

**Winter Solstice  
Dec 21 2000  
Ames Iowa**

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# Bit of Administration ....

- **Homework**
  - Always due on Wednesday in lecture - no extensions
  - Discuss together, but write up independently
  - Help with math at [www.astro.wisc.edu/astro104](http://www.astro.wisc.edu/astro104)
- **Reading**
  - Chap. 2.1-2.6
  - Begin Bless, Chaps. 3-6
    - Extensive reading through next two weeks!
- **Observing Labs**

## *Solar Motion*

- The Sun appears to move

**TO THE EAST RELATIVE TO THE STARS**

about 1 degree per day.

- The Sun's path in the sky is called the ecliptic; the constellations along the ecliptic are the Zodiac.
- The Sun completes a circuit along the entire ecliptic (through all the Zodiacal constellations) in

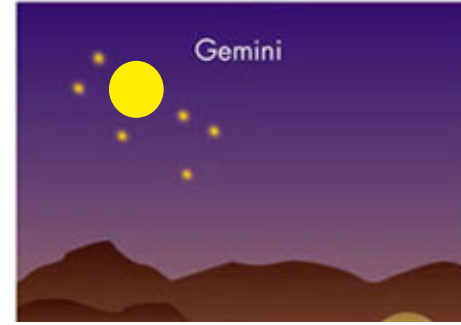
**ONE YEAR**

- Due to Earth orbiting the Sun in one year.

Late August

Late June

East

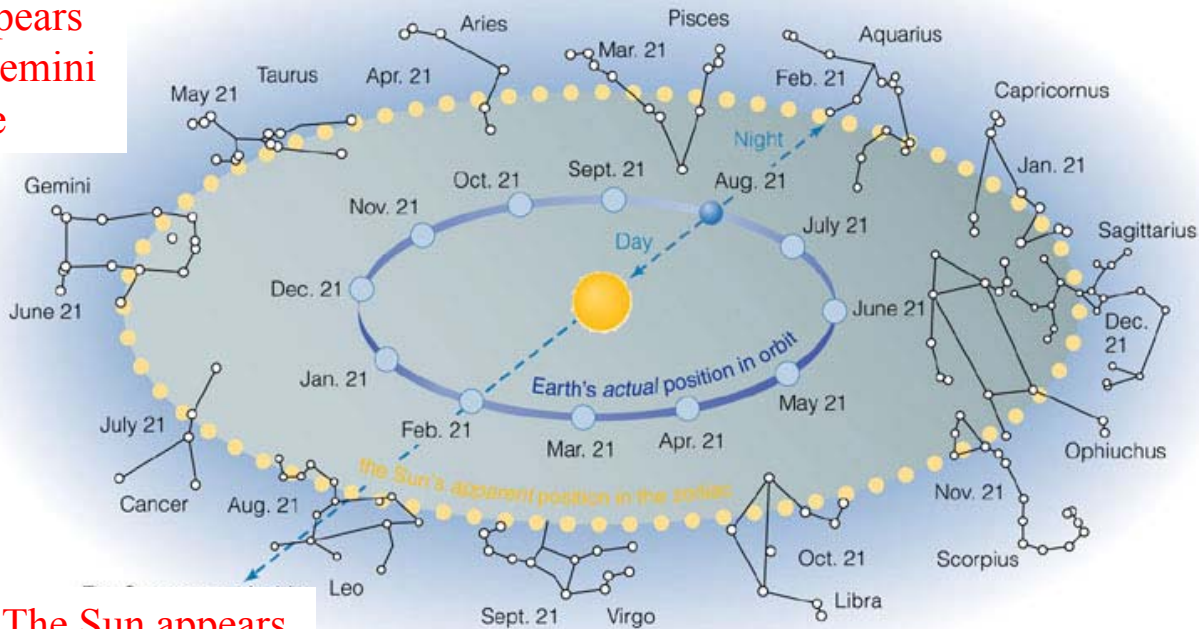


West

South

South

The Sun appears in front of Gemini in June



The Sun appears in front of Leo in August

# *Concept Test!*

**In February the constellation of Gemini is overhead at sunset.  
How many months will it be until Taurus is behind the Sun?**

