

Homework #2 Solutions

Astronomy 10, Section 2

due: Monday, September 12, 2011

Chapter 2; Review Questions:

8) If the Earth did not rotate, could you define the celestial poles and equator?

No, the celestial poles are the extension of the Earth's rotation axis out into space. If the Earth did not rotate, it would have no rotation axis. Likewise, the celestial equator is the Earth's equator projected out into space. The Earth's equator is the plane perpendicular to the rotation axis. (2 points)

9) Where would you go on Earth if you wanted to be able to see both the north celestial pole and the south celestial pole at the same time?

The north and south celestial poles are separated by 180 degrees on the sky. The only way to see both at the same time is to be at the equator (90 degrees away from each one). At this position, the celestial poles will both be on diametrically opposed horizons. (2 points)

11) Explain two reasons why winter days are colder than summer days.

Firstly, the Sun is lower in the sky, delivering less energy per unit area on the surface of the Earth where it happens to be winter time.

Secondly, the duration of daylight (amount of time the surface is exposed to radiation from the Sun) is shorter in the winter than it is in the summer.

(2 points)

Chapter 2; Discussion Questions:

3) Do planets orbiting other stars have ecliptics? Could they have seasons?

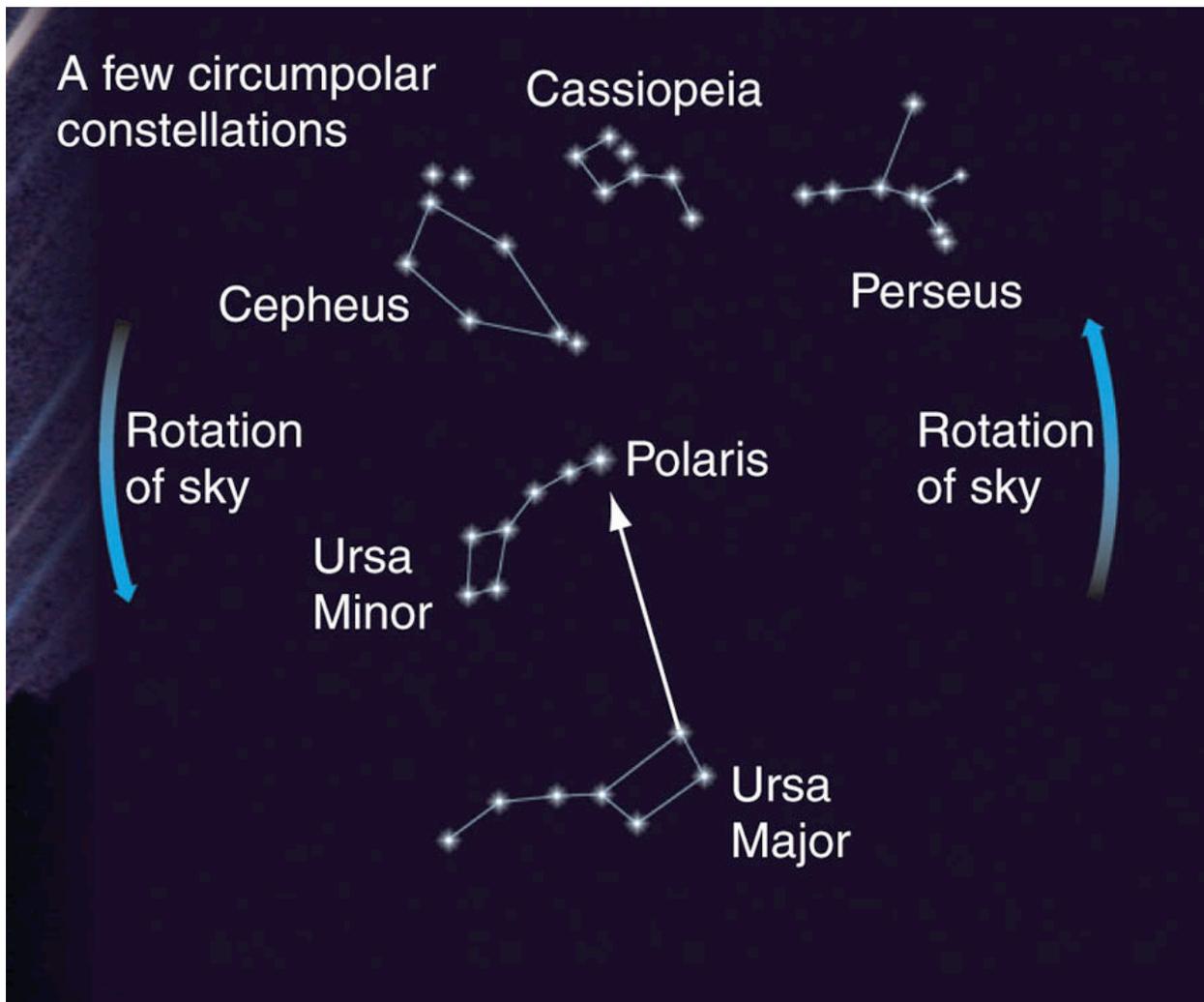
All of the planets are orbiting the Sun. Therefore, the path of the Sun across the sky over the course of the year can be defined. This is the definition of an ecliptic. Every planet has one, and they are all slightly different.

The question of seasons is completely different. Seasons will occur if there are significant changes in the surface temperatures with time. This can occur if a planet's rotation axis is tilted with respect to its own ecliptic. Table A-10 lists these angles for every planet. They range from 0 degrees (Mercury) to 177 degrees (Venus). Consequently, nearly all the planets will experience seasonal changes.

(2 points)

Chapter 2; Learning to Look

- 3) Imagine the diagram below is a photograph taken in mid-September. Use the star charts at the back of this book to decide about what time of night the photo would have been taken.



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Go to the sky chart valid for the Northern hemisphere at 8PM in mid-September (back of textbook). Turn it so that the northern hemisphere is at the bottom (the book will be upside down). This is how the northern sky would look at 8PM. You should be able to see differences between the sky chart and picture above. Ursa Major, for example, is located to the left of the location depicted above. This is evidence of the rotation of the sky. The arrows above indicate the direction of the rotation of the sky (counter-clockwise). Ursa Major has moved counter-clockwise since 8PM by about one-tenth of

a full circle. Therefore, the picture above was taken about one-tenth of 24 hours (about 2.4 hours) after 8PM, or about 10:30 PM.

(2 points)