



03.2_ Framework of the lesson plan

Age group: from 13 y. o.

Lesson title: Lunar and Solar Eclipses

School Discipline: Physics, Astronomy

Key concepts: the propagation of light, shadow, half-shadow, Earth's motions, Lunar motions, a star, a planet

Objectives:

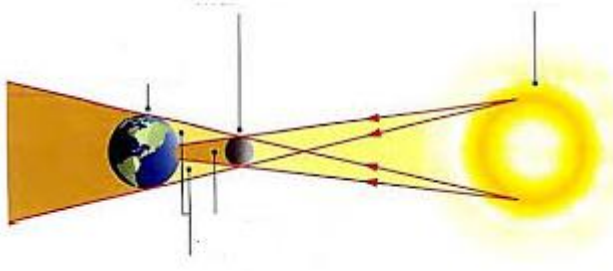
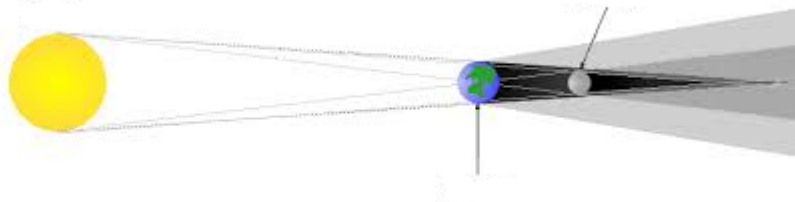
1. To remember The Law of Light Propagation;
2. To discuss the conditions for formation of shadow/ half-shadow;
3. To learn about the types of eclipses;
4. To learn about the main differences between Solar and Lunar Eclipses.

Skills developed: discussion, observation, analysis, and collaboration.

Materials/Equipment needed: VR video link, VR headset, computer, projector, handouts (on demand).

Lesson plan:

Stages	Description of activity	Time
Preparation before the lesson	If this is a first VR experience for students, a teacher goes through the safety rules.	5 min.
Introduction	A frontal survey to remind on the key concepts <ol style="list-style-type: none"> 1. The Law of Light Reflection; 2. The formation of shadow and half-shadow; 3. The Moon's motion through the sky; 4. Difference between Stars and Planets. During this lesson we will learn about the types of eclipses and how do Lunar and Solar eclipses happen.	5 min.
Initial Immersive Experience	Students are divided into two groups, put the VR headsets on and explore the VR experience individually (videos on solar and lunar eclipses).	5 min.
Guided Immersive	<i>Group work to find answers to the following guiding questions:</i>	15 min.

Experience	<p><i>I group (Solar Eclipse) questions:</i></p> <ol style="list-style-type: none"> 1. What causes Solar Eclipses? 2. Types of Solar Eclipses and what affects them? 3. The arrangement of the planets during the Solar Eclipse.  <p>(Write down the names of the physical bodies and phenomena marked with arrows on this drawing)</p> <ol style="list-style-type: none"> 4. The phase of the Moon during a Solar Eclipse. 5. Periodicity and duration of Solar Eclipses. <p><i>II group (Moon Eclipse) questions:</i></p> <ol style="list-style-type: none"> 1. What causes Lunar Eclipses? 2. Types of Lunar Eclipses and what affects them? 3. The arrangement of the planets during the Lunar Eclipse.  <p>(Write down the names of the physical bodies and phenomena marked with arrows on this drawing)</p> <ol style="list-style-type: none"> 4. The phase of the Moon during a Lunar Eclipse. 5. Periodicity and duration of Lunar Eclipses. 	
Follow up	<p>Each group presents the results of their group analysis.</p>	<p>5 min.</p>
Formative Assessment	<p>General analysis with the teacher:</p> <ol style="list-style-type: none"> 1. Solar and Lunar Eclipses are caused by motions of the Sun, the Moon and Earth. 2. Solar and Lunar Eclipses can be either total, in which the Moon's or Earth's shadow completely covers the Sun, or partial, in which the Moon or Earth half-shadow covers the Sun. 3. The arrangement of the celestial bodies during the Solar Eclipse: Sun-Moon-Earth; The arrangement of the celestial bodies during the Lunar Eclipse: Sun – Earth – Moon. 4. A Lunar Eclipse can take place at the phase of full moon, 	<p>10 min.</p>



	<p>while a Solar Eclipse can only take place at the phase of new moon.</p> <p>5. Lunar Eclipse lasts longer than the Solar one. The shadow cast by Earth on the Moon is much bigger than the one cast by the Moon during the Solar Eclipse.</p>	
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