**a) 0 months**

**b) 3 months**

**c) 6 months**

**d) 9 months?**

# *Concept Test!*

**Suppose in January the Sun is in Pisces? In April Pisces can be best seen in**

**A) the morning night sky (e.g., 4:00 am)**

**B) around midnight**

**C) in the evening night sky (e.g., 7:00 am)**

**D) Pisces will not be visible at night in April**

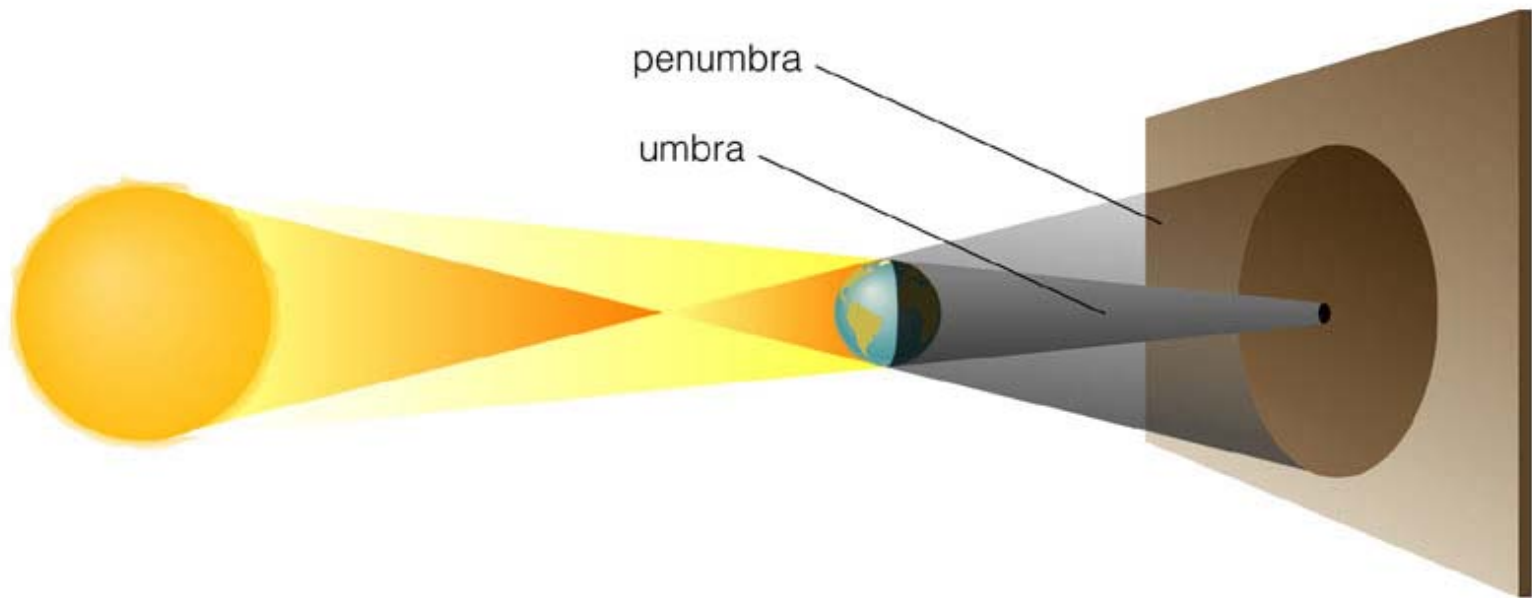
