

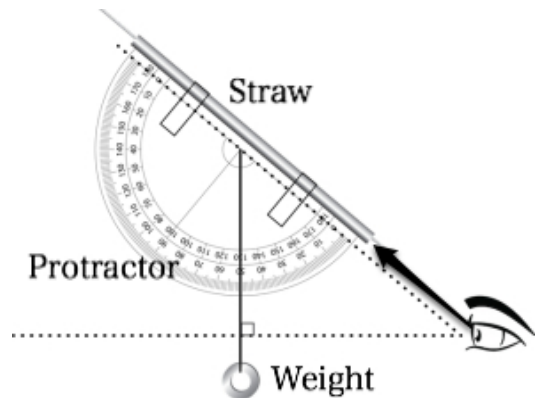
Name _____

Astronomical Instrument Challenge

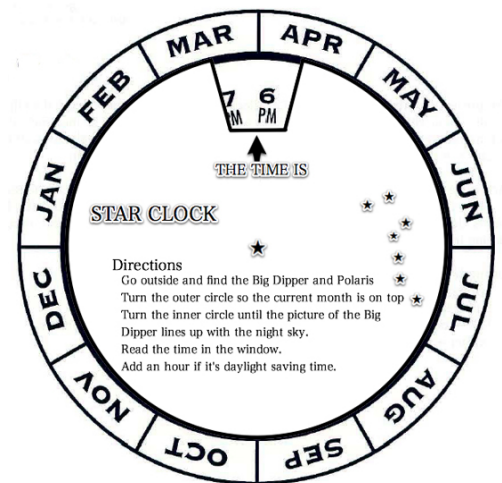
Test Bonus!

Directions: Cut out and construct your Star Clock and Astrolabe as described below. Use your Astrolabe to find the altitude of Polaris to the nearest degree above the horizon, then use your star clock to locate the position of Polaris as described below.

An Astrolabe: The mariner's astrolabe was developed over two thousand years ago. It was an instrument of navigation used to measure celestial altitude. Celestial altitude is the relative 'height' of a star, planet, or other celestial objects above the horizon. Why would "celestial altitude" be important to ancient mariners? Ancient navigators could not measure longitude. However, it was quite easy to determine latitude. To find the latitude of their location, all they needed to do was find the altitude of the North Star (Polaris). Astrolabes were the most popular astronomical instrument for several centuries, but sextants eventually replaced them.



Star Clock: Our daytime concept of time is based on the motion and position of the Sun. But did you realize that you can use the stars to tell time at night? Long before the invention of clocks and watches, skywatchers knew that the motion of the stars marked the passage of time during the night. As Earth turns on its axis, the stars appear to rise in the east and set in the west, just like the Sun and Moon. Looking up in the northern sky, however, the stars do not rise or set — instead, they seem to slowly turn counterclockwise around Polaris, the North Star. Your Star Clock uses this nightly pinwheel star motion around Polaris using the Big Dipper for reference for you to find the time during the night.



How to use your star clock: Once it's dark, go outside and face north, holding the Star Clock, so the current month is at the top of the outer circle. Now turn the front disk until the small picture of the Big Dipper matches the real Big Dipper's position in the sky. The current time will appear in the cutout.

Note: If daylight-saving (summer) time is in effect, you'll need to add one hour to the indicated time. Also, by turning both disks together (so that the time you've picked stays the same), you'll be able to see how the Big Dipper appears in the sky at that time throughout the year. It's highest in the sky, perched directly above Polaris, in the early evening during May and June. But during November and December, the Dipper is down low and maybe too near the horizon (or below it) to be seen. Be sure that you're facing north when using the Star Clock. If you're unsure where north is, simply note where the sunsets are and then turn to your right — now you're looking north, more or less.

Your Observations

1. State the date and time of the night that you made your observations.

2. Using your astrolabe, what is the altitude of Polaris above the horizon for your location?

3. Draw the position of the Big Dipper and Polaris at the time of your observations.

4. State the time of night as read by your star clock. _____

5. Did the clock time and your star clock time match? Explain why there might be a difference.

6. Go back outside an hour or two later in the evening and describe any changes you see.

7. What is the latitude for Wilson, New York? _____

8. How does your latitude relate to your observations?

