

Today's topics

- Precession
- Phases of the Moon
- Solar and lunar eclipses

Announcements

- If you have one of the following clickers, you need to register again: 16E052A4, 17890F91, 19545914
- Clear Sky patrol has started
- Astronomy tutorial has started
- Do people want homeworks for weeks without exams to be due on Wednesdays? (A=Monday, B=Tuesday, C=Wednesday)

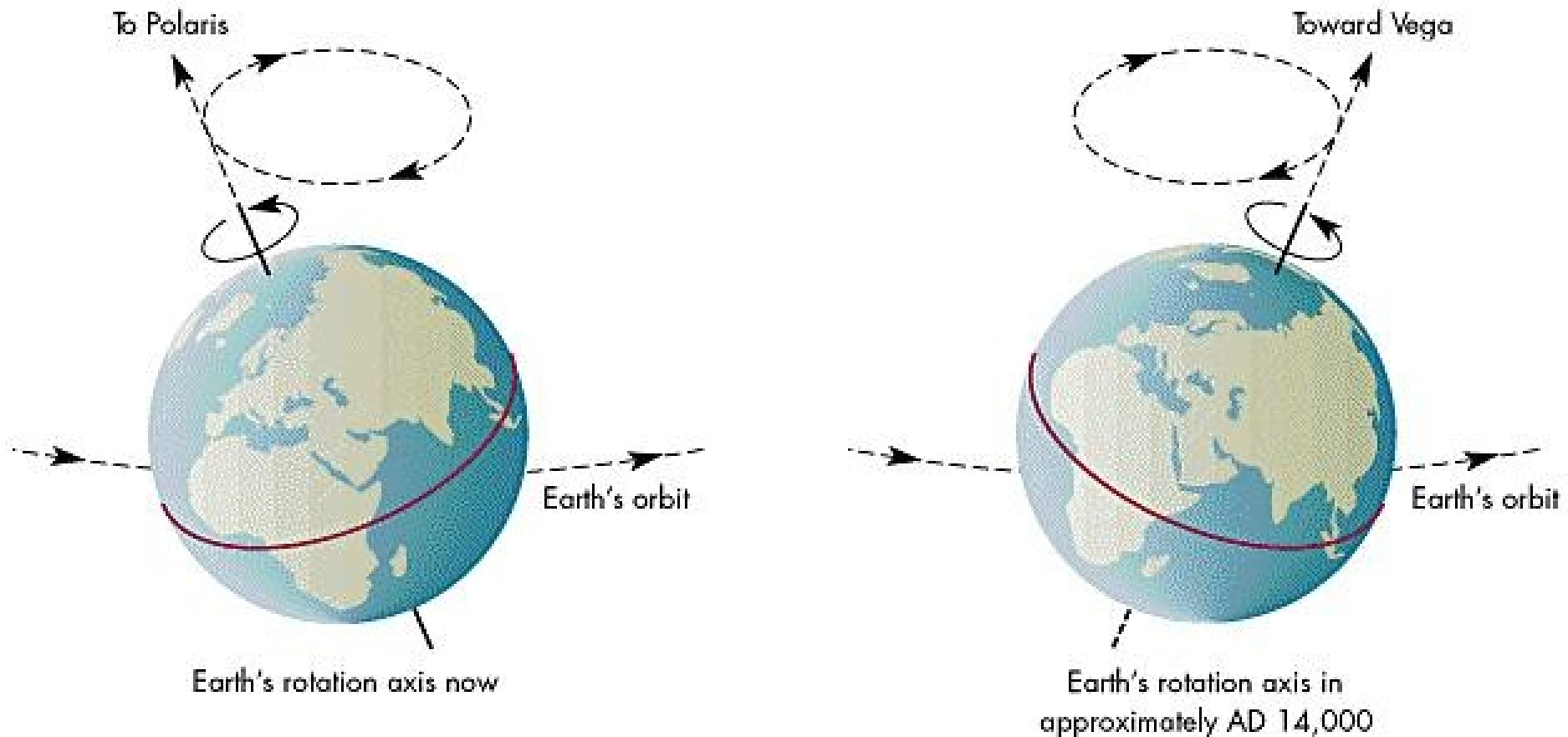
The path followed by the sun as it appears to move among the stars is the

- A) Ecliptic
- B) Equator
- C) Meridian
- D) Zenith
- E) Don't know

Precession

- If you spin a top, its very hard to get it to spin exactly straight – usually it wobbles around in a circle
- The spinning Earth wobbles in exactly the same way – this is called precession

Precession of the Earth



This causes the celestial pole to move. Thus, the coordinates of stars change slowly from year to year.

