

FYI

The Polestar

As a result of Earth's rotation on its axis, the stars appear to move across the night sky. Some stars, known as **circumpolar** stars, appear to move in circles around one of the celestial poles. Other stars appear to rise, arc across the sky, and set. One star, however, doesn't appear to move. This is Polaris, also known as the **polestar** or the North Star.

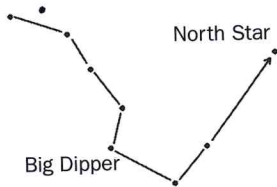


Figure 3-4: Diagram showing how to use the Big Dipper to find the North Star, Polaris

Located almost directly above Earth's northern pole, very near the North Celestial Pole, Polaris marks the point in the sky to which Earth's axis would extend. Thus, as Earth rotates, this star stays in place. It is the center of a northern hemisphere star finder—the point through which the fastener goes and around which all the other stars appear to spin.

Since Polaris appears to remain in the same place, it can be used for navigation. Finding it means that you have identified the bearing of due north. Some people assume that Polaris is one of the brightest stars in the sky, if not the brightest. It isn't. Polaris is about the 40th brightest star seen in the sky. However, Polaris is relatively easy to spot. If you find the Big Dipper in the night sky, you can locate the two stars that make up the front of the Dipper and follow them out to Polaris.

The southern hemisphere doesn't have a polestar. Moreover, the northern hemisphere didn't always—and won't always—have one either. Currently, Polaris is a polestar; however, the tilt of Earth's axis traces out a small circle over approximately 26,000 years. This is called **precession**. Imagine a spinning top. The top doesn't stand straight up, but tilts—like Earth—and moves in a circle—also like Earth. This means that over extended periods of time, the pole points to different parts of the sky. Currently, Polaris is less than one degree off from being perfectly placed as a polestar. Five hundred years ago, it was off by about 3.5° . Two thousand years ago, it was off by about 12° —not a polestar at all. And 5,000 years ago, another star, Thuban (Alpha Draconis), served as the polestar. Looking into the future, in 100 years, Polaris will be even closer to being perfectly placed. But in about 5000 years, Alpha Cephei will be the new polestar. And after that, others will serve, until eventually, Polaris's turn will come again.

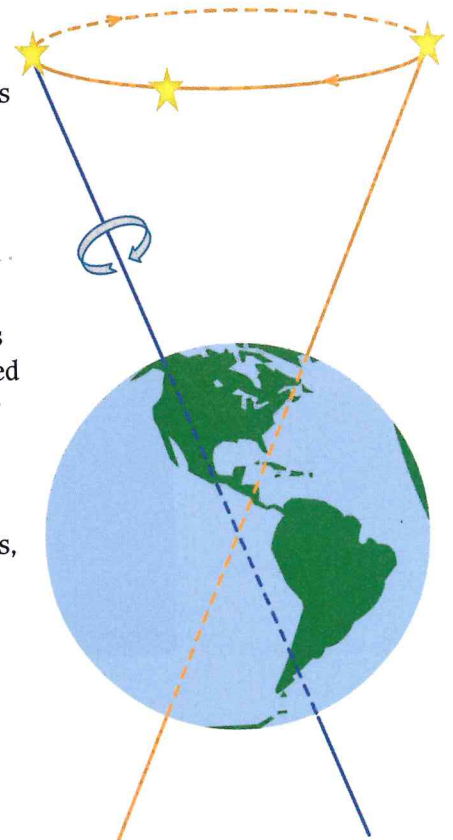


Figure 3-5: Diagram showing Earth's precession (NOT to scale)

Checking In

1. What is a polestar, and why is it useful for navigation?
2. Why does the polestar change over time?