic into twelve equal parts; each of these parts or "signs" is identified by a name and symbol.

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**Solar Eclipses**

A solar eclipse occurs when the moon gets in the way of the sun as seen from the Earth. A solar eclipse can only occur during a "New Moon" phase. At that time the Moon lies between the Earth and Sun, thus projecting a shadow back towards the Earth. When the moon is at the opposite side of its orbit, a Full Moon, a lunar eclipse can occur. During a lunar eclipse the surface brightness of the full moon drops considerably. The light refracting through the Earth's atmosphere causes the moon to take on a ruddy crimson color. Although not as spectacular as a total solar eclipse, it is still a fantastic site.

There are three types of Solar Eclipses visible from the Earth:

- Total eclipse
- Partial eclipse
- Annular eclipse

In the case of both total and annular eclipses of the sun, there will be a partial eclipse of the sun as well. Only during those few short minutes (or seconds) of totality that you can look directly at the sun with out any filters or protection for your eyes. That is because the entire bright surface of the sun is eclipsed from view and all you can see are the dimmer corona and solar flare. At all other times you must use a filter!

There can be up to five solar eclipses a year and as few as two. Generally when there are numerous (four or five) eclipses in a single year they are all partial as they occur while the moon is just entering or leaving the nodal area where the orbits intersect.

The longest eclipse occurs when the Moon is closest to the Earth and the Sun at its farthest. It will also occur near the tropical regions of the Earth. When all the conditions are just right, a total eclipse of the sun can last for 7 and half minutes!