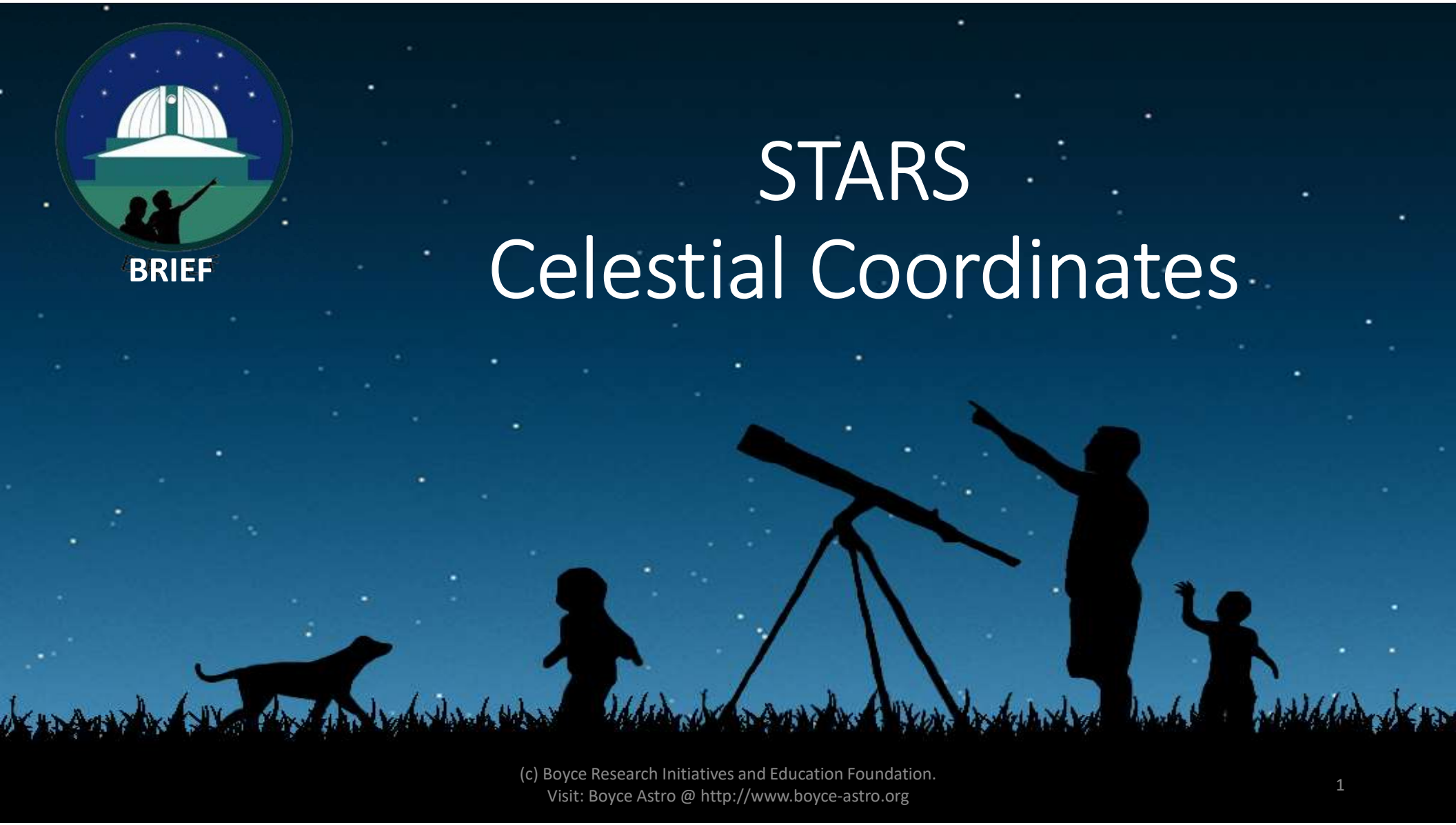
BRIEF

STARS
Celestial Coordinates



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Overview

This lesson will teach you how to navigate the night sky that is essential to astronomical research. It is very similar to the Latitude/Longitude system used to locate objects with Google or your handheld GPS.

