Lecture 8

Learning Goals:
By the end of class today you should be able to …
•Explain angular size and how the actual size of an object can be determined from its angular size
•Explain why solar eclipses occur
•Explain why lunar eclipses occur
•Explain why eclipses don't happen every month

Reading for today: Units 10.4, 8.2, 8.3
Reading for Next Time: Units 10, 11

Angular Size
•Angular size (A) = how big something *looks* on the sky.
•How big something looks varies with distance.

From Angular Size to Linear Size
•If we know the distance to an object and its angular size
→ We can determine an objects linear (actual) size

$$L = 2\pi d \times \frac{A}{360^\circ}$$

$$L = d \times \frac{A}{57.3^\circ}$$

Size of the Moon
•Angular size ≈ ½°
•Distance ≈ 384,000

$$L = d \times \frac{A}{57.3^\circ}$$

$$\mathrm{L} = 384{,}000\ \mathrm{km} \times \frac{0.5^\circ}{57.3^\circ} = 3400\ \mathrm{km}$$

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Eclipses
•**What is an eclipse?**

Two Types:
•Solar Eclipse
•Lunar Eclipse

Solar Eclipse
•Solar Eclipse – occurs when the Sun's light is blocked by the Moon as it passes directly between the Earth and the Sun.

–Just so happens that the angular size of the Sun and Moon are the same.
→ When perfectly lined up, the Moon blocks our view of the Sun.

Solar Eclipse

Casting Shadows
•**Total Solar Eclipse:** Sun is completely obscured by Moon.
•**Partial Solar Eclipse:** Sun is partially blocked by the Moon.

•Orbit of Moon isn't a perfect circle – sometimes the moon is a little closer or farther away.
•Remember: Angular size depends on distance:

–It won't quite completely cover up the Sun

Annular Eclipse
•Orbit of the Moon isn't perfectly circular – so sometimes even though Sun and Moon are exactly aligned, still see a ring (annulus) of the sun around the Moon

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Lunar Eclipses
•Lunar eclipse – occurs whenever the Moon passes through the Earth's shadow
•When Moon is entirely within the Earth's shadow
→ Total Lunar Eclipse

Why don't we get a solar and lunar eclipse every month?

Are there any upcoming eclipses that are visible from BG?