



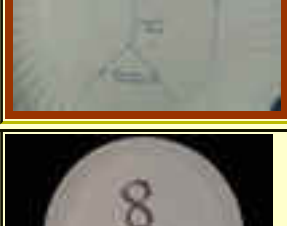
# Paper Plate Education

## "Serving the Universe on a Paper Plate"



Title	Description	Image	*Link Contents
<a href="#">Addition &amp; Multiplication Tableware</a>	Design a plate for practicing addition and multiplication tables.		Pix Text
<a href="#">African Masks</a>	Highlight the role of masks for celebrations.		Pix Text
<a href="#">Alien Platecraft</a>	Decorate and fly a saucer-like Platecraft.		Ref. Pix Text
<a href="#">Analemma</a>	Plot the figure-8 of an analemma on a globe through one year. This year-long project is a variation of the <a href="#">Sub-Solar Cup</a> activity.		Ref. Pix Text
<a href="#">All-Sky Projectors for Portable Planetariums</a>	Project all-sky images onto the inside of a Starlab dome for pennies apiece using clear plastic cups.		Ref. Text
<a href="#">Altitude Co-Altitude</a>	Illustrate altitude and its complement co-altitude (or zenith distance) of a sighted star or the sun in celestial navigation.		Pix Text
<a href="#">Altitude Measurer</a>	Make an astrolabe-like instrument to measure the altitude of celestial objects.		Ref. Text Video
<a href="#">Altitude of the Noon Sun</a>	Observe, collect data, and discover the pathway of the sun.		Ref. Text
<a href="#">Altitude of the Noon Sun II</a>	Demonstrate the relationships between the date, the altitude of the Sun at transit, the observer's latitude, and the altitude of Polaris.		Ref. Pix Text Video

<a href="#"><u>Altitude of the Noon Sun III</u></a>	Construct an Altitude/Latitude Finder (ALF) to understand, explain, and demonstrate how the sky changes when one changes latitude.		Ref. Pix Text
<a href="#"><u>As the World Turns</u></a>	For young participants, make a rotating window that segues from day to night drawings.		Ref. Pix Text
<a href="#"><u>Bad Moons Rising</u></a>	Children's books often depict the moon inaccurately. See if you can determine the errors in these children's books.		Ref. Pix Text
<a href="#"><u>Capo Dial</u></a>	Construct dial to determine on which fret to place a capo to transpose musical notes.		Pix
<a href="#"><u>Clock Face</u></a>	Learn time by making a moveable clock face.		Pix
<a href="#"><u>Communicating With ISS</u></a>	Demonstrate the basic principle behind communication systems between the International Space Station and ground control.		Pix Text
<a href="#"><u>Constellation Projector</u></a>	Make an overhead projector for portable planetariums to project constellation outlines onto the dome.		Pix Text
<a href="#"><u>Core of the Matter</u></a>	Illustrate sun, moon, or planet interiors by coloring and intersecting three plates.		Ref. Pix Text
<a href="#"><u>Cosmic Hats</u></a>	Decorate and wear Cosmic Hats.		Ref. Pix Text
<a href="#"><u>Cosmic Hat II</u></a>	A reprise for the <a href="#"><u>Cosmic Hats</u></a> activity, decorate and wear a plate with a ribbon. Succinct and handwritten.		Pix Text
<a href="#"><u>Deep Field View</u></a>	Create a telescopic view of a starfield using a tempera paint that reacts with a foam plate and compare a with Hubble Space Telescope image.		Ref. Pix Text
<a href="#"><u>Defining the Zodiac</u></a>	Make a model to demonstrate how the zodiac is defined by the stars seen in the plane of the sun.		Ref. Text
<a href="#"><u>Directions-Earth &amp;</u></a>	Correlate cardinal directions both from the Earth-bound perspective and		Ref.