Phases of the Moon



Phases of the Moon

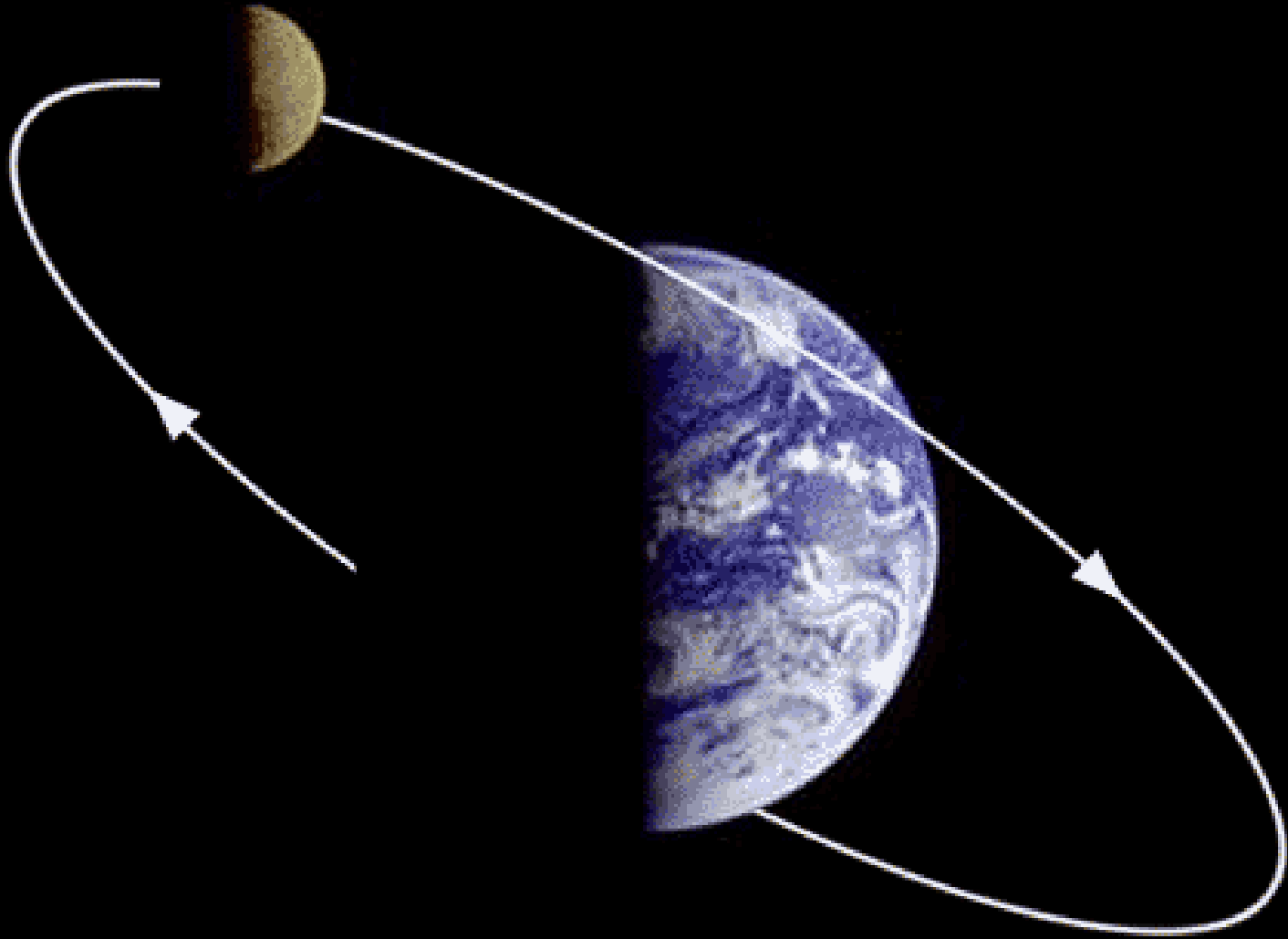
- The phases of the Moon are caused by the orbit of the Moon around the Earth, but how does this work?
- Any thoughts?