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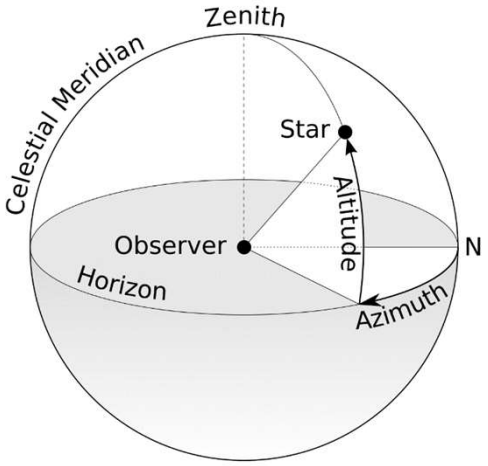
Three Coordinate Systems

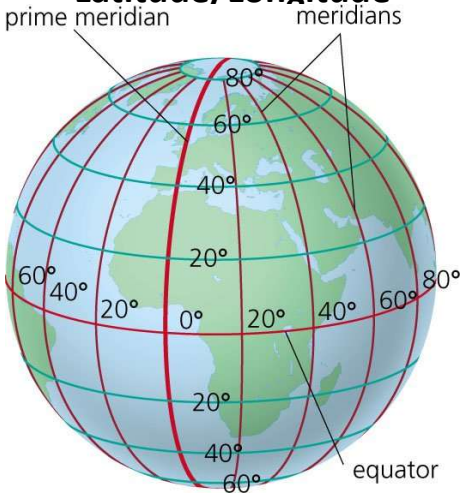
Three basic coordinate systems for describing the location of objects

- Observer based – azimuth and altitude
- Earth based – latitude and longitude
- Celestial – declination and right ascension

