

# MAKING A PAPER PLATE PLANET PROJECTOR FOR PORTABLE PLANETARIUMS (P<sup>6</sup>)

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**Abstract: In this activity, portable planetarium users make an inexpensive, hand-held device that transfers the two-dimensional drawing of the planets in orbit around the sun to a projection of solar system objects in the planetarium sky.**

Recommended materials are a Mini Maglite® flashlight, a Chinet® paper bowl, a thick paper plate, a large pin or tack, a pencil, and an illustration or tables indicating the position of the planets or moon for the desired dates.

Turn over the bowl and on its bottom draw the planets in small orbits around the sun. Their respective positions can be found in *Sky & Telescope* magazine, for example, or you can use right ascension tables for more advanced lesson plans.

I prefer to mark out 24 hours of right ascension on the bowl's rim first. I draw the Earth near the center of the bowl and mark nearby the location of the Sun from the right ascension tables. Finally, I draw orbits around the Sun and place the remaining planets in mid-month positions.

From the *Earth* draw a line through each of the planets and the Sun and extend the lines down the outer sides of the bowl.

Midway down the bowl's side, punch a hole on each line to denote the respective planets. I use a pin for planets and enlarge it only slightly with a sharp pencil. For the Sun and Moon, I enlarge the hole additionally with the taper of the pencil.

In the middle of the plate, cut an "X" so that the flashlight handle will snugly fit through the plate. Place the upside down bowl on the upright paper plate and tape them together, preferably so the earth is centered over the plate's hole. Your P<sup>6</sup> is ready for use.

In the planetarium, remove the head of the Mini Maglite® so the illuminated light bulb is exposed and insert the flashlight up through the bottom of the paper plate. Use caution and keep the tip from contacting the paper, for the exposed halogen bulb is fragile. You should now be holding the handle of the upright flashlight topped by a paper plate with an inverted bowl on it.

Align the device so that the P<sup>6</sup> sun projection corresponds with the actual Sun's position for the given time. As you hold the flashlight, the paper plate should be in the plane of the ecliptic. The projected planets, moon and sun will appear in their respective positions.

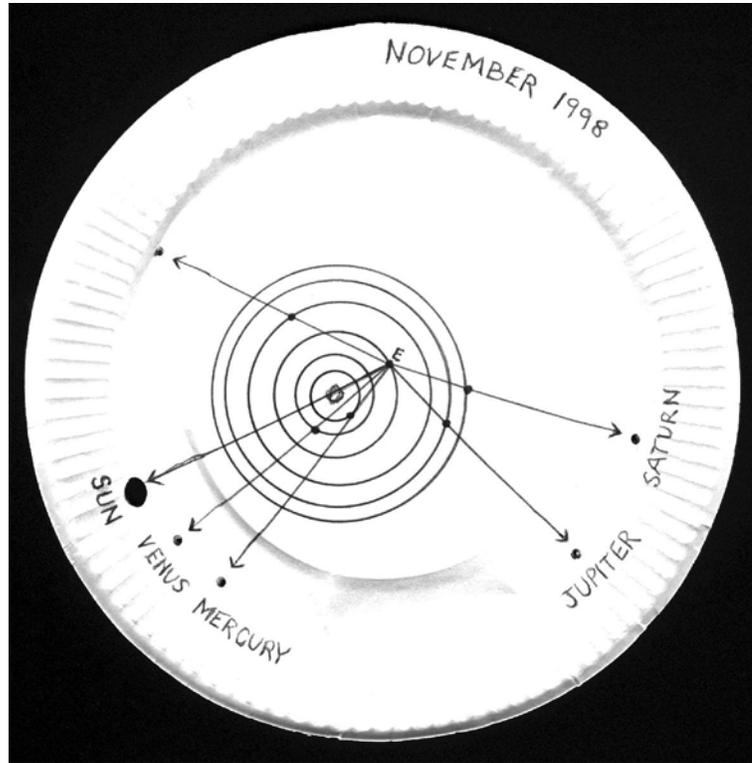
The Sun serves as a clock. Because there is no horizon cut-off, the sun projection will remain illuminated when it is below the horizon. If you know the sunrise and sunset time for that day, you can interpolate to get the times between the Sun's horizon position and its noon or its midnight position. With the diurnal motor on, you can demonstrate the rising and setting of the planets, Moon, and Sun.

A key feature of the P<sup>6</sup> is that the instructor can readily refer back and forth between the familiar planar position of the planets in orbit around the Sun and the position of the planets as seen from Earth.

As a variation on this theme, one can make a moon projector to show the relative positions of the Sun and the Moon through the four primary phases. A hole punch yields clean, circular moons and sun. Place black tape over half of the hole to project quarter moons.

In another variation, you can project a horizon onto the dome with your P<sup>6</sup>. For example, neatly cut the outline of Stonehenge or Medicine Wheel on the side of the bowl. You can still use the planetarium's projector concurrently to show the rise of the Sun at key azimuths.

As always, I welcome your feedback on this activity.



( Planet Finder )

( Rainbow Finder )