Moon's Orbit



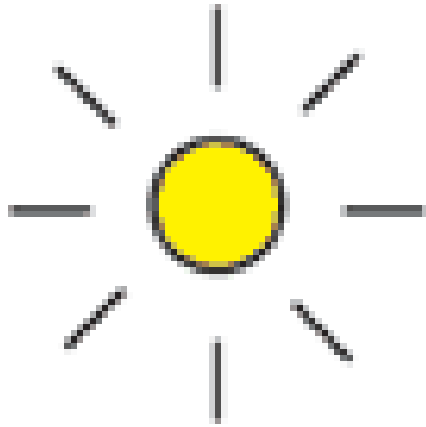
- Relative to the Sun, the Moon orbits the Earth once every 29.5 days (relative to the stars the orbit is 27.3 days)
- The orbit of the Moon is tilted by about 5 degrees relative to the ecliptic
- The Moon rotates at the same rate that it orbits, so the same face of the Moon always points towards Earth

Phases of the Moon



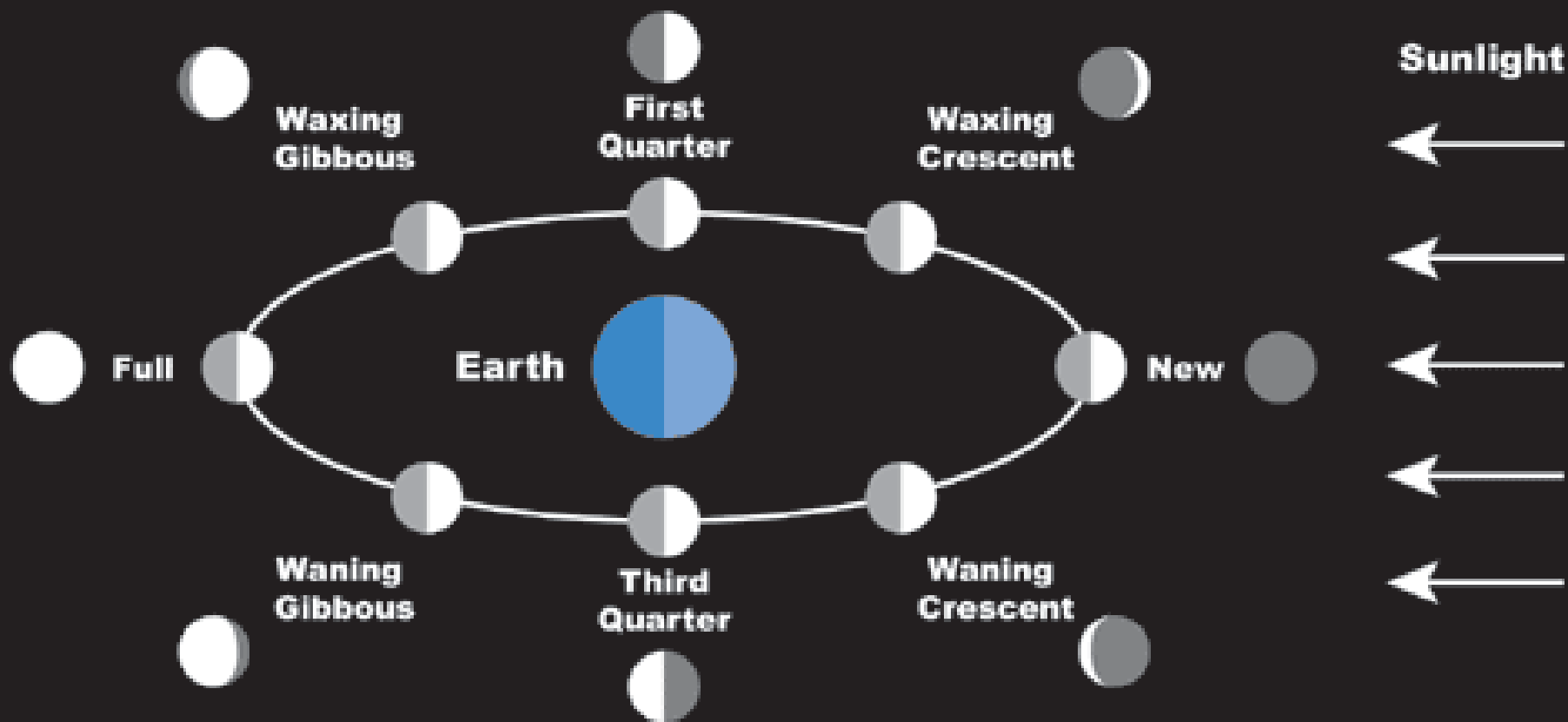
Picture taken by Galileo spacecraft from 4 million miles away