<a href="#">Sky</a>	when looking upward.		Text
<a href="#">Directions- Terrestrial and Celestial</a>	Correlate cardinal directions both from the Earth-bound perspective and when looking upward.		Ref. Text
<a href="#">Directions at Sea</a>	Demonstrate the system of directions relative to the vessel used by sailors.		Pix
<a href="#">Drinking Gourd</a>	Use a <a href="#">Platisphere</a> to depict the seasonal variations of the Big Dipper's aspect as seen by slaves traveling north on the Underground Railroad.		Ref. Pix Text
<a href="#">Drinking Gourd II</a>	Show the changing position of the drinking gourd relative to Polaris through the seasons.		Pix Text
<a href="#">Drum Heads</a>	Design your own drum head to accompany personal history, local lore, or universal storytelling.		Pix
<a href="#">Dynamic Solar System</a>	Create a solar system model, with students pacing off distances to scale. (Also in <a href="#">Belorussian translation.</a> )		Ref. Pix Text
<a href="#">Feynman Diagrams</a>	Illustrate the outcome of a particle colliding with an anti-particle.		Pix Text
<a href="#">Flash Plates</a>	Improve math skills with round flash cards, a format better suited for young learners as suggested by intriguing research.		Pix Text
<a href="#">Full Circle</a>	Consider the wholeness of the circle and design exquisite artwork from simple paper plates. Currently available only as a Microsoft Word document. (Images courtesy of Bradford Hansen-Smith.)		Ref. Pix Text
<a href="#">Galaxy Models</a>	Make models of galaxies.		Ref. Text
<a href="#">Gemini's Signature</a>	Model and predict the "signature photos" of the Gemini Observatories, both in Hawaii and in Chile.		Ref. Pix Text

<a href="#">Geocentric vs. Heliocentric</a>	Make a moveable model that compares features of two systems.		Pix Text
<a href="#">Globe at Night</a>	Determine your limiting magnitude on a plate and compare with the magnitude charts from the <i>Globe at Night</i> observing campaign.		Pix Text
<a href="#">Globular Clusters</a>	Plot globular clusters or brightest stars and analyze the patterns to determine their galactic locations.		Ref. Text
<a href="#">GLPA Logo</a>	Given either a date or an hour, determine what time or season is suggested by the star pattern of the GLPA logo.		Ref. Pix Text
<a href="#">Gno Problem Mon</a>	Track the path of a shadow cast by a gnomon through the day.		Ref. Text
<a href="#">Good(night) Moons Rising</a>	The classic children's book is illustrated with a keen eye toward astronomical integrity.		Ref. Pix Text
<a href="#">Hemisphere Maps</a>	Place two plates side by side – akin to old charts – and make map of world as individual perceives it.		Pix Text
<a href="#">How Far The Planets?</a>	Measure the varying distances of the planets in orbit to reveal their proximity to earth.		Ref. Pix
<a href="#">Impact Game</a>	Play an asteroid impact game by flipping a rock on a string into planets orbiting the sun.		Text
<a href="#">Latitude by Polaris</a>	Demonstrate how a navigator correlates the observed altitude of Polaris with her latitude.		Ref. Pix Video
<a href="#">Light Pollution</a>	Demonstrate of simple shielding over an exposed bulb significantly diminishes light pollution while increasing the efficiency of the lighting fixture.		Pix Text
<a href="#">Lunar Eclipse</a>	Make a model to show how two shadows--the umbra and the penumbra--can fall on the moon during a lunar eclipse.		Pix Text
<a href="#">Lunar Surface</a>	Make a clay model depicting features of the moon's surface.		Pix Text
<a href="#">Meteor Shower</a>	Plot the paths of meteors on a starfield plate to illustrate the radiant of a meteor shower.		Pix Text
<a href="#">Milky Way Galaxy</a>			Ref. Text





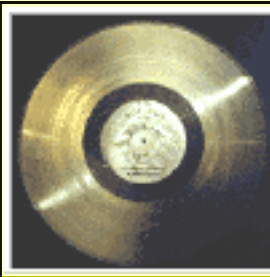
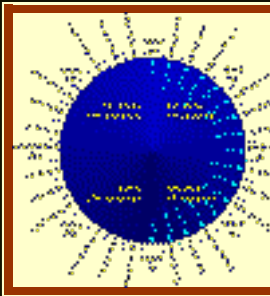