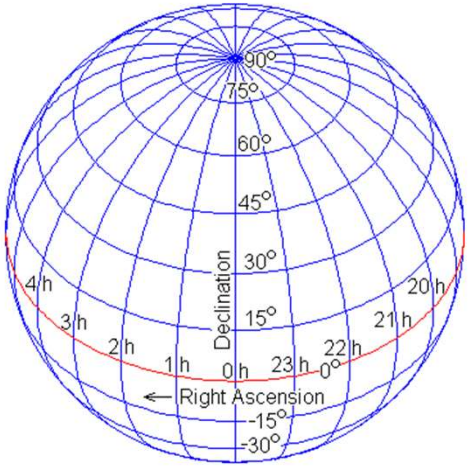
Observer Based: Altitude/Azimuth



Earth Based: Latitude/Longitude



Celestial Based: Right Ascension/Declination



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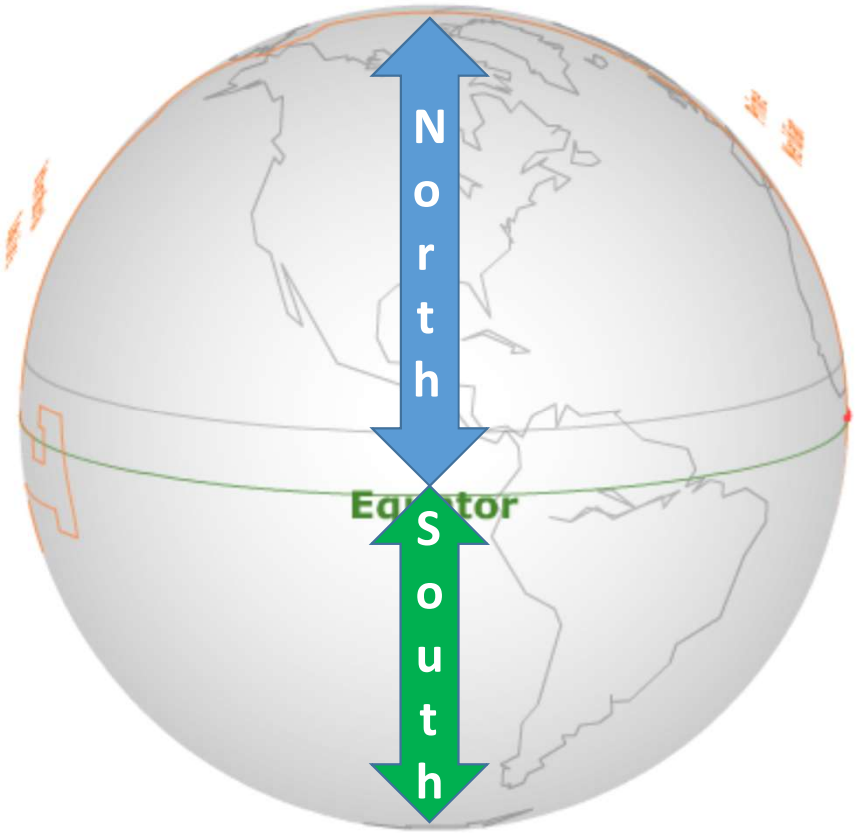
Latitude/Longitude

Latitude: North or South orientation where the Equator divides North and South

Equator to the North Pole contains all North values

Equator to the South Pole contains all the South values

Ex. If a location is at 33 degrees North Latitude, it is 33 degrees above the Equator.



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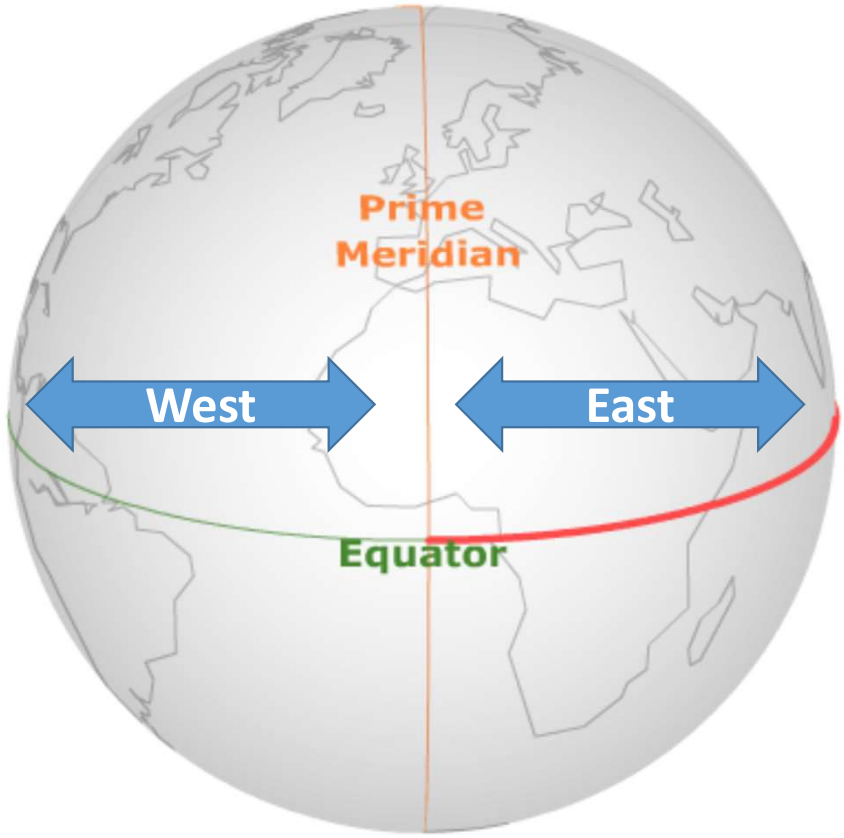
Latitude/Longitude

Longitude: East or West orientation where the Prime Meridian denotes 0 degrees West.