Phases of the Moon



Lamp

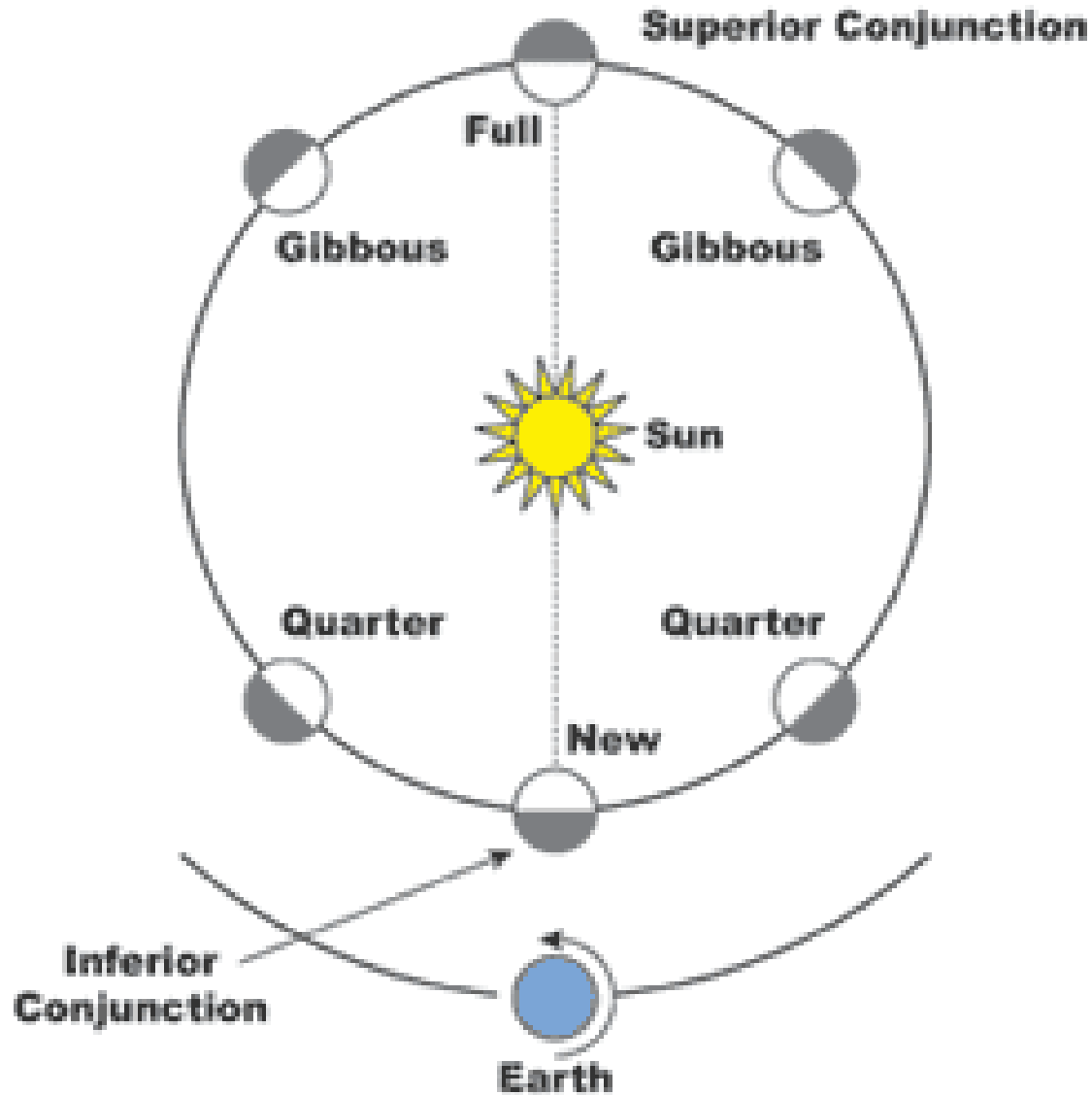