<a href="#"><u>Mirror Diameter</u></a>	Demonstrate the correlation between mirror diameter and its light gathering ability.		Text
<a href="#"><u>Mission Patch</u></a>	Design a circular NASA mission patch.		Text
<a href="#"><u>Moon Finder</u></a>	Make a model to explain moon phases and create a moon dial akin to old volvelles to determine when and in which direction one can see any given phase.		Ref. Pix Video
<a href="#"><u>Moon Masks</u></a>	Decorate and wear Moon Masks, Sun Masks and Cosmic Hats.		Ref. Pix Text
<a href="#"><u>Moon Meets the Football Field</u></a>	Illustrate the concave tendency of the moon's orbit around the sun using a football field for scale.		Ref. Text
<a href="#"><u>Moonthly Eclipse</u></a>	Demonstrate why eclipses do not occur every month both at new moon and at full moon.		Pix
<a href="#"><u>Music Shaker</u></a>	Tape two plates together with beans between them to make a musical shaker.		Pix Text
<a href="#"><u>Orbit Basics</u></a>	Draw a simple model of the solar system with planets in orbit around the central sun.		Pix Text
<a href="#"><u>Orbit Basics II</u></a>	Demonstrate elliptical orbits.		Ref. Text
<a href="#"><u>Orbit Basics III</u></a>	Demonstrate the planets in orbit around the sun by using multiple stacked plates that adjust to the current sky.		Pix Text
<a href="#"><u>Orbit by Elongation</u></a>	Derive orbits of Mercury and Venus from elongation tables, with Earth's orbit on perimeter of plate.		Ref. Pix Text
<a href="#"><u>Oreo® Moon Phases</u></a>	Halve and scrape Oreo® cookies to illustrate moon phases.		Pix Text
<a href="#"><u>P6</u></a>	Construct hand-held projectors to indicate the current planet and moon positions inside a portable planetarium for any given time.		Ref. Pix Text

<a href="#">Paper Moons I</a>	Cut out portion of plates to depict moon phases.		Ref. Pix Text
<a href="#">Paper Moons II</a>	Cut out portion of plates to depict moon phases.		Ref. Text
<a href="#">Paper Moons III</a>	Cut out portion of plates to depict moon phases.		Ref. Text
<a href="#">Photographic Plate</a>	Model and predict photographic star trails of the circumpolar stars for a given exposure time.		Ref Pix Text Video
<a href="#">Physical Fitness</a>	Develop physical fitness skills in the gym with colored plates.		Text
<a href="#">Planet Pointer</a>	Make a model of the solar system showing the position of the planets and where to find them in the sky.		Ref. Text
<a href="#">Planet Pointer II</a>	Make a planet pointer akin to old volvelles to indicate the position of the planets in the sky for any given time.		Ref. Pix Text Video
<a href="#">Planetarium Planet Plotting</a>	Track the motion of visible planets and correlate the plate view with both the planetarium sky and the real night sky.		Ref. Text
<a href="#">Plate-a-tarium</a>	Build the ultimate plate model that depicts features of celestial sphere, indicates real time position of planets and zodiac, and illustrates rising and setting position of sun for any date.		Pix
<a href="#">Plateful of Planets</a>	Demonstrate the scale of the planets with nuts and seeds relative to a plate-sized sun.		Ref. Pix Text
<a href="#">Plate Tectonics</a>	Teach plate tectonics by cutting paper plates into tectonic plates.		Pix Text
<a href="#">Platisphere</a>	Make an instrument akin to a planisphere that shows the position of the circumpolar stars for any given date and time.		Ref. Pix Text Video
<a href="#">Platisphere for Children</a>	Construct a device to locate the Big and Little Dippers and Cassiopeia after sunset through the seasons.		Ref. Pix Text Video
<a href="#">Platisphere Tactile</a>	Make a tactile model of circumpolar stars for visually impaired persons by drilling holes for stars on a stack of plates.		Ref. Pix Text Video
<a href="#">Portable Sundial</a>	Create a simple, portable sundial.		Ref. Pix Text
<a href="#">Portable Sundial II</a>	Create a functional, portable sundial.		Pix

			Text
Portable Sundial III	Design a portable sundial.		
<a href="#">Portable Sundial IV</a>	Design a portable dial using interlocking plates for a gnomon.		Ref Pix Text
<a href="#">Ptolemaic Polemic</a>	Make Ptolemaic model with equants, epicycles, and deferents to explain retrograde motion.		Ref. Pix
<a href="#">Rainbow Finder</a>	Construct a rainbow finder to locate a potential rainbow and to predict its apparent size.		Ref. Pix Text
<a href="#">Rainbow Finder II</a>	Fold a plate in half to find a rainbow.		Pix Text
<a href="#">Rainbow Turntable</a>	Make a freestanding rainbow using a phonographic record player.		Pix Text
<a href="#">Reflector Flex</a>	Demonstrate how modern reflector telescopes use rapid actuators to compensate for gravity-induced distortions of the primary mirror.		Pix Text
<a href="#">Retrograde Motion</a>	Show how planets appear to loop westward against background stars.		Ref. Text
<a href="#">Revolving Star Chart</a>	Make a simple plate to depict the circumpolar stars.		Ref. Text
<a href="#">Ricehenge</a>	Model the Stonehenge site out of rice cereal treats--then eat it.		Ref. Pix Text
<a href="#">Roman Shields</a>	Recreate the scutum, a military device used by the Roman Army.		Pix Text
<a href="#">Salad Spinner Zoetrope</a>	Make a zoetrope from a salad spinner to illustrate moon phases and persistence of vision.		Ref. Pix Text
<a href="#">Satellite Tracking</a>	Draw a local horizon and plot the paths and times of satellite passes inside a		Ref. Pix

