

## 1.13 Saros Cycle

### PRE-LECTURE READING 1.13

- *Astronomy Today*, 8<sup>th</sup> Edition (Chaisson & McMillan)
- *Astronomy Today*, 7<sup>th</sup> Edition (Chaisson & McMillan)
- *Astronomy Today*, 6<sup>th</sup> Edition (Chaisson & McMillan)

### VIDEO LECTURE

- Saros Cycle<sup>1</sup> (8:42)

### SUPPLEMENTARY NOTES

#### The Saros Cycle

- See Saros Cycle<sup>2</sup>.
- 19 eclipse years happen to be  $\approx 223$  synodic months, or  $\approx 6585\frac{1}{3}$  days.
- Consequently, (1) the line of nodes and (2) the moon in its orbit around Earth return to the same positions with respect to the sun, and with respect to each other, every  $\approx 6585\frac{1}{3}$  days.
- In other words, every configuration of the line of nodes, the moon in its orbit around Earth, and the sun repeats every  $\approx 6585\frac{1}{3}$  days.
- Consequently, the pattern of eclipses in time, called the Saros cycle, repeats itself every  $\approx 6585\frac{1}{3}$  days (which is just over 18 tropical years).
- Because of the extra  $\approx 1/3$  day, Earth rotates an additional  $\approx 360^\circ/3 = 120^\circ$  and consequently eclipses do not reoccur at the same longitudes compared to the last cycle.
- However, after three cycles, Earth rotates an additional  $\approx 360^\circ$  and consequently eclipses do reoccur at approximately the same longitudes (and latitudes) compared to three cycles ago.
- Since the moon's orbit is eccentric, the moon may be closer to or farther away from Earth than it was the last cycle. Consequently, solar eclipses can change from total to annular and from annular to total from cycle to cycle.

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<sup>1</sup><http://youtu.be/35aJduq8PIs>

<sup>2</sup>[http://en.wikipedia.org/wiki/Saros\\_\(astronomy\)](http://en.wikipedia.org/wiki/Saros_(astronomy))

- The existence of the Saros cycle was determined in ancient times, before long-distance travel was common. At any fixed location on Earth, (noticeable) solar eclipses occur too infrequently for their repeating pattern in time to be determined. However, lunar eclipses can be seen by everyone on the night side of the planet (weather permitting). Consequently, at any fixed location on Earth, nearly half of lunar eclipses can be seen, which is enough for their repeating pattern in time to be determined after only a few generations (once records were kept).

## **ASSIGNMENT 1**

Do Question 10.