In-Class Activity 1: Celestial sphere appearance based on Earth location

1. In the diagram of the sky below, the observer is marked with “O” and the horizon is labeled. Draw and label the following for an observer at the North Pole:
   - cardinal directions (N, S, E, W) and zenith (Z)
   - visible celestial pole(s) (P)
   - celestial equator (Q)
   - What is the value of the angle ZOP?
   - What is the value of the angle ZOQ?

2. Draw and label the following for an observer at the Equator:
   - cardinal directions (N, S, E, W) and zenith (Z)
   - visible celestial pole(s) (P)
   - celestial equator (Q)
   - What is the value of the angle ZOP?
   - What is the value of the angle ZOQ?
3. Draw and label the following for an observer in Atlanta (33.8° N, 84.4° W):
   - cardinal directions (N, S, E, W) and zenith (Z)
   - visible celestial pole(s) (P)
   - celestial equator (Q)

   What is the value of the angle ZOP?

   What is the value of the angle ZOQ?

   For a celestial object with a declination \( \delta = +15^\circ \), draw its path across the sky. Mark where it will cross the meridian and label it with ★1.

   What are the altitude and azimuth of ★1 when it crosses the meridian?

   For a celestial object with a declination \( \delta = -20^\circ \), draw its path across the sky. Mark where it will cross the meridian and label it with ★2.

   What are the altitude and azimuth of ★2 when it crosses the meridian?

   For a celestial object with a declination \( \delta = +50^\circ \), draw its path across the sky. Mark where it will cross the meridian and label it with ★3.

   What are the altitude and azimuth of ★3 when it crosses the meridian?

   Which object (1, 2, or 3) will spend the most time above the horizon?