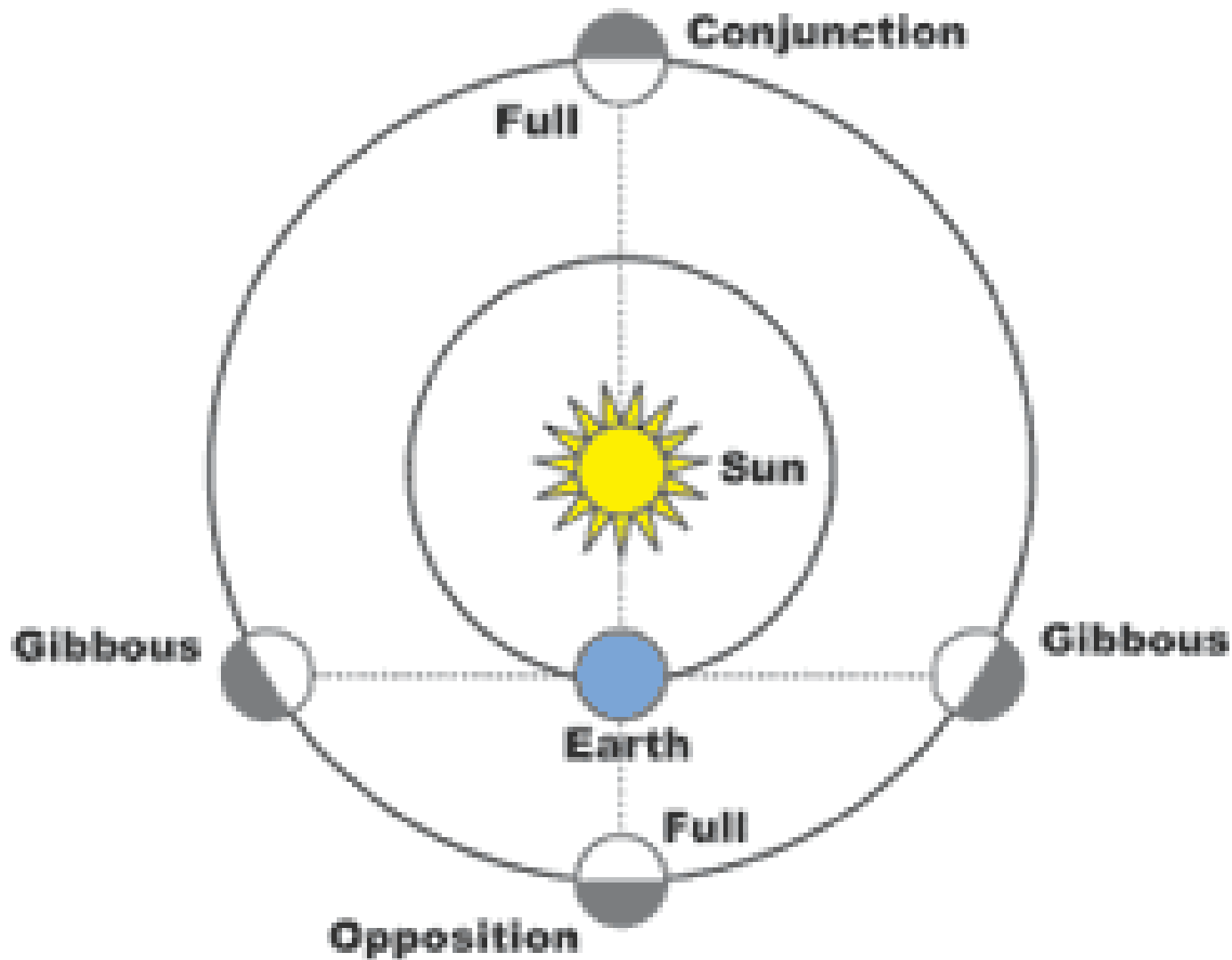
Seen from the Moon, does the Earth have phases? (A=yes, B=no)