<a href="#">Bowl</a>	bowl prior to an observing session.		Text Video
<a href="#">Saturn's Rings</a>	Make a model of Saturn to suggest why its rings "disappear" periodically.		Ref Pix Text
<a href="#">Seasons</a>	Make a model to explain the cause of the seasons.		Ref. Text
<a href="#">Sine Waves</a>	Construct a sine curve from two plate halves.		Pix Text
<a href="#">Slide tray index</a>	Make a useful index for slide trays that doubles as a dust shield.		Ref. Pix Text
<a href="#">Solar System Mobile</a>	Create planet mobile with appropriate features.		Ref. Text
<a href="#">Stargazing Plates</a>	Build collection of observing notes, diagrams, images, or other information and suspend from telescope during observing sessions.		Ref. Text Pix
<a href="#">Star Life Models</a>	Model the timeline of a star's existence.		Ref. Text
<a href="#">Stellar Bar Code</a>	Show similarities between a bar code and spectroscopic lines.		Pix
<a href="#">Sub-Solar Cup</a>	Track the sub-solar path of the sun across a globe in real time to highlight the boundaries of the tropics and to illustrate an analemma.		Ref. Pix Text Video
<a href="#">Sunrise Sunset</a>	Track the position of the sun at sunrise and sunset through the seasons. Track the moon and some stars as well.		Ref. Text Video
<a href="#">Telescope View</a>	Draw celestial objects as seen through a telescope, with the plate simulating the field of view.		Text Pix
<a href="#">Transit Frequency</a>	Illustrate why a transit of Venus has such an irregular period, with transits occurring in pairs--eight years apart--separated by over a century.		Text Pix
<a href="#">Transit of Venus</a>	Plot the path of Venus as the planet's disk moves across the surface of the		Text



	sun on June 8, 2004.		Pix
<a href="#">Tracking Sunspots</a>	Project, trace, and track sunspots directly on a plate which defines the outline of the sun.		Ref. Pix
<a href="#">Turtle Hatch</a>	Record on a paper plate the fate of sea turtles hatching in the presence of light pollution. This is a dynamic activity that works best with a large group (say, 50-100) of students.		
<a href="#">Vanishing Spacecraft</a>	Demonstrate visual blind spots that sometimes causes satellites to disappear from view.		Ref. Text Pix
<a href="#">Voyager's Golden Record</a>	Design a personal cover plate for the <i>Voyager</i> spacecraft's mounted record and prioritize your own list of items for inclusion in the record.		Pix Text
<a href="#">Wayfinding</a>	Polynesian navigators recognized patterns in nature to perfect their skills and protect their craft. We solicit educational material inspired by the practice of wayfinding.		Pix
<a href="#">Wind Rose</a>	Design a wind rose on a paper plate.		Pix

\*Note: As we build this site we will be uploading much information that has already been published. The far right column indicates what you will find if you click the links that are highlighted under the Title column. "Ref" indicates that the material was previously published in the respective *Proceedings of the Annual Great Lakes Planetarium Association Conference* and the reference is cited. As a membership benefit, GLPA members may order back issues from GLPA while supplies last. "Pix" indicates that a picture or image(s) can be found at the Title's linked page. "Text" indicates that you can find text or a write-up on the activity at the linked page, though some instructions are admittedly sparse for now. "Video" indicates the activity is included in the [Paper Plate Astronomy videotape](#).

Several more activities (below) have yet to be completed and uploaded to this website. We invite you to complete the development of some of these proposed activities yourself and then [offer your handiwork](#) to the Paper Plate Education effort. Thank you for your support.

