Astronomy (Eclipses)
STUDY GUIDE

S6E2 – Obtain, evaluate and communicate information about the effects of the relative positions of the sun, Earth and moon.

b. Construct an explanation of the cause of the solar and lunar eclipses.

REMEMBER: NEVER look directly at the sun: It can permanently damage your eyes! You must use proper safety equipment to look at any type of solar eclipse.

	1. **Eclipses**, whether solar or lunar, occur because of the periodic alignments of the sun, Earth, and moon.
	2. A **solar eclipse** happens when the moon casts a shadow on Earth, fully or partially blocking the sun's light in some areas.
	3. During a solar eclipse, the moon casts two shadows on Earth. The first shadow is called the **umbra** (UM bruh). This shadow gets smaller as it reaches Earth. It is the dark center of the moon's shadow. The second shadow is called the **penumbra** (pe NUM bruh). The penumbra gets larger as it reaches Earth. People standing in the penumbra will see a partial eclipse. People standing in the umbra will see a total eclipse.
	4. A **total solar eclipse** occurs when the Moon gets between the Sun and the Earth and covers up the Sun. The sun, moon and Earth must be in a direct line. As seen from Earth, the Moon and the Sun, appear to be the same size in the sky. So if the two are exactly lined up, the Moon can hide the Sun from our sight. In this position, the Moon is in a new phase.
	5. The people who see the total solar eclipse are in the center of the moon's shadow when it hits Earth. The sky becomes very dark, as if it were night. Solar eclipses happen once every 18 months and only last for a few minutes.
	6. During a **partial solar eclipse**, the sun, moon and Earth are not exactly lined up. The sun appears to have a dark shadow on only a small part of its surface.
	7. An **annular eclipse** happens when the moon is farthest from Earth. Because the moon is farther away from Earth, it seems smaller. It does not block the entire view of the sun. The moon in front of the sun looks like a dark disk on top of a larger sun-colored disk. This creates what looks like a ring around the moon.

	8. The moon moves in an orbit around Earth, and at the same time, Earth orbits the sun. Sometimes Earth moves between the sun and the moon. When this happens, Earth blocks the sunlight that normally is reflected by the moon. *(This sunlight is what causes the moon to shine.)* Instead of light hitting the moon's surface, Earth's shadow falls on it causing an eclipse of the moon or **lunar eclipse**. A lunar eclipse can occur only when the moon is full.
	9. A **total lunar eclipse** occurs when the moon and the sun are on exact opposite sides of Earth. Although the moon is in Earth's shadow, some sunlight reaches the moon. The sunlight passes through Earth's atmosphere, which causes Earth's atmosphere to filter out most of the blue light. This makes the moon appear red to people on Earth.
	10. A **partial lunar eclipse** happens when only a part of the moon enters Earth's shadow. In a partial eclipse, Earth's shadow appears very dark on the side of the moon facing Earth. What people see from Earth during a partial lunar eclipse depends on how the sun, Earth and moon are lined up.
	11. A lunar eclipse usually lasts for a few hours. At least two partial lunar eclipses happen every year, but total lunar eclipses are rare. It is safe to look at a lunar eclipse.