Do the planets have phases?

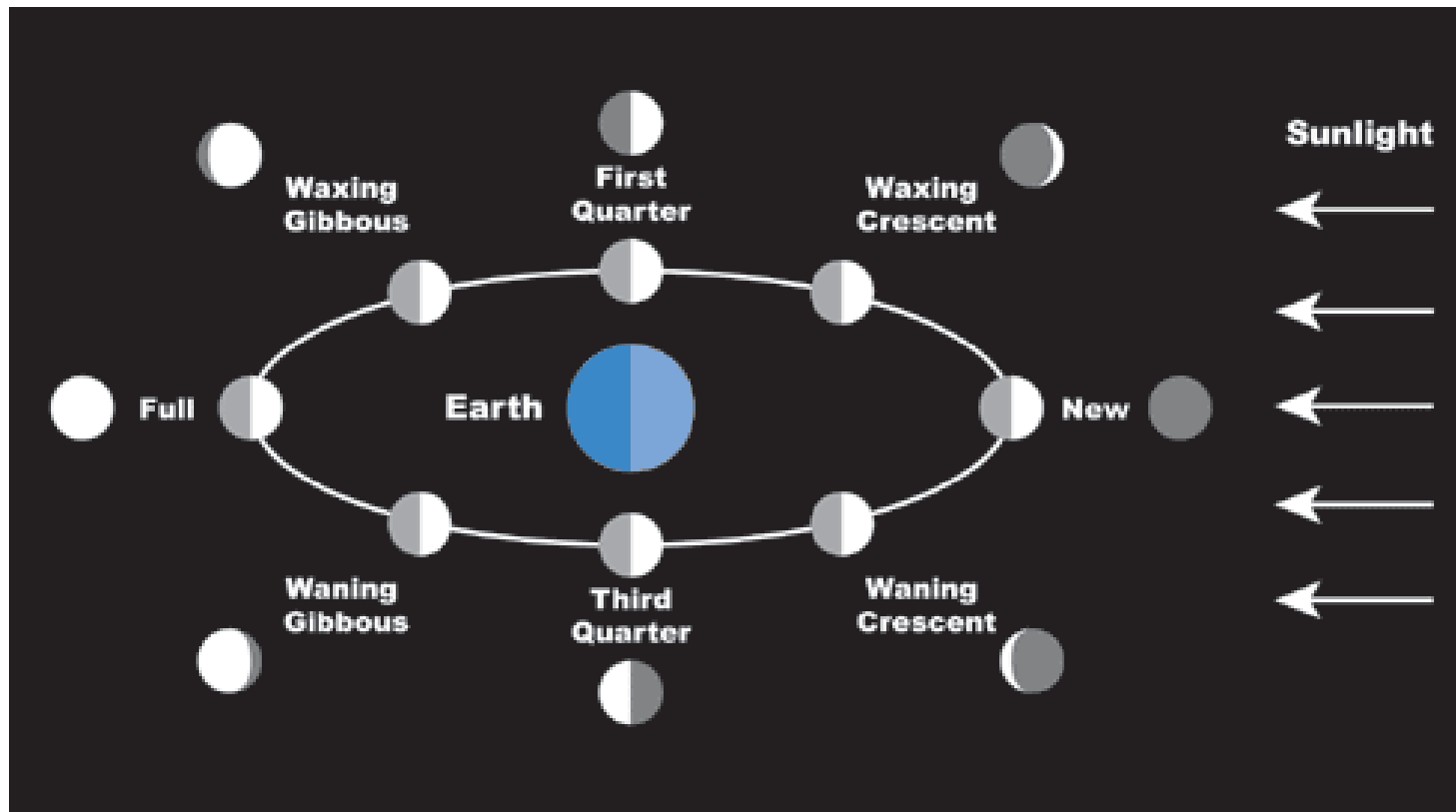


Phases of the Planets



At approximately what time does