# Solar and Lunar Eclipses



# Layout Of Eclipses

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# The Geometry of Shadows



# Total Solar Eclipse

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# Total Solar Eclipse

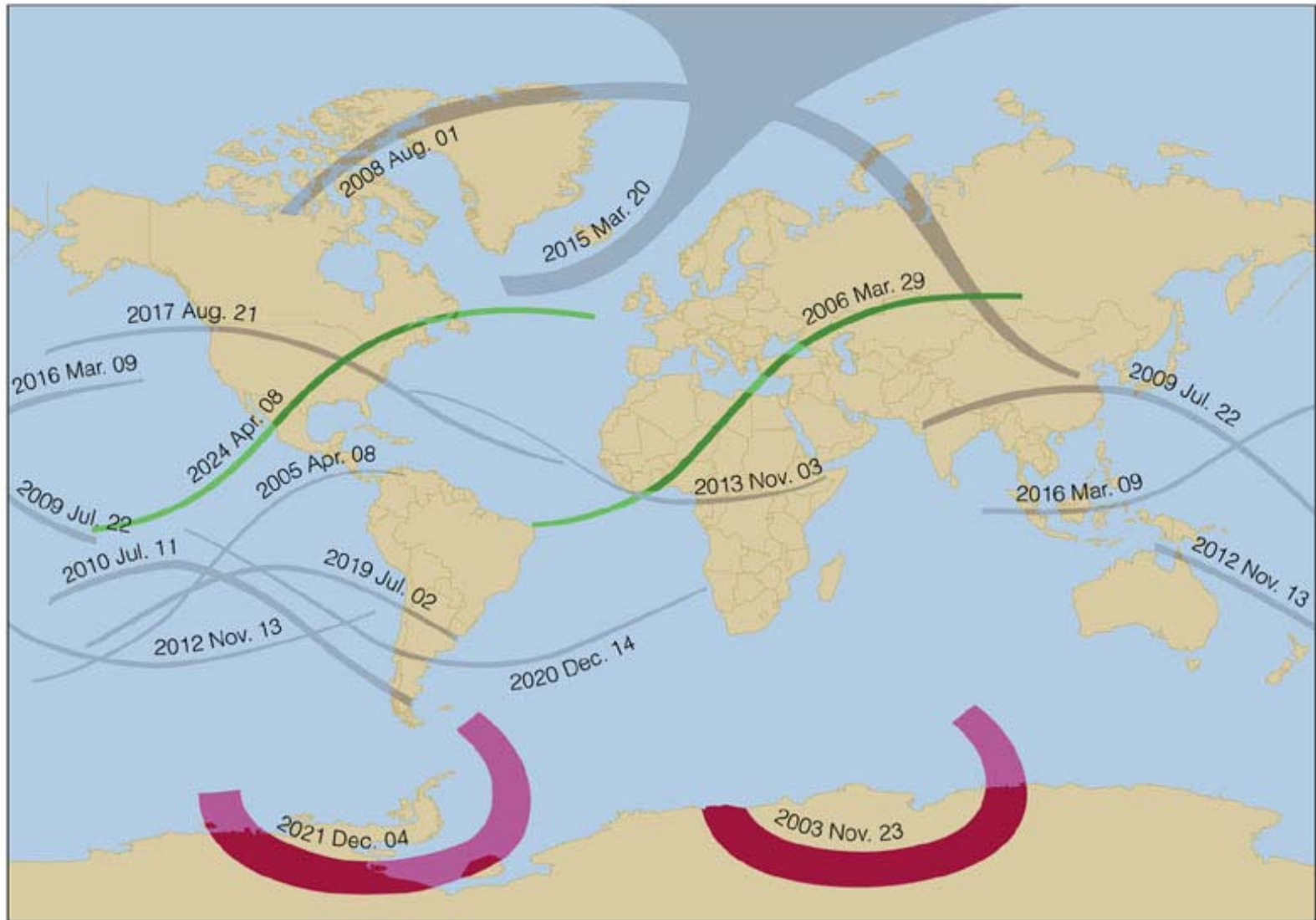


# Solar Eclipse from Space

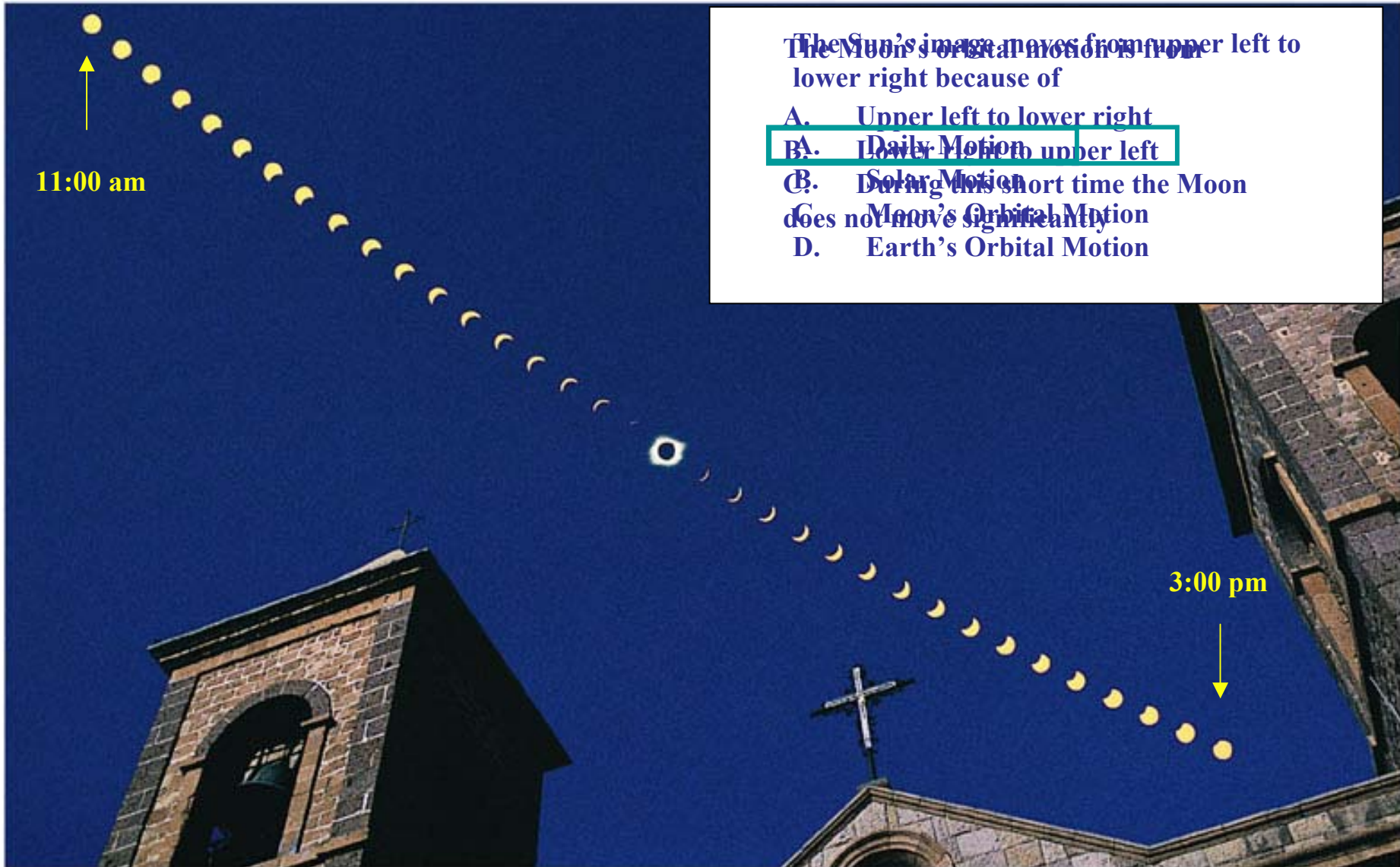


QuickTime™ and a GIF decompressor are needed to see this picture.

