

# Make your own planisphere

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A planisphere is a simple hand-held device which shows a map of which stars are visible in the night sky at any particular time. By rotating a wheel, it shows how stars move across the sky through the night, and how different constellations are visible at different times of year.

Here, I present a kit which you can download and print to make your own planisphere out of paper or cardboard.

The design of a planisphere depends on the geographic location where it is to be used, since different stars are visible from different places. I have created kits for use at a wide range of latitudes, which you can download from

<https://in-the-sky.org/planisphere/>

The planisphere presented in this document is designed for use at a latitude of  $45^{\circ}\text{N}$ .

## What you need

- Two sheets of A4 paper, or preferably thin card.
- Scissors.
- A split-pin fastener.
- Optional: one sheet of transparent plastic, e.g. acetate designed for use with overhead projectors.
- Optional: A little glue.

## Assembly instructions

**Step 1** – Planispheres look slightly different depending on where you live. The planisphere prepared in this document is designed for use anywhere on Earth which is within a few degrees of latitude  $45^{\circ}\text{N}$ . If you live elsewhere, you should download an alternative kit from

<https://in-the-sky.org/planisphere/>

**Step 2** – Print the pages at the back of this PDF file, showing the star wheel and the body of the planisphere, onto two separate sheets of paper, or more preferably onto thin card.

**Step 3** – Carefully cut out the star wheel and the body of the planisphere. Also cut out the shaded grey area of the planisphere's body, and if you have it, the grid of lines which you have printed onto transparent plastic. If you are using cardboard, you may wish to carefully score the body of the planisphere along the dotted line to make it easier to fold it along this line later.

**Step 4** – The star wheel has a small circle at its center, and the planisphere's body has a matching small circle at the bottom. Make a small hole (about 2mm across) in each. If a paper drill is to hand, these are ideal, otherwise use a compass point and enlarge the hole by turning in a circular motion.

**Step 5** – Slot a split-pin fastener through the middle of the star wheel, with the head of the fastener against the printed side of the star wheel. Then slot the body of the planisphere onto the same fastener, with the printed side facing the back of the fastener. Fold the fastener down to secure the two sheets of cardboard together.

**Step 6 (Optional)** – If you printed the final page of the PDF file onto a sheet of plastic, you should now stick this grid of lines over the viewing window which you cut out from the body of the planisphere.

**Step 7** – Fold the body of the planisphere along the dotted line, so that the front of the star wheel shows through the window which you cut in the body.

**Congratulations, your planisphere is now ready for use!**

## How to use your planisphere

Turn the star wheel until you find the point around its edge where today's date is marked, and line this point up with the current time. The viewing window now shows all of the constellations that are visible in the sky.

Go outside and face north. Holding the planisphere up to the sky, the stars marked at the bottom of the viewing window should match up with those that you see in the sky in front of you.

Turn to face east or west, and rotate the planisphere so that the word "East" or "West" is at the bottom of the window. Once again, the stars at the bottom of the viewing window should match up with those that you see in the sky in front of you.

If you printed the grid of altitude and azimuth lines onto transparent plastic, these lines let you work out how high objects will appear in the sky, and in which direction. The circles are drawn at altitudes of 10, 20, 30, ..., 80 degrees above the horizon. For reference, a distance of ten degrees roughly equates to a hand-span at arm's length. The curved lines are vertical lines connecting points on the horizon up to the point immediately above your head. They are drawn in the cardinal directions S, SSE, SE, ESE, E, etc.