The **Prime Meridian** is a line that passes North to South through Greenwich, England.

International Date Line divides on the opposite side.

As you move West from Greenwich, the numbers increase: 10 West, 20 West, and so on.



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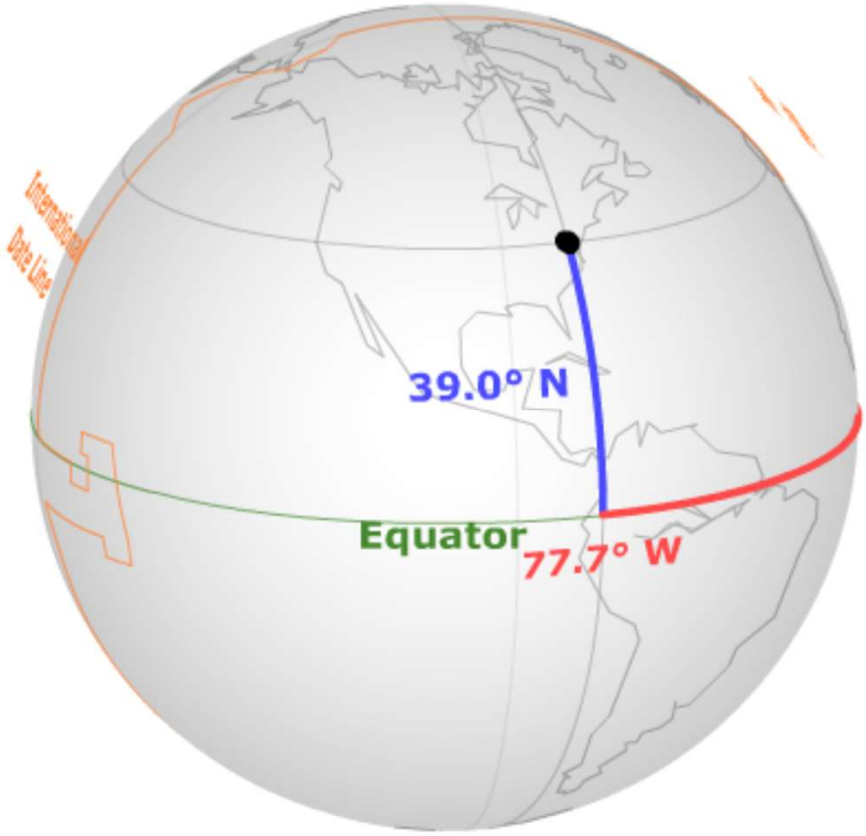
Latitude/Longitude

Putting it Together

The city of Washington DC, is located at approximately 39 degrees North Latitude, and 77.7 degrees West Longitude.

In other words, it is 39 degrees North above the Equator, and 77.7 degrees West of Greenwich, England.