# Eclipse Tracks



# Concept Test!



11:00 am

3:00 pm

Partial  
And  
Total  
Solar  
Eclipses

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# Partial Solar Eclipse



# Annular Solar Eclipses

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# Annular Solar Eclipses

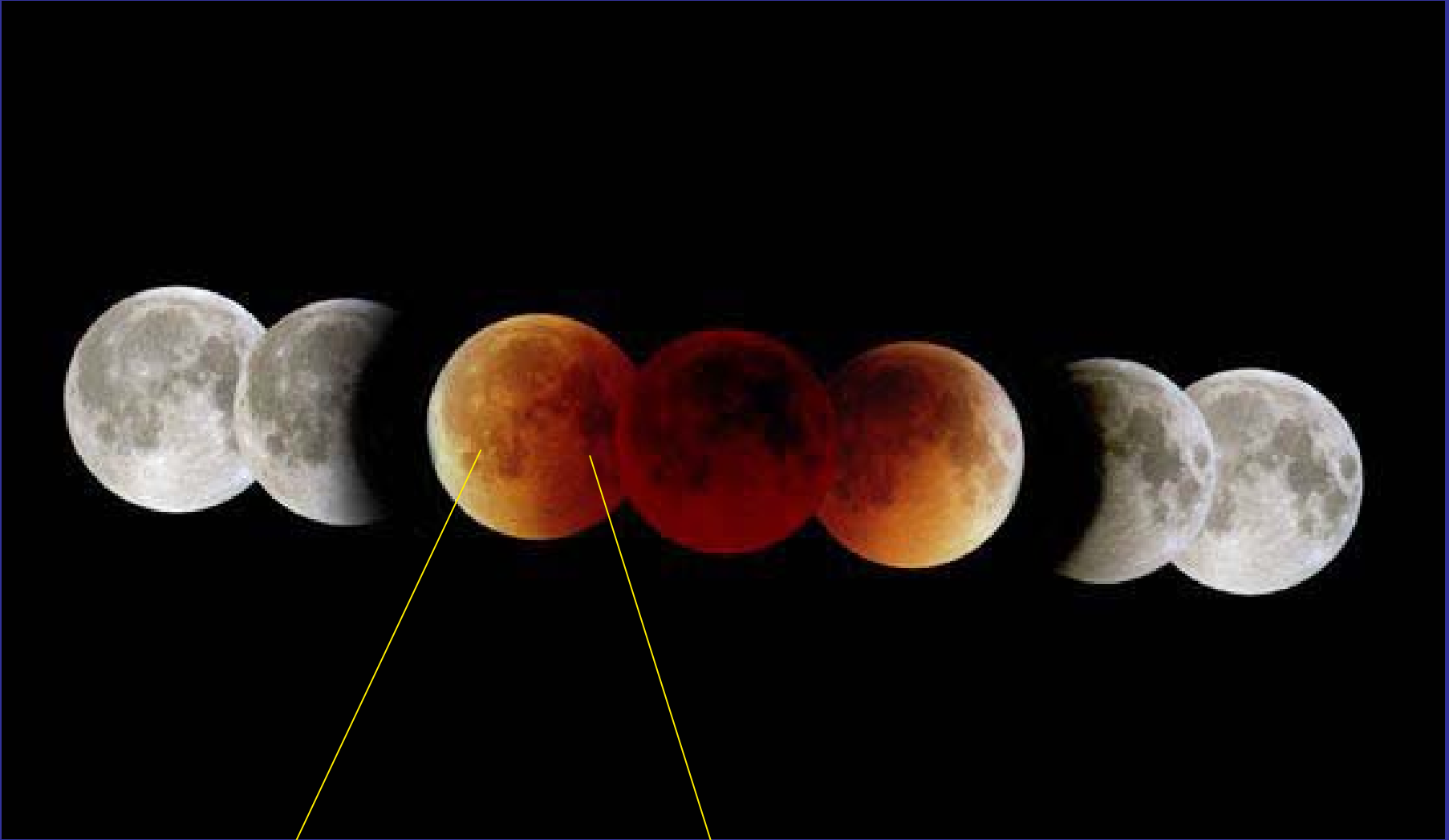


Total  
Lunar  
