

Monday, Sep. 8

If you don't have them yet, pick up syllabus, ABCD card, and homework after class.

Syllabus, class notes, and homeworks are at:
www.as.utexas.edu → courses → AST 301, Lacy

Reading for this week: chapter 4

The homework handed out last Friday is due in two weeks.

It requires observations of the Moon and planets.

We will take last week's homework this week. Bring it up after class.

Topics for last week

Know what the magnitudes of stars tell you about their relative brightnesses

Describe the apparent motions of stars across the sky during a night as seen from various locations on Earth

Describe and explain the apparent motion of the Sun relative to the stars during a year

Explain how the tilt of the Earth's axis causes the seasons

Describe how the path of the Sun across the sky during a day differs during different seasons

Describe and explain the phases of the Moon and the motion of the Moon relative to the stars during a month

Explain how eclipses occur

Assignment for the next week

Look for Venus, Mercury, and Mars in the west in the evening. Look for them on several nights.

Note how they move relative to each other and relative to Spica, the moderately bright star near them.

Jupiter is the brightest object in the south.

Watch how it moves relative to the star just to its south.

Look for the Moon.

Watch how its position in the sky changes during a night and from night to night.

Note how the phase of the Moon changes from night to night.

Apparent motion of Sun during the year

The Earth orbits the Sun once a year.

This makes the Sun appear to pass in front of different stars (the constellations of the zodiac) during a year.

The zodiac does not lie on the celestial equator, but is on a circle tipped about 23° from the equator.

This is because the axis of the Earth's rotation is tipped about 23° from the axis of its orbital motion.

During a day the Sun follows the same path across the sky as the stars it is in front of, since this motion is caused by the rotation of the Earth.

But from day to day the Sun slowly moves along the zodiac (also called the ecliptic).

This causes it to rise with different stars and to move north and south of the celestial equator during a year.

The solar day and the sidereal day

The motion of the Sun along the ecliptic causes the time from sunrise to sunrise (the solar day = 24 hours) to differ from the time from when one star rises until when it next rises (the sidereal day = 23 hours, 56 minutes).

There are 365.24 solar days in a year.

How many sidereal days are there in a year?

Figure out the rule by having the “Earth” walk around the “Sun” while spinning on her axis.

How would it change if the Earth spun the other way?

Seasons

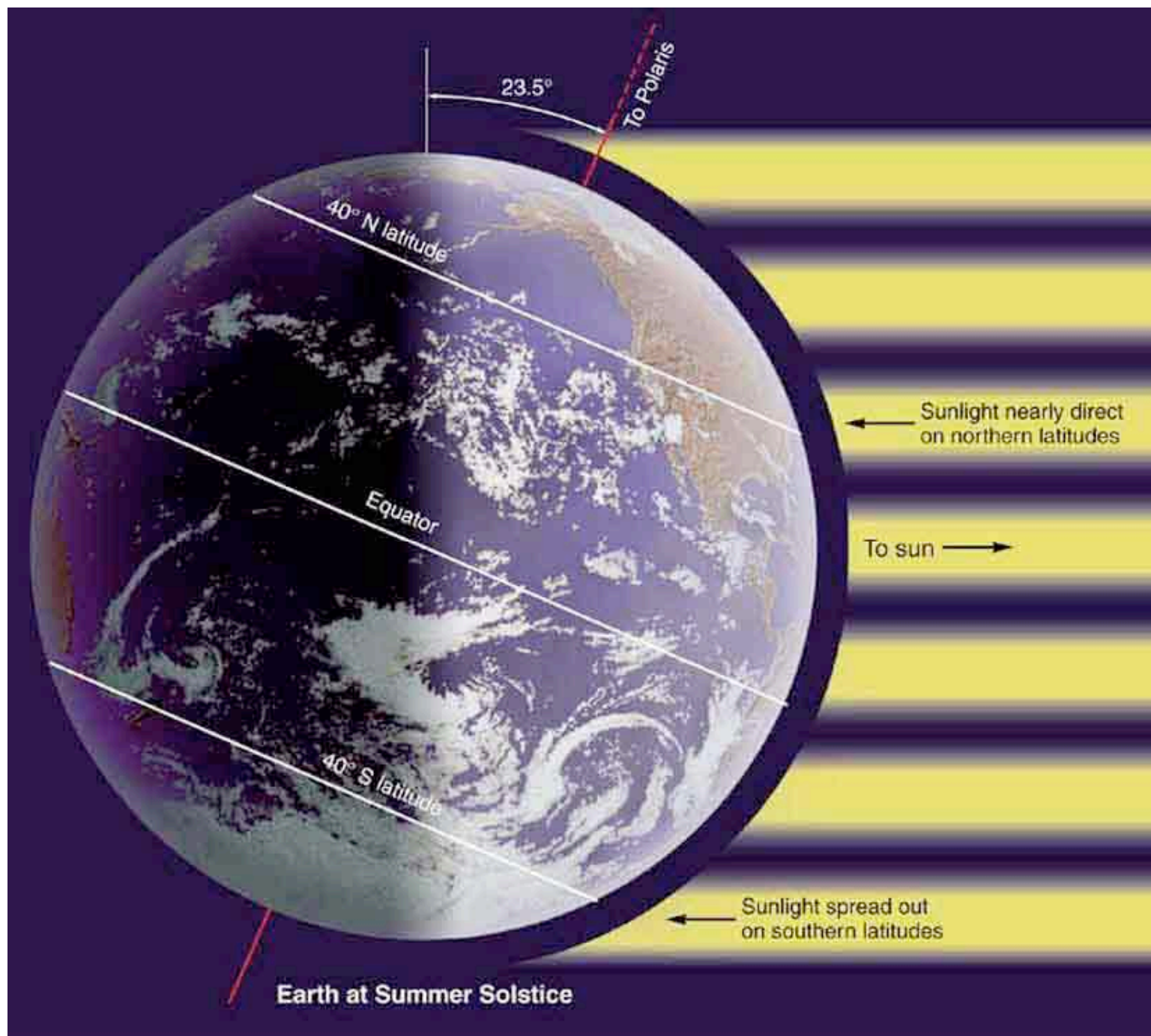
The fact that the ecliptic is tipped relative to the celestial equator means that at some times of the year the Sun is in front of stars north of the equator and at some times it is south.

