DIRECTIONS FOR LIFE

When you absolutely, positively have to know in which direction you're heading, look to the stars.

WRITTEN BY MARK JOYNER ★ ILLUSTRATED BY TIM LEE

Here's a simple question for the outdoorsman: Which is more reliable, a compass or the stars? Let's say you have both in hand, so to speak, in the wilderness, and they're in serious disagreement as to direction. Which do you trust?

If you're not that familiar with a compass, let me point out that they're not just point and go. Although compasses have been around for at least 1,000 years, it still comes as a surprise to many people that they don't really point north. Or at least not to true north. The business end of a compass orients itself to the earth's magnetic fields and points to a position known as magnetic north. The problem is that this location is hundreds of miles from the North Pole, which is defined as geographic north. The difference measured in degrees is called declination, or variation as it's known in nautical settings. It's said that Christopher Columbus discovered the phenomenon on his trip to America in 1492, but it was actually known well before that time.

Along the North Carolina coast, variation ranges from 8 degrees off Wilmington to 10 degrees along the northern Outer Banks. Travel north as far as Maine and it increases to 20 degrees. It can surge as high as 45 degrees in extreme sites, in either a positive or a negative direction. If it helps any, there are a few places where it's 0, such as the Florida panhandle, where the two norths are in perfect alignment. Variation changes over time also, as in hundreds of years, which could be significant if you're consulting an old deed or a treasure map.

It's also pretty obvious that a compass is thrown seriously out of whack by the nearness of any metal objects. This effect is known as deviation and can be caused by something as innocent as your pocketknife. That's easy enough to remedy, assuming you're aware of the problem. More troubling are fixed objects that can't be eliminated. Onboard a boat, for instance, anchors, steel railings and electronics can all influence a compass reading.

Deviation changes with a boat's orientation on the water, strengthened at some headings and diminished at others. The prudent mariner is therefore advised to create a deviation table for his particular vessel through a procedure known as swinging the boat. This involves the use of known landmarks, or these days a GPS (global positioning system) device. And lest you're wondering why to bother with a compass at all if you have GPS, be advised that the U.S. Coast Guard still requires compass know-how to earn a captain's license.

All this means that a compass must be corrected for deviation to yield an accurate magnetic course, which must then be corrected for variation to yield a true bearing. If you have all this down, congratulations! You're well on your way to earning a captain's license. (Actually, generations of boat captains have relied on the memory aid True Virgins Make Dull Company to remind them of the steps in which True bearing, Variation, Magnetic course, Deviation and Compass reading have to be addressed.)

The problem is that the average person is not likely to go to such lengths for the sake of accuracy. Unless you're piloting a ship at sea or doing some serious trekking, you might never need to. Still, it's always comforting to have a general sense of direction in the outdoors.

You might even want to make your own compass, as I once did on a camping trip from a fishhook rubbed on a magnet. Floated on a leaf in a quiet pool, it spun slowly and then unhesitatingly pointed north. Of course, this is easier to do in a bowl of water in the kitchen, but so much more dramatic in the wild. Straighten the hook with pliers, and then rub just the hook point along a magnet. Don't let the piece of paper or whatever you float it on touch the sides of the bowl, and you'll be rewarded with a glimpse of the powerful but unseen forces that surround us.

The Stars

You can actually see the "unseen" forces on any given night, just by stepping outside and gazing up at the heavens. Blazing away in the night sky are countless stars passing overhead in their appointed and timeless seasons. We think of them as coming up in the east and going down in the west, but the stars actually move in a giant counterclockwise motion, or seem to, since we're actually the ones turning. At the very center is the one fixed point in the sky, which we know as the North Star. More properly called Polaris, or the pole star, this celestial beacon is positioned less than a single degree from true north. Polaris has been valued as a navigational beacon for centuries, although it wasn't always that way. Some 2,000 years ago, the distinction of being the pole star fell to another star, known as Thuban. A slight wobble in the Earth's rotation causes a 25,000-year shift, and Thuban will again be our pole star in the far-distant future. For the time being, however, finding north is as easy as finding the North Star.

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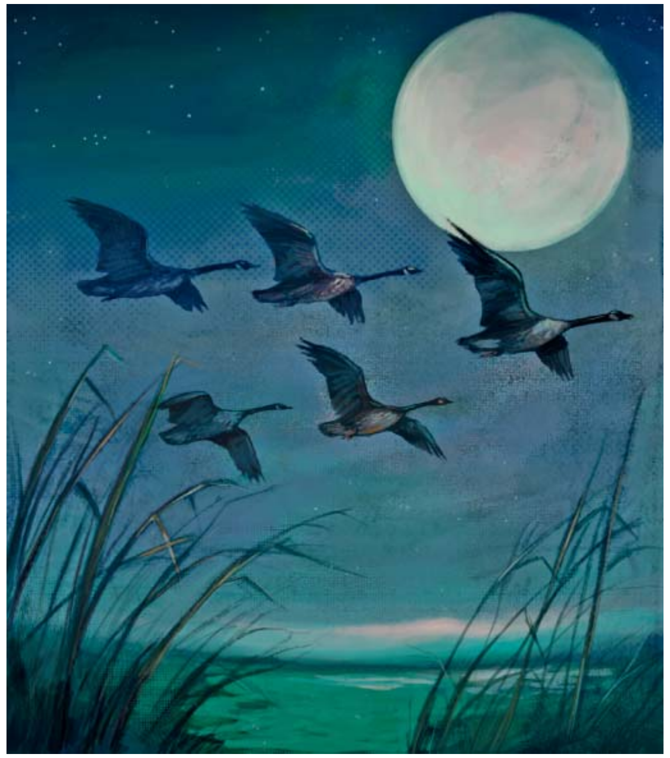
But let's be honest: How many of us can reliably pinpoint this one star in a crowded sky? To be so famous, Polaris is rather underwhelming as a sky object. It's not particularly bright, perhaps because it's located some 400 light-years away. That means the point of light we see at any given time has been traveling more than 400 years to get here, having left close to the time the Lost Colony was being established along our coast. How ironic that knowing how to find this one star can keep us from ever being lost.