Eclipse



# Total Lunar Eclipse

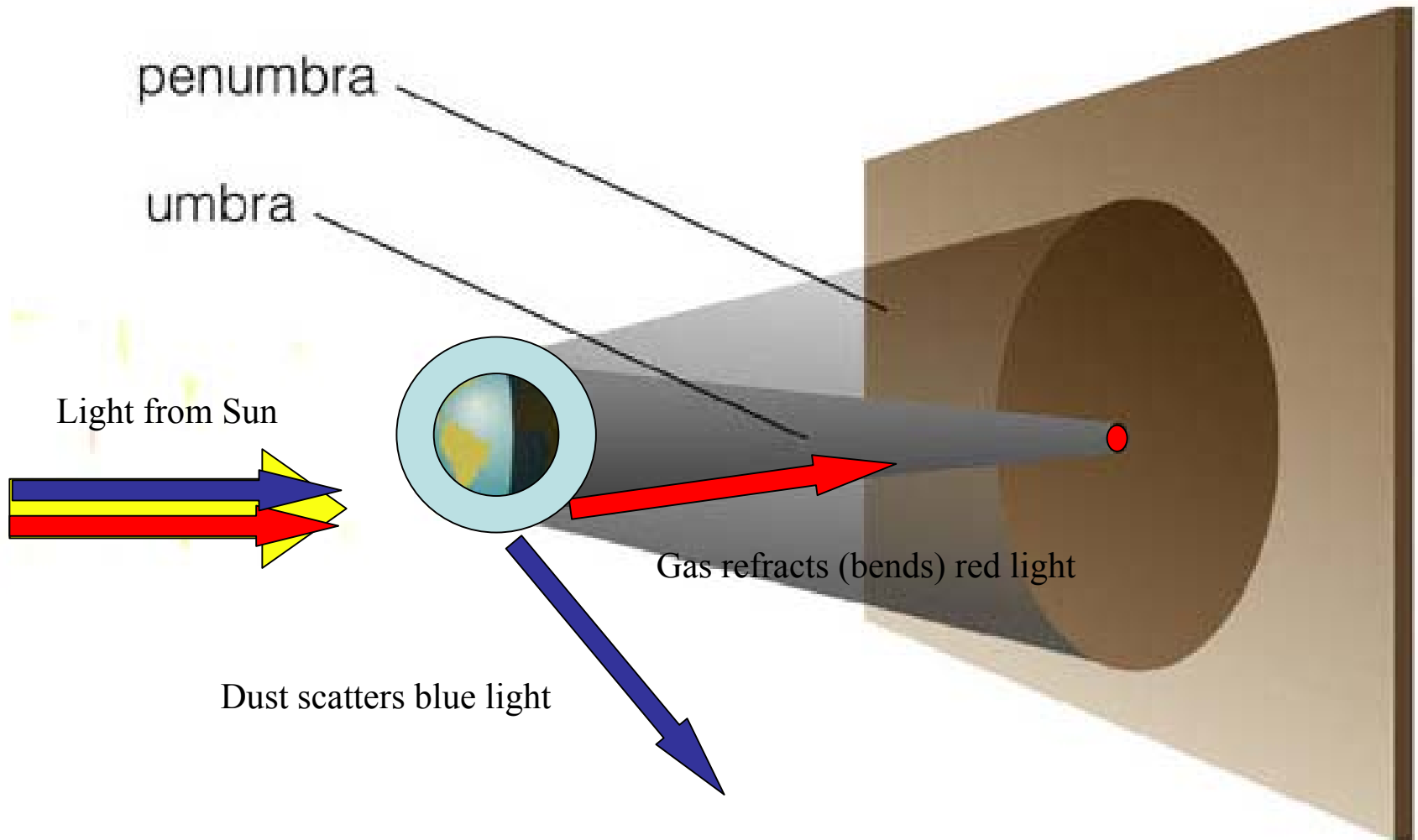
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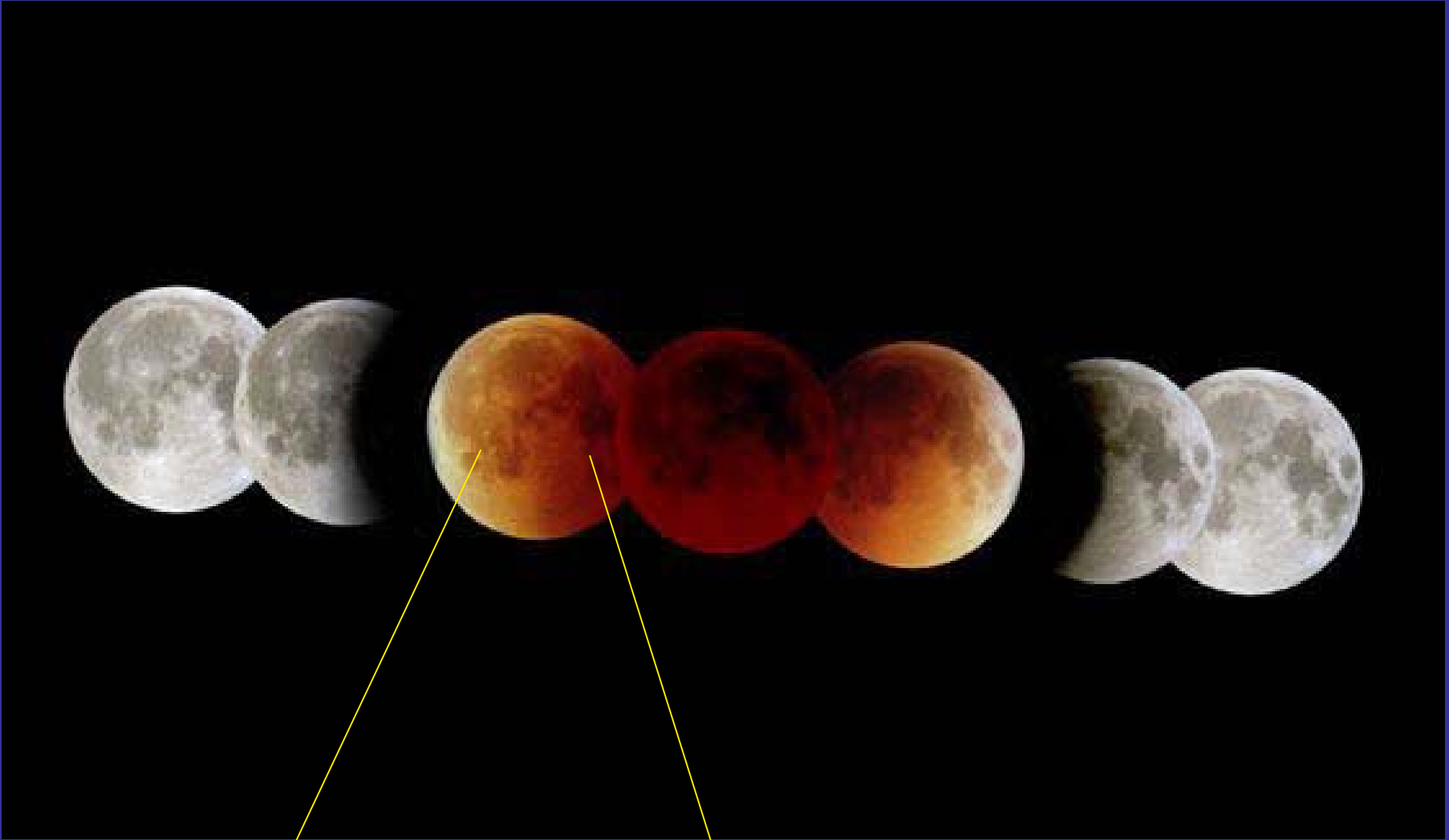