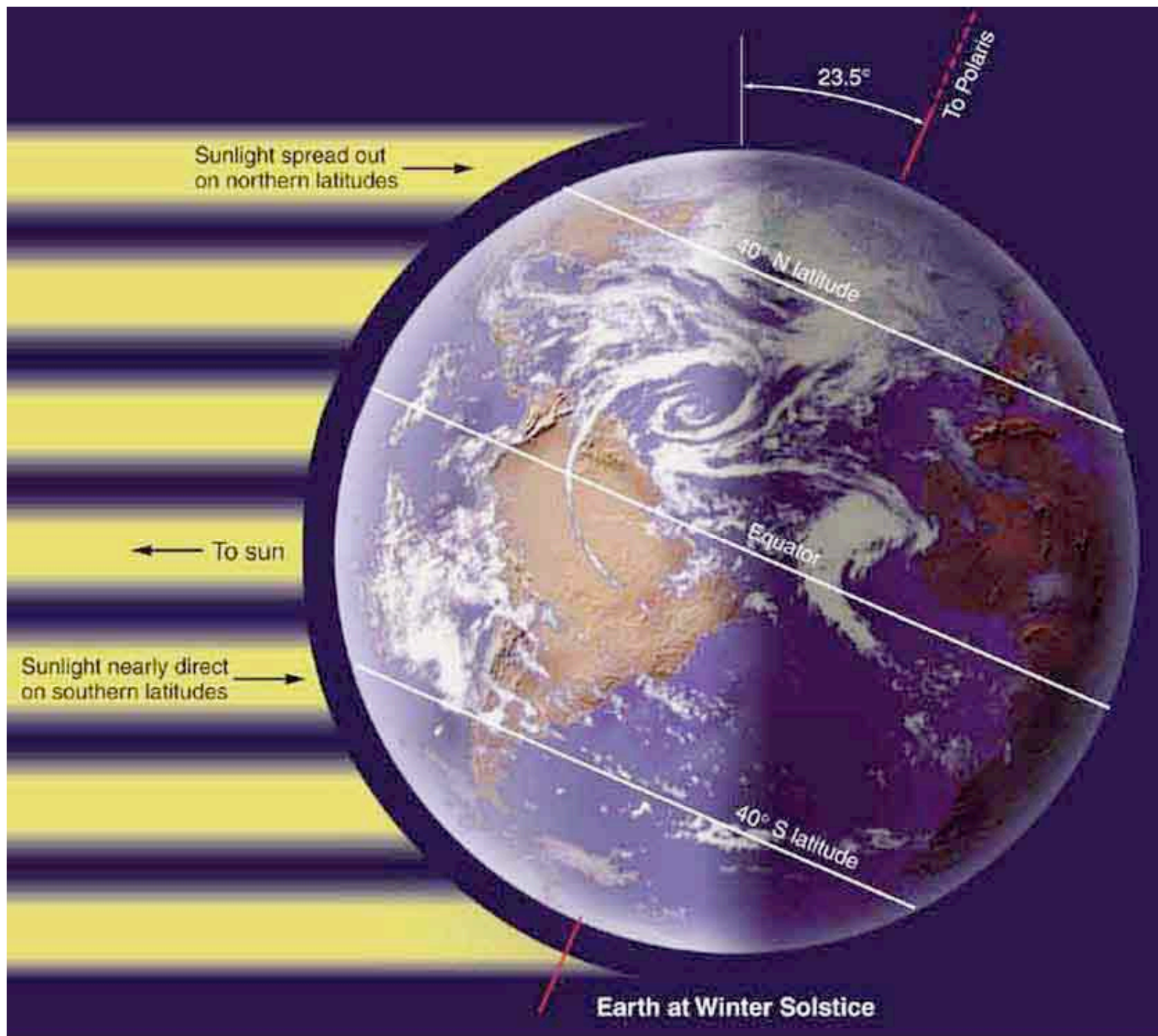
Stars on the equator rise due east, pass 30° south of overhead (seen from Austin), and set due west.