the new moon rise?

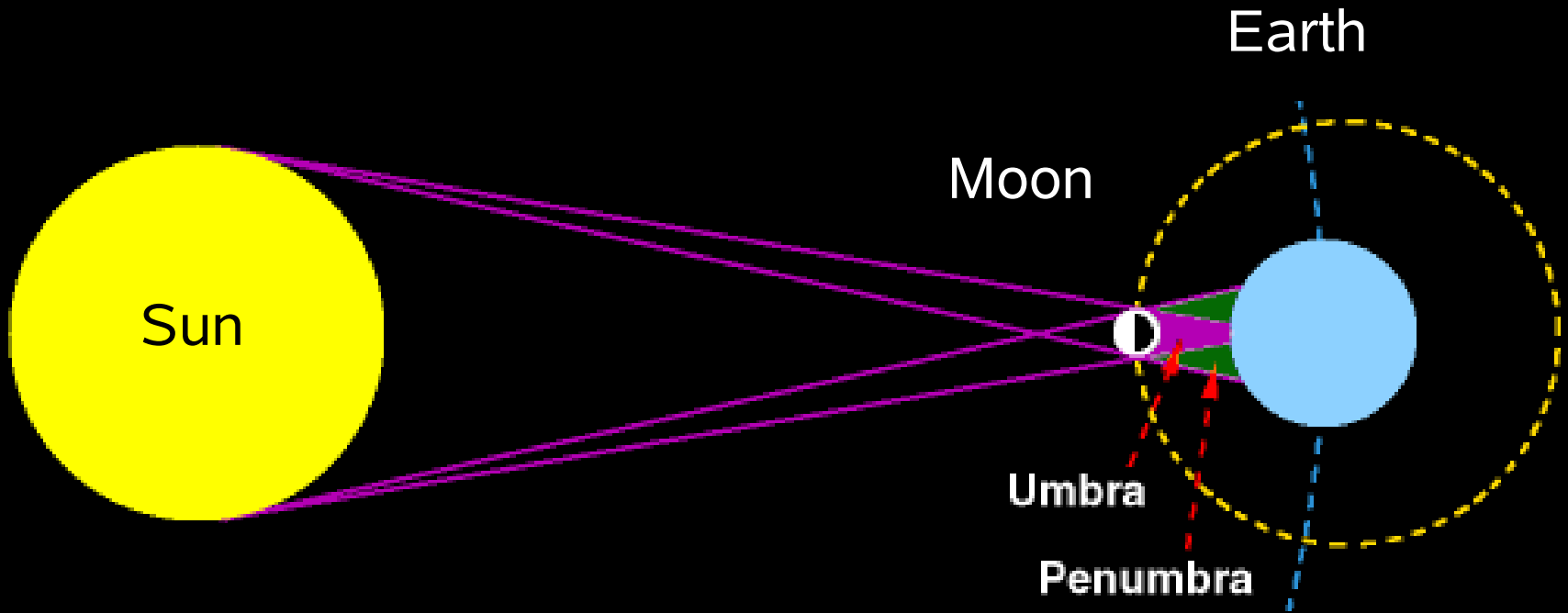
- A) Sunset
- B) Midnight
- C) Sunrise
- D) Noon
- E) No clue