## Customised planispheres

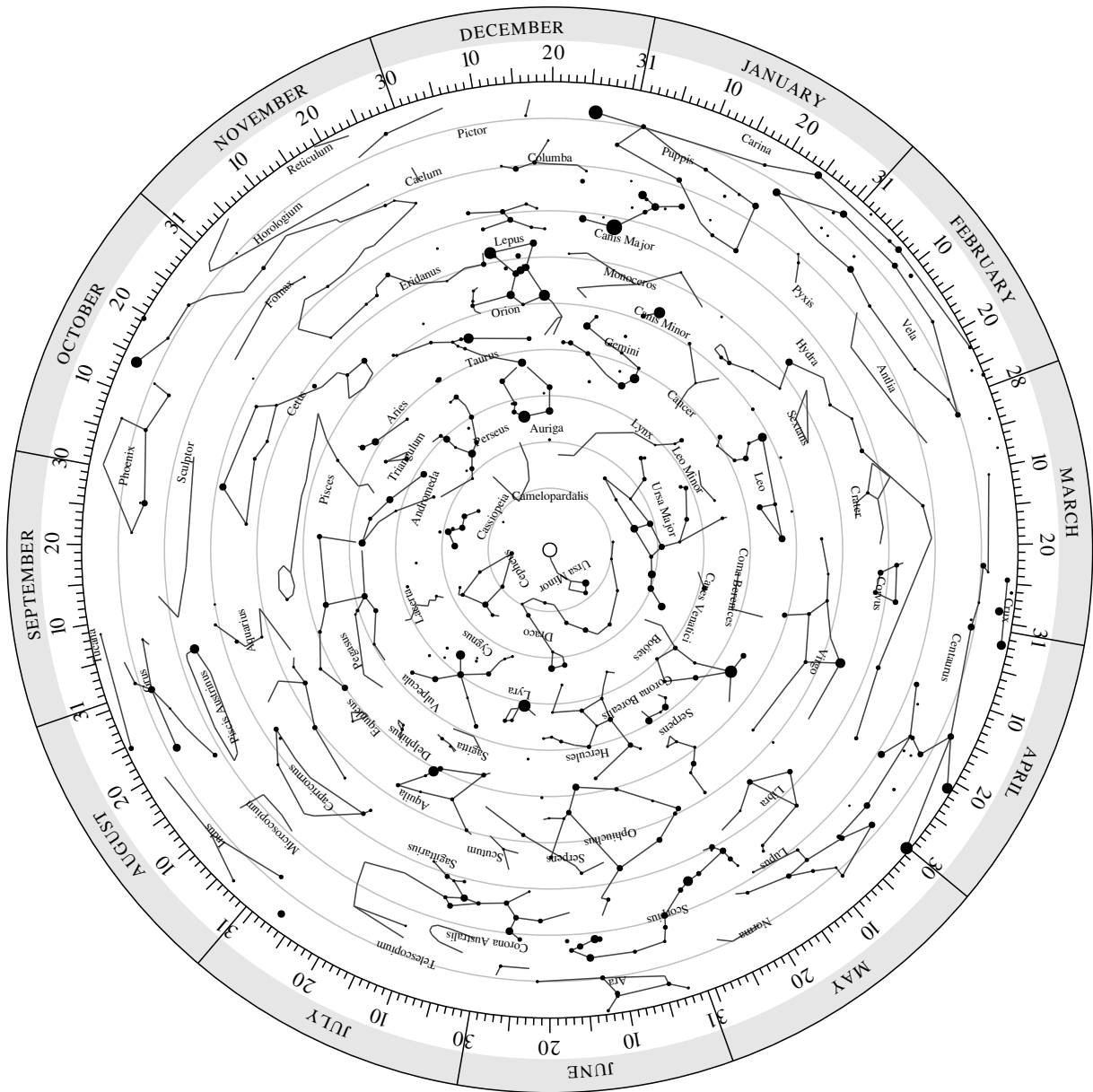
This planisphere kit was designed using a collection of Python scripts and the `pycairo` graphics library. If you would like to customise your planisphere, you are welcome

to download the scripts from my GitHub account and modify them, providing you credit the source:

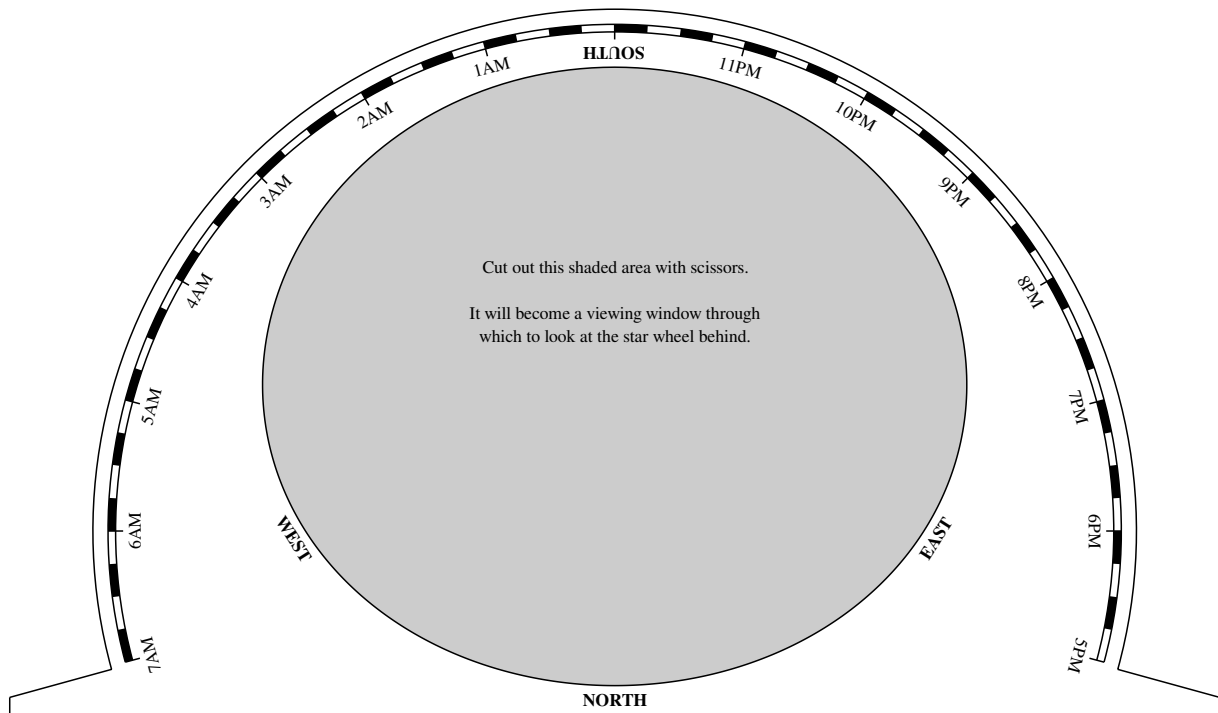
<https://github.com/dcf21/planisphere>

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The planisphere's central star wheel, which should be sandwiched inside the folded holder.



# PLANISPHERE 45°N

1

Turn the starwheel until you find the point around its edge where today's date is marked, and line this point up with the current time. The viewing window now shows all of the constellations that are visible in the sky.

2

Go outside and face north. Holding the planisphere up to the sky, the stars marked at the bottom of the viewing window should match up with those that you see in the sky in front of you.

3

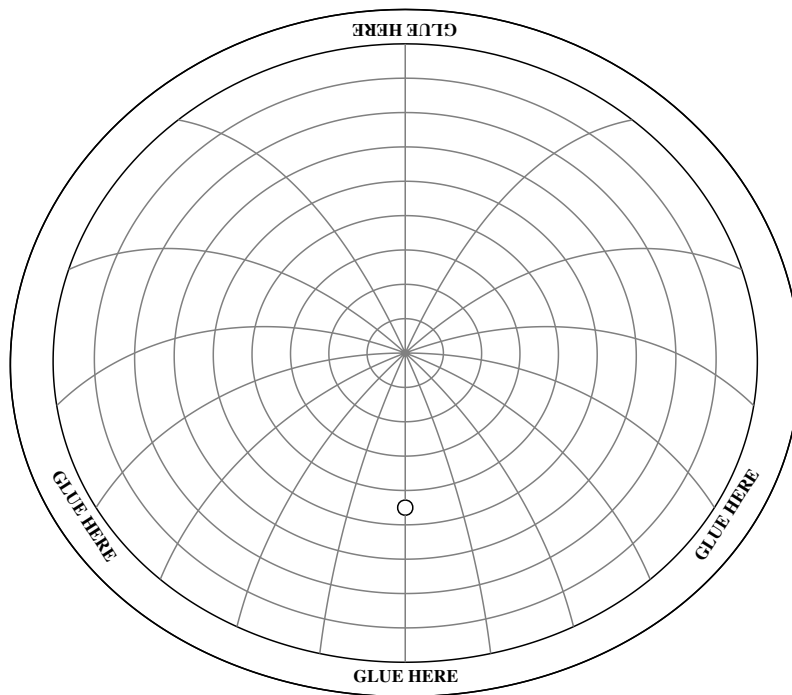
Turn to face east or west, and rotate the planisphere so that the word "East" or "West" is at the bottom of the window. Once again, the stars at the bottom of the viewing window should match up with those that you see in the sky in front of you.

For more information, see <https://in-the-sky.org/planisphere> © Dominic Ford 2021.

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The constellations of the night sky revolve around the celestial poles once every 23 hour and 56 minutes. The idea of representing the night sky as a flat map, which is turned to emulate the night sky's rotation, dated back to the ancient Greek astronomer Hipparchus (circa 150 BC). The fact that this rotation takes four minutes less than the length of a day means that stars rise four minutes earlier each day, or half-an-hour earlier each week. Through the year, new constellations become visible in the pre-dawn sky, and disappear into evening twilight.



This grid of lines can optionally be printed onto transparent plastic and glued into the cut out window in the planisphere's body to show the altitudes of objects in the sky, and their directions.