Stars north of the equator rise north of east, pass closer to overhead, and set north of west.

Stars south of the equator rise south of east, pass more than 30° south of overhead, and set south of west.

What path is the Sun currently following across the sky?
If you don't know, watch it.





The Moon: Phases, Eclipses, etc.

Most questions about the appearance of the Moon can be answered by drawing the right drawing:

The Moon orbits around the Earth in the same direction as the Earth rotates. The Sun lights up the side of the Moon (and Earth) that faces the Sun.

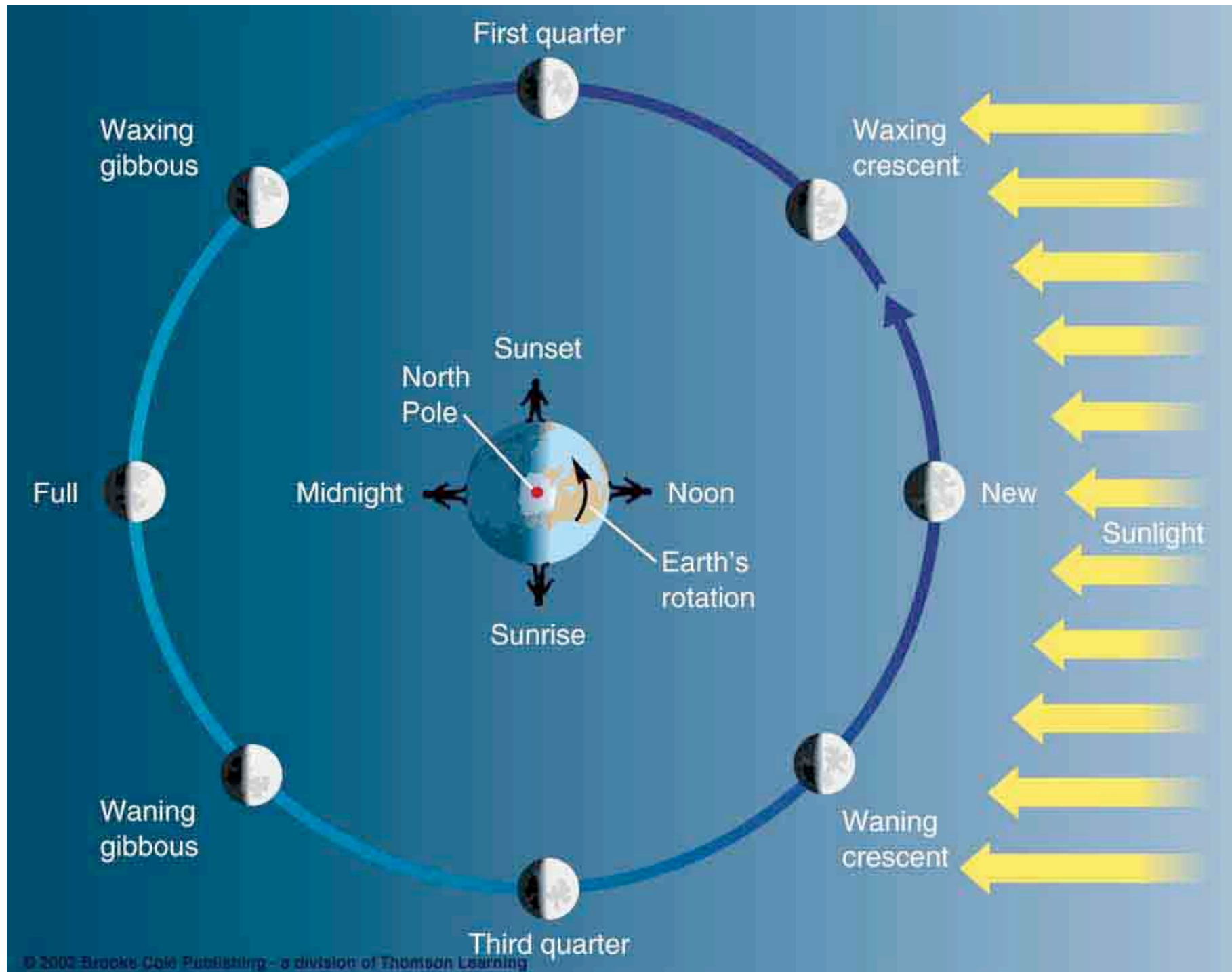
Eclipses (but not phases!) are caused by shadows of the Earth and Moon on each other.

Typical questions:

What time does the Moon rise and set in each of its phases?

What phase is the Moon in just before a solar eclipse?

What phase is the Moon in just before a lunar eclipse?



Quiz

Last night the Moon was in the 1st quarter phase.

At what time did it rise yesterday?

Hint: Draw the picture, remembering that everything moves counter-clockwise.

- A. around sunrise
- B. around noon
- C. around sunset
- D. around midnight

Quiz

The Moon is in 1st quarter phase.

What phase will it be in two weeks from now?

- A. new
- B. full
- C. 1st quarter
- D. 3rd quarter