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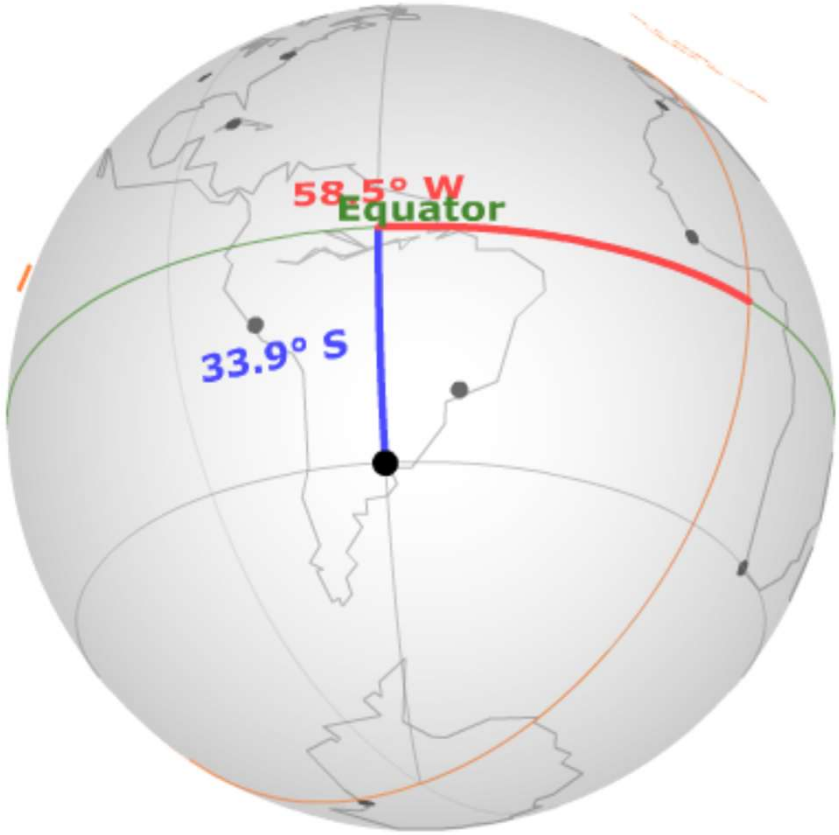
Latitude/Longitude

Putting it Together

Buenos Aires, is located at 33.9 degrees South and 58.5 degrees West.

With Lat/Long coordinates, you can measure any point on the globe and be able to tell its exact location from you no matter where you are located.



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Celestial Coordinates (RA/Dec)

Right Ascension:

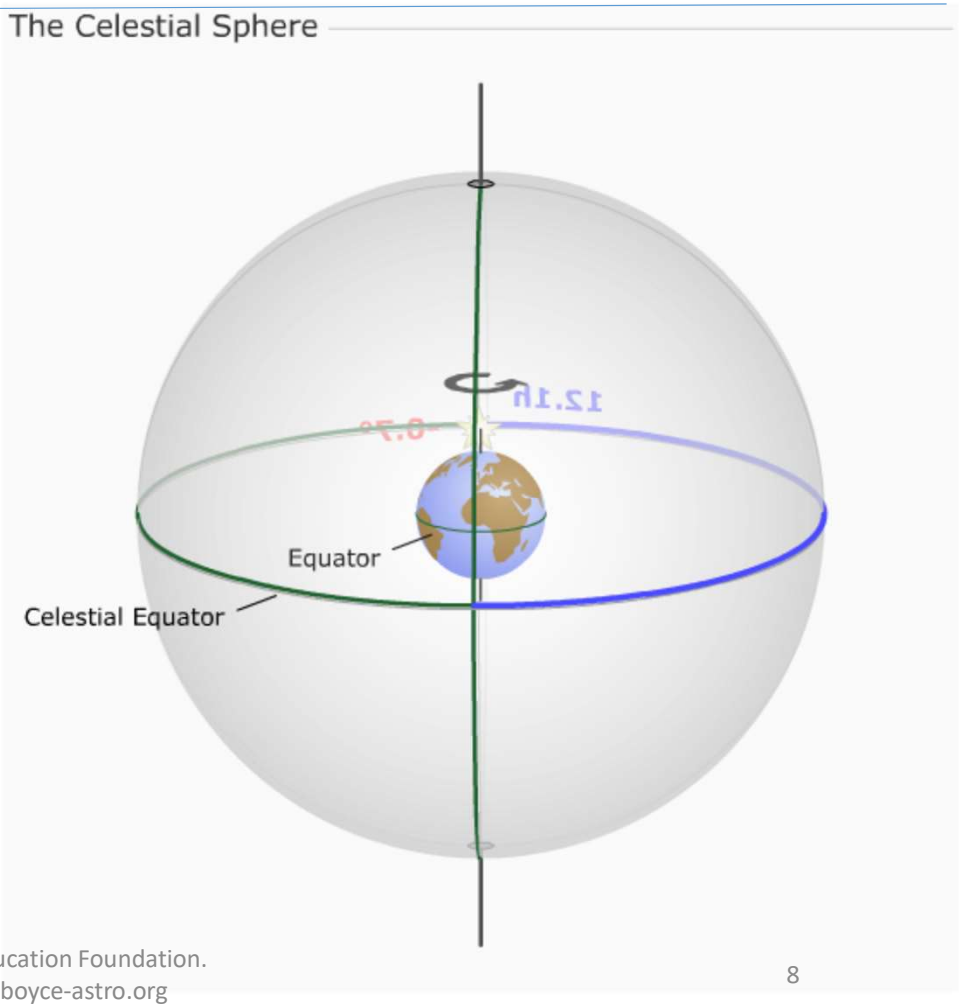
Measures the angular distance of an object eastward along the celestial equator from the vernal equinox to the hour circle passing through the object.