Solar and Lunar eclipses

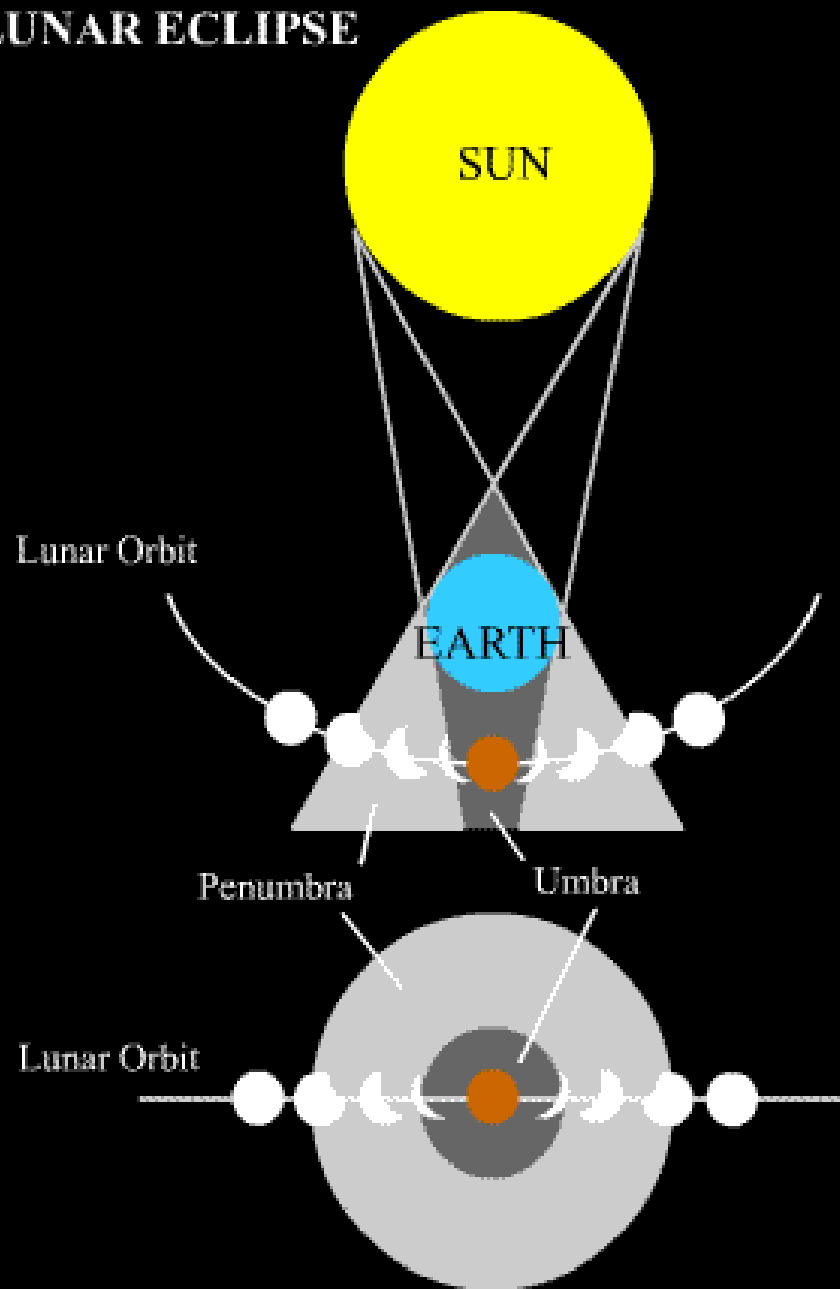
- What causes a solar eclipse?
- How about a lunar eclipse?

A solar eclipse





LUNAR ECLIPSE



What is the phase of the moon during a solar eclipse?

- A) First quarter
- B) Full
- C) Third quarter
- D) New
- E) Still no clue

Review questions

- Draw a diagram of the positions of the Earth, Sun, and Moon at new moon, first quarter moon, and full moon.
- Draw a diagram of the positions of the Earth, Sun, and Moon during a lunar eclipse.