Another problem is that Polaris does not appear in an easily recognized group of stars. That's despite the fact that it marks the tail end of the Little Dipper, which is itself vague and visible only under the best of conditions. (Unknown is how many people mistake the Pleiades, a brilliant cluster in the winter sky, for the Little Dipper. Its seven stars do form an almost perfect dipper, but don't be deceived.)

What's needed are some handy reference points overhead. Fortunately, these are provided by one of the best-known of all the constellations, the Big Dipper. It, too, has been celebrated for centuries and is in fact one of the few constellations mentioned by name in the Bible. Before someone objects, let me explain that the Big Dipper is not a real constellation but rather an asterism, a grouping of stars sometimes found within a constellation. In this case, the dipper shape is part of Ursus Major, the Big Bear. The Little Dipper also is an asterism and is part of the constellation Ursus Minor.

Just seven stars make up the Big Dipper; four creating the bowl and three forming the curved handle (the tail of the great bear). An ancient test of eyesight was to detect that the middle star of the handle harbors a dim companion star. The star is Mizar, and the two are known as the horse and rider. It's interesting to note that following the arc of the tail outward leads to another famous star, Arcturus, helpfully remembered as "Arc to Arcturus."

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For direction-finding purposes, it's the two outer stars of the bowl that concern us. They're sometimes known as the pointer stars because a line drawn between them and extending about five times their distance from each other leads right to Polaris. Over the course of a night, the Big Dipper will rotate around Polaris, but the two pointer stars always line up in just this way.

Finding north has therefore gotten as simple as finding the Big Dipper, which is easy most of the year. In the fall, the dipper rides low on the horizon and can't be seen well at our latitude. Fortunately, during this time another constellation picks up the slack. It's also easy to recognize and is known as Cassiopeia, in mythology the queen who came out poorly in a quarrel with Poseidon. Positioned directly across from the dipper on the other side of Polaris, Cassiopeia forms a large M or W, depending on how it's viewed. When one star is down, the other is up.

Speaking of latitude, which is of course a measurement of location between the equator and the pole, that's also indicated by Polaris. The height (actually the angle in degrees) of Polaris above the horizon reveals an observer's exact latitude. If you're standing at the North Pole, Polaris would be straight overhead at 90 degrees. If you traveled south in any direction, Polaris would drop lower and lower in the sky, until at the equator it would appear on the horizon at 0 degrees. At a point in between, such as Raleigh, it would be about a third of the way up in the sky at 36 degrees, which is indeed Raleigh's latitude.

Just as trivia, you can't very well stand at the North Pole. It's located in the middle of the Arctic Ocean, unlike the South Pole, which lies on a continental landmass. And for that matter, there is no comparable South Pole star, although the Southern Cross constellation points the direction rather accurately.

If all this leaves you a bit bewildered, don't worry. It's said that Daniel Boone himself, asked if he was ever lost in the vast American countryside, replied no, he had never been lost, but there were times when he was a mite bewildered for several days in a row. We can't all be great frontiersmen, but by star or compass, we can at least hope to find our directions in life.

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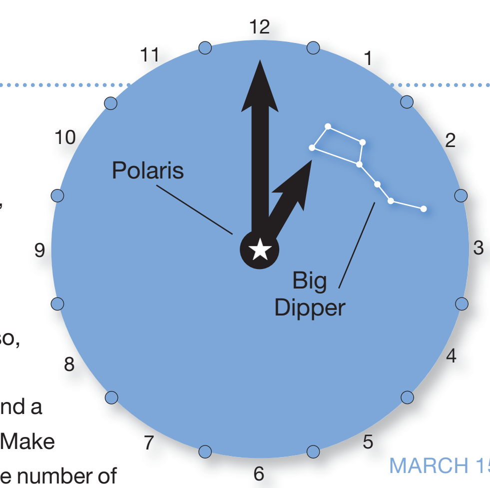
Telling Time by the Big Dipper



Many people know that Polaris, the North Star, can reveal direction and location, but few realize that it can be used in conjunction with the Big Dipper to tell time. In its counterclockwise rotation around Polaris, the Big Dipper makes a full turn every 24 hours with such precision that it can be used as a celestial clock. The method is a bit cumbersome and at best accurate to only within half an hour or so, but with a little practice it can be used with relative ease.

To do so, envision Polaris as the center of a large clock face, with the hour hand a line extending from Polaris outward through the pointer stars of the Big Dipper. Make your best estimate of the "time" indicated by this hour hand, and then add to it the number of months that have passed since the beginning of the year. (That means to allow a one-month lapse; the first of February would count as only one, for instance, since only one month would have gone by since the beginning of the year.) Double the number you just arrived at and then subtract it from 28 1/2. If it's larger than 28 1/2, subtract it from 52 1/2. The result will be the correct time, although it's configured on the 24-hour clock used by the military and airlines. The number 23, for example, would mean 11 p.m. —and if Daylight Saving Time is in effect, you'll have to add one hour.

In the diagram shown here, the clock time indicated is one o'clock. By March 15 we calculate that 2 1/2 months of the year have passed. That means we add 1 + 2 1/2 to get 3 1/2. Doubling that gives us 7. Subtract that from 28 1/2 to get 21 1/2, which translates to 9:30 p.m.