Declination:

Measures the angular distance of an object perpendicular to the celestial equator, positive to the north, negative to the south

More practice: **http://astro.unl.edu/animationsLinks.html**

- The University of Nebraska, Lincoln has great demonstrations to help better understand Celestial Coordinates and other astronomical topics.



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Right Ascension….an Orange?

Since we know the Earth has to rotate completely in 24 hours, and one entire rotation means circling 360°, the rate in degrees that the Earth rotates per hour is:

$$\text{Rotation rate} = \frac{360 \text{ degrees}}{24 \text{ hour}} = \frac{15 \text{ degrees}}{\text{hour}}$$

Or 15° per hour

Or 15 ° per wedge

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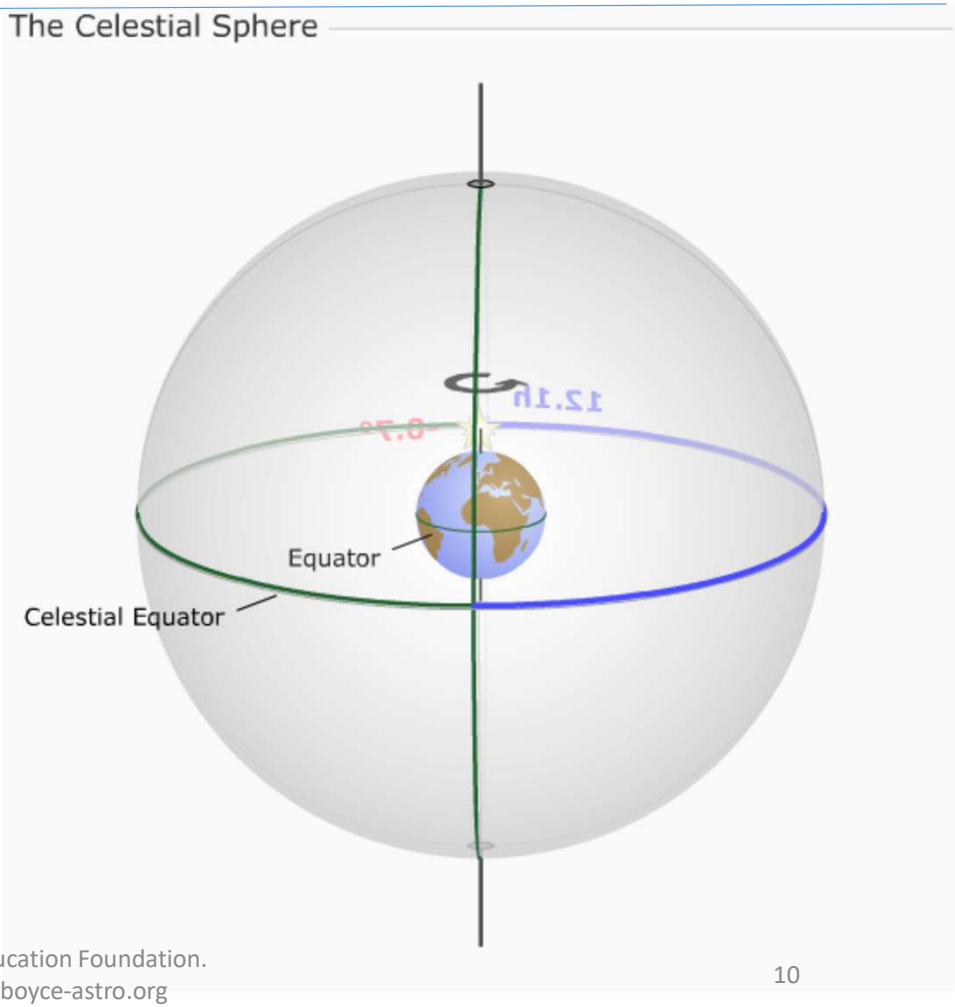
Celestial Coordinates (RA/Dec)

