

Friday, Sep. 5

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 3 (4 by next Wednesday)

The homework handed out today is due in two weeks.

It requires observations of the Moon and planets.

We will take this week's homework next Monday if you haven't finished it yet.

Topics for this 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 two weeks

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.

Motions of objects in the sky

The Earth rotates on its axis once each day.

The Earth's axis passes through the north and south poles, and points at the north star (Polaris) above the north pole.

The rotation of the Earth on its axis makes the stars appear to move around the sky during the night.

It is often easiest to pretend that the sky rotates around the Earth instead of the Earth rotating.

Think of the stars as tiny lights on a glass sphere surrounding the Earth. The sphere rotates about a line through the Earth's poles and through the north star.

Quiz

If you were standing on the pack ice at the north pole in the wintertime and watched the sky for 24 hours, you would see Polaris ..

- A. remain directly overhead
- B. circle the horizon
- C. rise in the east and set in the west, passing directly overhead

Quiz

If you were standing at the north pole and watched the sky for 24 hours, you would see the big dipper ...

- A. remain stationary in the sky
- B. circle around the sky
- C. rise in the east and set in the west, passing directly overhead
- D. rise in the east and set in the west, passing south of overhead

Apparent motion of stars during a night

The Earth rotates on its axis through the poles once a day.

The west-to-east rotation makes stars appear to move east-to-west, generally rising in the east and setting in the west.

The appearance is the same as if the stars were on a giant sphere surrounding the Earth, which rotates east-to-west about an axis running through the Earth's poles.

This imaginary sphere is referred to as the celestial sphere.

The axis of rotation passes through the celestial poles, which are directly above the Earth's poles.

The celestial equator is a line on the celestial sphere above the Earth's equator.

Quiz

If you watch the sky during a night in Austin, Polaris will...

- A. rise in the northeast, pass north of overhead, and set in the northwest
- B. rise due east, pass near overhead, and set due west
- C. rise due east, pass north of overhead, and set due west
- D. remain stationary near overhead
- E. remain stationary about 30° above the north horizon

Quiz

As seen from Austin, Orion rises near due east. During a night it ...

- A. passes near overhead and sets near due west
- B. passes south of overhead and sets near due west
- C. passes near overhead and sets in the southwest
- D. passes south of overhead and sets in the southwest

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?

