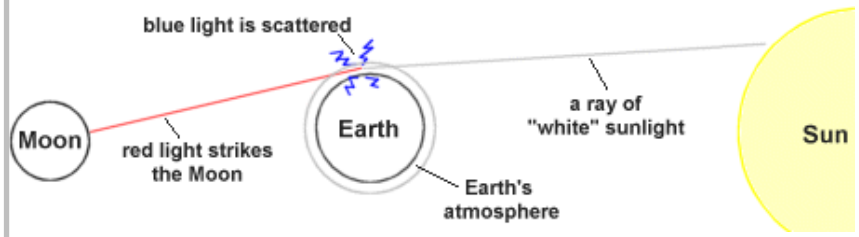
Why isn't the moon totally dark when Earth gets between it and the sun? It's because of Earth's atmosphere.



White light from the Sun is a mixture of all the colors of the rainbow. When a ray of "white" sunlight passes at grazing incidence through Earth's atmosphere, molecules and aerosols in the air scatter blue light in all directions (this is why the sky is blue). The remaining reddish light is bent (refracted) into Earth's umbral shadow zone, giving the eclipsed Moon a coppery glow. Image credit: Tony Phillips.

Lunar eclipses are considered total when the Moon passes completely into the umbral shadow. Unlike total solar eclipses, which are over in just a few minutes, lunar eclipses are slow. From start to finish, this week's lunar eclipse lasts nearly three and a half hours. The eclipse begins as the Moon's eastern edge slowly moves into the Earth's umbral shadow. During this partial phase, it takes just over an hour for the Moon's orbital motion to carry it entirely within the Earth's dark umbra. Then, totality lasts for 77 minutes. After the total phase ends, it is once again followed by a partial eclipse as the Moon gradually leaves the umbral shadow.

Tonight: A Total Lunar Eclipse
Credit and Copyright: Vic Winter, ICSTARS

You might think that the Moon would be completely dark at totality. Not so. The Earth's atmosphere bends and refracts sunlight into the umbra. Even at maximum eclipse the moon is weakly illuminated. When this sunlight passes through Earth's atmosphere most of the blue-colored light is filtered out. The remaining light is a deep red or orange in color and is much dimmer than pure white sunlight. The exact appearance depends on how much dust and clouds are present in Earth's atmosphere. Total eclipses tend to be very dark after major volcanic eruptions since these events dump large amounts of volcanic ash into Earth's atmosphere. During the total lunar eclipse of December 1992, dust from Mount Pinatubo rendered the Moon nearly invisible. Since no major volcanic eruptions have taken place recently, the Moon will probably take on a vivid red or orange color during the long total phase.

Ch 18:

$*V = IR$ ← resistance

Current

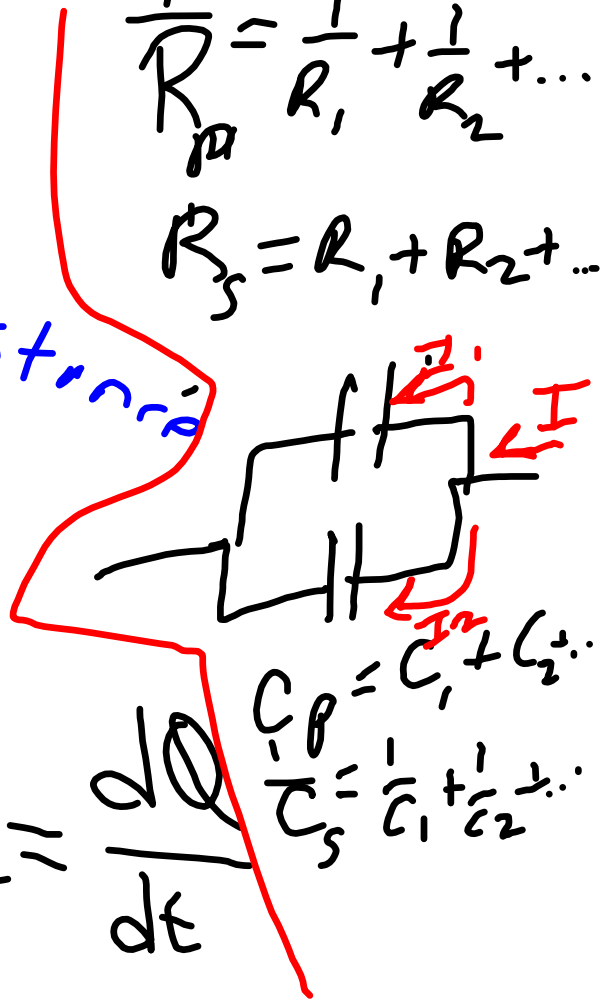
↳ movement in Amps

$1A = 1\frac{C}{S}$

$I = \frac{\Delta Q}{\Delta t} \Rightarrow I = \frac{dQ}{dt}$

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$

$R_s = R_1 + R_2 + \ldots$



$C_p = C_1 + C_2 \ldots$

$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} \ldots$

$$C = \frac{Q}{V} \Rightarrow Q = VC$$

units $F = \frac{\text{coulomb}}{\text{joule/c}}$

farad