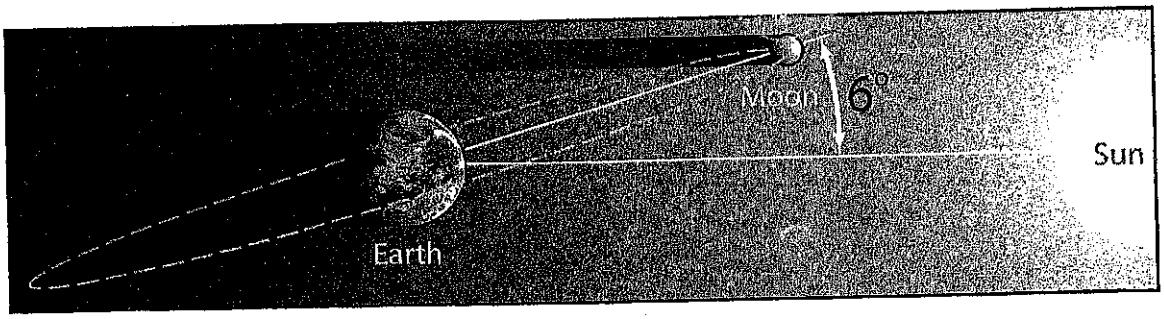
Those Beautiful Eclipses

Content Background:

An **eclipse** is when one celestial body moves into the shadow of another celestial body and is either partially or totally obscured by it. If you walk into the shadow cast by a tree or similar object, then to an observer you have been eclipsed by that tree. That is, the tree has blocked the sunlight that would have reached you and reflected off your body; the tree has come between you and the sun. As the earth revolves around the sun and the moon about the earth, they occasionally align so the sunlight is blocked. When these alignments occur, an eclipse of either the sun or the moon may occur. If the moon blocks the light from the sun resulting in the total disappearance or partial disappearance of the sun as viewed from the earth, then a **solar eclipse** takes place. A **lunar eclipse** occurs when the earth blocks the sun's light from reaching the moon. A solar eclipse is possible when the moon is in its new moon phase and a lunar eclipse is possible when the moon is in its full moon phase. However, eclipses do not occur every time there is a new moon or full moon. The reason for this is because the moon and Earth do not revolve in the same geometric plane each month or year. The earth-moon orbit is approximately six degrees out of alignment with the earth-sun orbit; hence, an eclipse can only occur if these orbital planes intersect during a new moon or full moon phase.

With the present understanding of the motion of the sun, Earth, and moon, the occurrences of solar and lunar eclipses are now predictable. A number of Internet websites, such as http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html, list the times and dates for these upcoming events.



Because light rays travel in straight lines, light from the sun will cause the shadow of the earth or moon to be cone-shaped. The shadow's cone will have two parts: a lighter outer region of the shadow called the **penumbra** and a darker inner region called the **umbra**. During a solar eclipse, the penumbra will cast a shadow covering a length of about 6,400 km (3,977 miles). Individuals in this area will be able to see a partial solar eclipse. The inner shadow, or umbra, will cast a narrower shadow of about 270 km (168 miles) wide, where observers will be treated to a total solar eclipse. An **annular solar eclipse** occurs when the moon orbit is farthest from the earth. The moon passes in front of the sun, but the moon does not totally cover the sun's surface, leaving a ring of sunlight around the moon.