**Penumbra**

**Umbra**

# Why Lunar Eclipses are Reddish





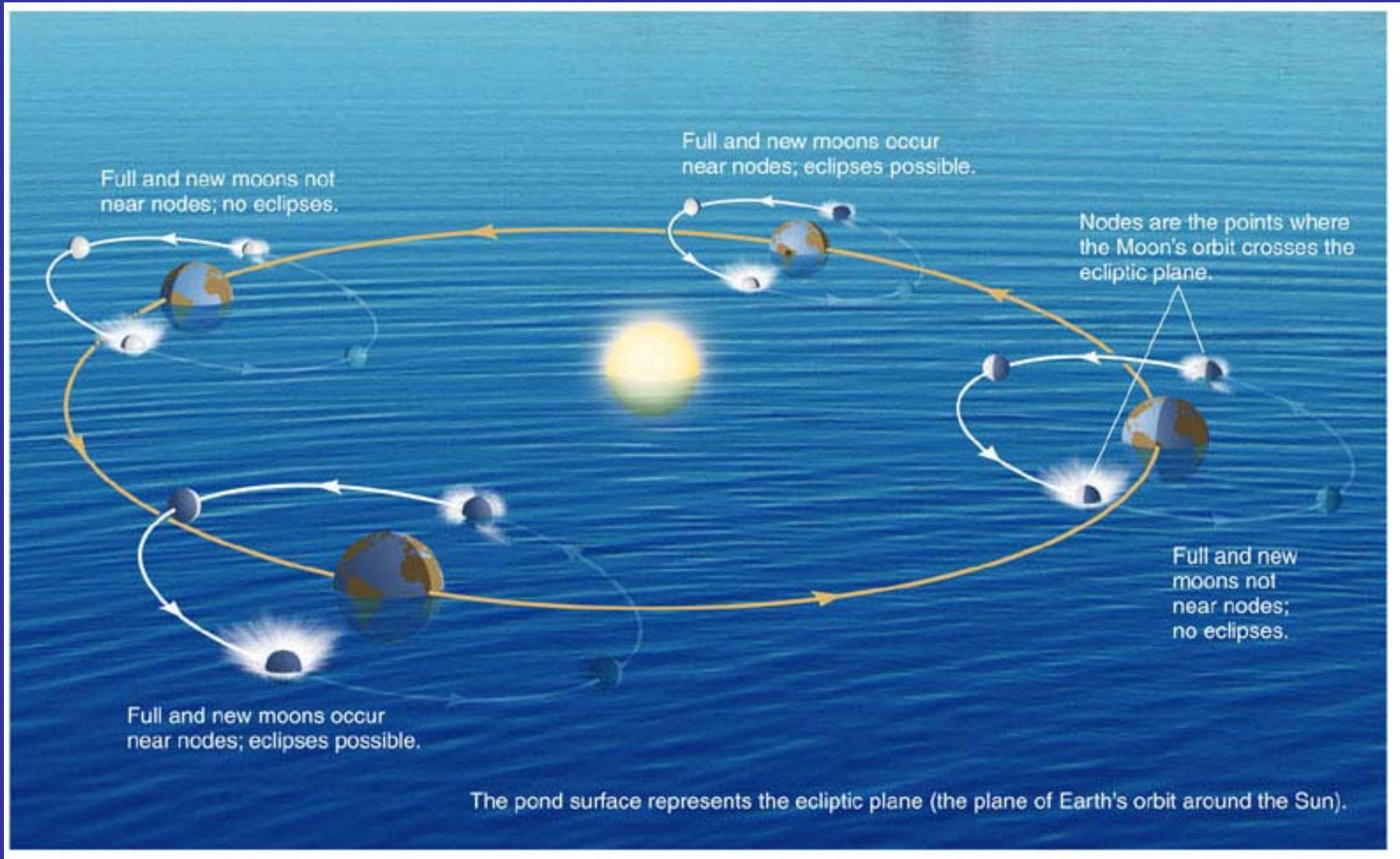
**Penumbra**

**Umbra**

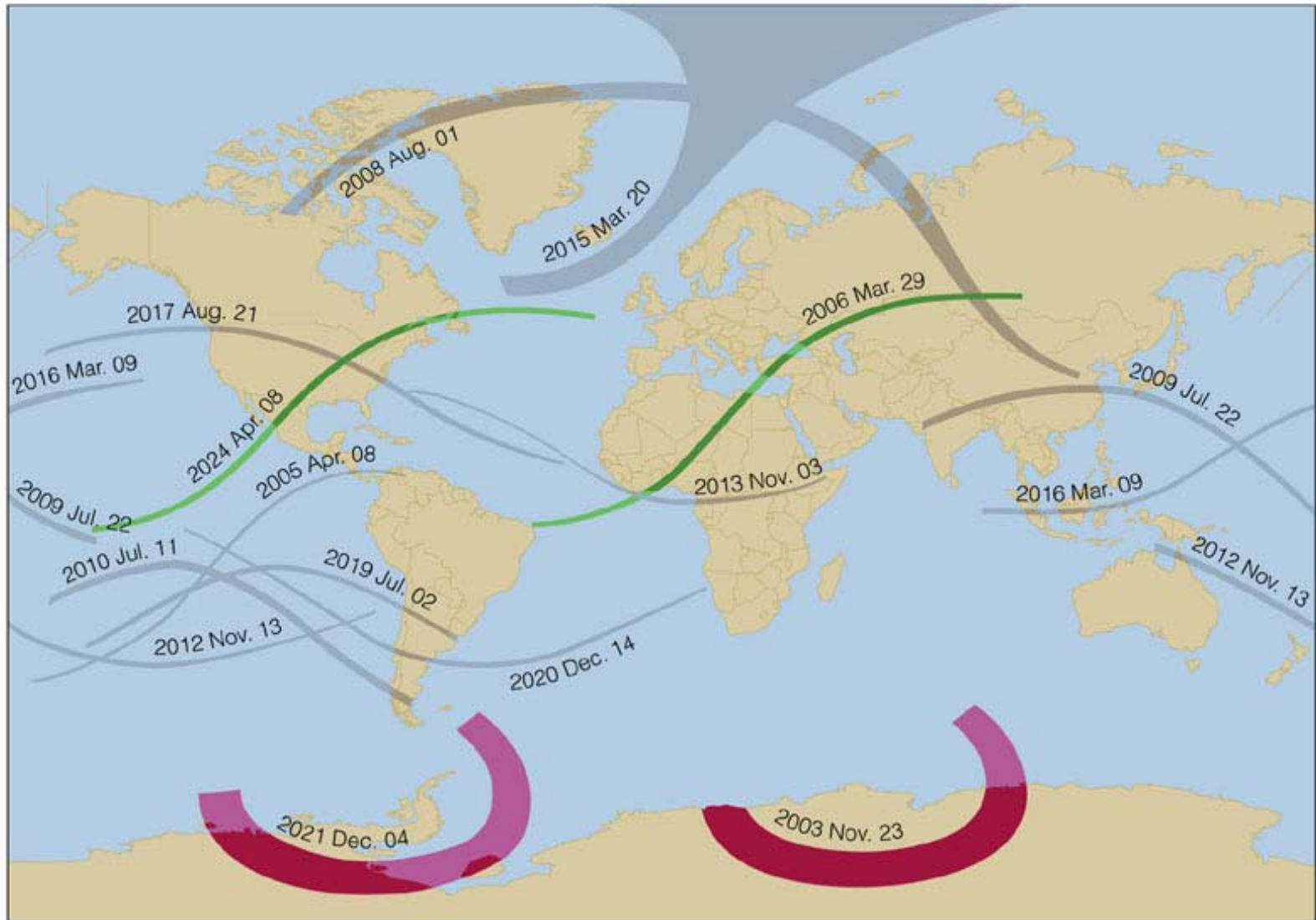
# Tilt of Moon's Orbit

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# Timing of Eclipses



# Eclipse Tracks



# *Concept Test!*

**If you see a full moon, than**

**A) the moon is above the Earth's shadow**

**B) the moon is below the Earth's shadow**

**C) the moon is either above or below the Earth's shadow**

**D) the moon is about to enter the Earth's shadow**