- Rough guide on selecting stars with in the Right Ascension range for your class
  - Summer Classes: 18 through 02 RA
  - Fall Classes: 00 through 08 RA
  - Spring Classes: 12 through 18 RA



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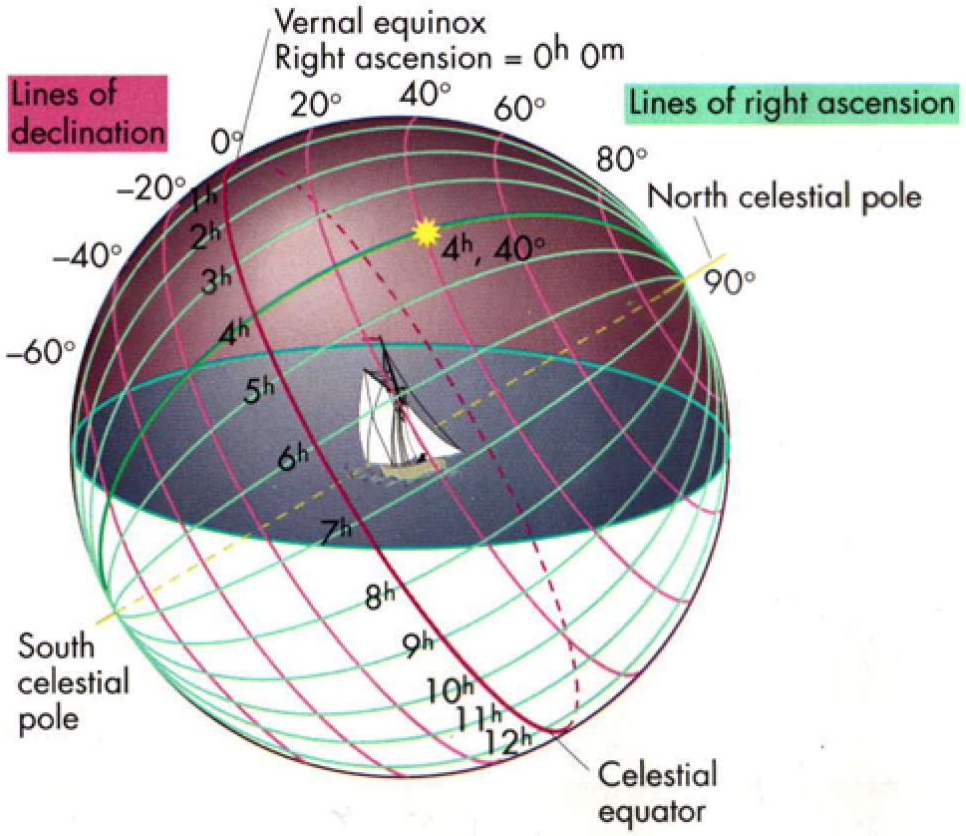
Review

RA and DEC are the Earth's Lat/Long

RA is divided up into 15 degree wedges

DEC of 0 is at the Celestial Equator

All celestial objects have a corresponding RA and DEC



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Questions?

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