**Title:** Using the Sun to Find the North Star

**How to determine North from your location Using Shadows:**

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**Organization:** Robeson Planetarium and Science Center   www.robeson.k12.nc.us/domain/47/

**Description:**Most people think that the North star is the brightest, but it is not. It is always within 1 degree of true North, however, and this is what makes it special! I will show you a simple way to find the North star, the other cardinal directions, and help you set up for stargazing, all by going out at a special time we astronomy-types call solar noon. Here’s the best part: once you’ve found the North star from your favorite stargazing site, you’ll never lose it; even your grandchildren will be able to use your landmarks to find it if they follow one simple rule, which I will share with you. Note: this presentation is best for those of you that live North of the equator.

**Bio:**Ken is an astronomy educator, planetarium director, and an ardent fan of space exploration. Ken loves teaching, and some of his finest hours are spent with students, be they third graders or college seniors. Ken also reminds us that we are one planet, and we all live under the same night sky.

“Hi, I’m Ken Brandt, and I direct the Robeson Planetarium and Science Center in North Carolina.  If you want to find your way around the night sky in the Northern hemisphere, you should know how to find the most important star in the night sky-the North Star, otherwise known as Polaris.

The first step to finding the North Star at night is to go outside during the day. If you have done this activity properly, you will be a true ‘star navigator’-you will know how to find your way around the night sky.  You can also learn your cardinal directions, North, South, East, and West as reckoned from your location. You will also be able to use a star chart to find objects and constellations in the sky. You can make a compass rose in your own neighborhood, using the Sun!

Here’s what you need: a sunny day, a flat area with a fairly clear horizon in at least 3 directions, and a good sense of time.  Ideally, this place should be very close to your location for nighttime stargazing.  Some obvious points: the area should be dark, but SAFE.  You should not go out alone.

The time to go outside to begin is solar noon.  A good link for determining your local time for solar noon is by going to this website: <http://www.srrb.noaa.gov/highlights/sunrise/sunrise.html>

For most of us, solar noon has only a little to do with normal clock time otherwise known as ‘mean solar time’, which includes allowances for time zones, daylight savings time, and the like.  In daylight savings time solar noon usually occurs around 1 pm.  In standard time, it usually occurs around 12:00 ‘noon’.   At solar noon, go outside; note the position of the sun and the shadow cast by your body.  Every day, the sun is due south at solar noon, which means that any shadow cast by the sun points north!  Note where your shadow is pointing and find a good landmark along your shadow’s line of sight, which will be on your Northern horizon.  Make sure you can figure out where North is from wherever you are going to observe the stars, as this is where you’ll look to find the North Star!  Mark the spot you are standing with something big that you’ll be able to see in the dark.  Now, while you are facing north, stretch out your arms and point at the horizon.  You will be pointing at a landmark of some sort with each hand.  Your left hand is pointing west, and your right hand is pointing east.  Now turn around and you will see where the sun is in the sky.  Don’t look directly at it.  You will see a landmark along your horizon directly under the Sun-this is south.  You might want to write your horizon landmarks down now so you don’t mix them up later.  You are now done with the daylight portion of this activity.

Now, before we go any further, ask yourself: ‘Is the North Star the brightest star in the night sky?’  I’ll wait…go ahead and say it out loud…

NO!  For most people starting off in astronomy, this is something of a shock!  The North Star is NOT important because it is extremely bright, but because of where it is.  The Earth’s North Pole points to a spot within one degree of the North Star, so as we spin on our axis every day, the North Star in one spot will stay!

So the North Star is important because it always remains in the same place in the sky.  Once you have found it, the rest of the sky is open for navigation!

Go out relatively early in the evening shortly after nightfall and find the spot you were standing in earlier, and face your North landmark.  At this time of the year (March), the Big Dipper is slightly to your right and sticking up out of the ground by its handle (imagine a saucepan stuck in the ground, and you get the idea).  Look for the top two stars of the dipper.  These are the pointing stars, and if you connect them with an imaginary line and continue drawing toward the North (or left) you will run directly into a star that is directly over your North landmark.  You have found the North Star!  You should go inside for a while, and come back out later in the evening, after you have looked around a bit.  Note how the positions of most of the stars will have shifted somewhat.  The Big Dipper, for example, will be further up off the Northeastern horizon.  Find the pointer stars of the Big Dipper again, and check to see if the North Star is still above your North landmark.  Assuming that it has remained steady, you have done it-you really have found the North Star.

Here is the best news of all:  as long as that remains your ‘stargazing spot’, the North Star will *always*be waiting for you in exactly the same spot!

As an added bonus, the height of the North Star off the horizon is equal in degrees to your latitude.

Finally, your grandchildren will be able to take *their* grandchildren out to that spot, and see the North Star in almost exactly the same place you did, and that is something really special!  Happy stargazing!”

Location:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
Date of observation:\_\_\_\_\_\_\_ Time of observation: \_\_\_\_\_\_\_\_\_\_\_\_   
  
Describe the following landmarks you will use for stargazing. 

North:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
South:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
East:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
  
West:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_