Title	Description	
<a href="#">Altitude Measurer II</a>		Incomplete
<a href="#">Apparent Magnitude</a>		Incomplete
Atoms	Build atoms from plates representing protons, electrons, and neutrons.	
Binary Stars	Create a model of an eclipsing binary star system or of any two objects in orbit around a common point.	

Blood Platelets		
Calabash Cup	Make a model of the alleged Polynesian calabash, a water-bearing gourd perhaps used to confirm latitude.	
Celestial Atlas	Recreate historical celestial atlas features.	
Circle of Fifths	Demonstrate the principle behind music's Circle of Fifths.	
Color Wheel	Color multiple plates with varied combinations and rotate them rapidly on a paint brush spinner.	
Compass Rose	Design a compass rose showing the cardinal and inter-cardinal directions and label the traditional points in what is known as "boxing a compass."	
Congruence	Correlate declination/right ascension with latitude/longitude using intersecting plates.	
Connect-the-Dot Constellations	Connect dots (on pre-drilled stack) to make own constellations, with no particular side being "up." Write story on back.	
Dig This!	Simulate an archeological dig with a stack of plates and recreate a timeline as you peel away plates that each represent a given number of years. To scale intersperse pictures of "artifacts."	
Dip	Illustrate dip and the need to correct for it during C-Nav sight reduction.	
Double Helix	Make DNA "ladder" by spiraling and intertwining two plates.	
Drum Heads	Design patterns for drum heads akin to Mongol, Tartar, and Pacific Northwest cultures.	Awaiting copyright permission
Eclipse Plate	With Earth's shadow cast onto plate, view back side of plate from multiple holes (at different paper plate latitudes) to observe partial eclipse, total eclipse, and near-eclipse.	
<a href="#">Egyptian Calendar</a>	Recreate an Egyptian calendar or build your own stylistic version	
Expanding Universe	Mimic the expanding universe by making galaxy models that accelerate away from each other.	
GHA, SHA, LHA	Correlate Greenwich hour angle, sidereal hour angle, and local hour angle.	
<a href="#">Gravity and the Planets</a>	Demonstrate the varying pull of gravity between the planets as they orbit; John Beach activity.	Incomplete
H/R Wall	Construct a large H-R diagram on a wall with colored plates of varying sizes.	
<a href="#">Inverse Square Rule</a>	Demonstrate inverse square relationships.	Incomplete
Land & C-Nav	Demonstrate the relationships between the date, the altitude of the primary navigation stars at transit, the observer's latitude, and the altitude of Polaris.	
Latitude Formula	Illustrate why latitude equals the great circle distance from an observer's zenith to the celestial equator (Latitude = 90 - Ho +/- same/contrary declination).	
Nickel Plated	Create your own design for a new state coin. Select features that are inherent to your interests.	
Nocturnal	Make and use a nocturnal, an antique instrument that determined time from the position of the northern Guardian Stars.	
North at Noon	Find true north with two timed observations before and after noon.	
North and Scout	Use a scouting technique to determine cardinal (N, S, E, & W) directions.	
Orbital Shells	Demonstrate the principle of orbital shells with stacked plates and cake trays of successive sizes.	
Polynesian Practices	Demonstrate techniques used by Polynesian wayfinders to determine their position, such as sighting on zenithal stars and interpreting wave patterns.	Awaiting copyright permission
	Demonstrate how Polynesian wayfinders use star pairs to determine latitude and	Awaiting

Polynesian Star Pairs	directions.	copyright permission
Potato Moon	Model lunar features with potato salad and measure mountain heights from contrived shadow lengths.	
Rainbow Wall	Build a rainbow model from suspended clear and colored plates representing water drops.	
Radar Plating	Simulate radar plotting and tracking multiple targets. Determine other vessels' courses, speeds, and closest points of approach.	
Syene Well	Reproduce Eratosthenes' determination of the circumference of the earth with a Syene well simulation. See <a href="#">video</a> for sample.	
Tree Rings	Simulate the cross-sectional cut of a tree to yield information on a tree's history.	
<a href="#">Variable Star Field</a>	Compare a plate depicting a telescopic field of view containing variable stars with an AAVSO finder chart and estimate stellar magnitudes.	Incomplete
Vernier Scale	Construct a working model of a vernier scale.	
Viking Directions	Make a solar stone, or bearing dial, to simulate the direction-finding technique of Norsemen.	

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