

REACH OUT ASTRONOMY July 11th to 16th

By Peggy Walker

Sidewalk Astronomers invites you to “Reach Out” of your comfort zone and take your outreach to people with disabilities. We want to encourage amateur astronomers to make a paradigm shift in how you conduct outreach by going to shut-ins, schools for blind, deaf, special needs students and adults. If you start now, you can develop some tactile hands on exhibits that not only will be great for blind, but special needs, autistic other children who learn from visual and tactile experiences. Some simple ideas are at a senior center of veterans hospital where you can do a special presentation, talk or workshop on countless topics. You could simply read Dr. Seuss’ book “There’s No Place Like Space”, or other books at a children’s hospital.

I have personally made over 60 various hands on exhibits or tactile activities for people with disabilities. For those with access to 3-D printing check out NASA’s lunar surface printing files at <https://3dprint.com/10099/nasa-3d-printable-models/> . In fact a 3-d printable model of the moon is available from Amelia Ortiz Gil from the Valencia Planetarium in Spain just for the asking. In addition, for those with planetariums/theatre/large screen classrooms, there is also 3-D printable Sky in your Hands session of constellations. The 3-D printable files are sent to you -please contact Amelia at amelia.ortiz@uv.es and tell them Peggy Walker sent you! Granted not everyone would have the ability or funds to replicate these so I have added some things I have made but then again, I love art and am pretty creative. So I hope these ideas get you thinking because you will change up your outreach and reputation in your community as becoming accessible and inclusive and that is always a good thing.

1. Make an itty bitty radio telescope and add a sun funnel to it for visually impaired individuals. But most people do enjoy this special telescope because you can hear the sun and that shocks most people. For plans go to:

nightsky.jpl.nasa.gov/download-view.cfm?Doc_ID=347

2. Put a video eyepiece in a tracking telescope and then set up a projector facing a wall or projection fabric to put the moon or a planet on. It will be large enough for people to view the object up close since it will be much larger. In fact, let them take a lunar selfie or Saturn selfie.



3. Bring refractors that have eyepieces at the back so that people can reach the eyepiece easily from their wheel chairs and the scope can be lowered down for ease of use.

4. Astro Art — Set up tables and get black paper and tempera paint or chalk pastels and have an art session outside in the evening for the moon or have them paint the sun—with the help of some eclipse glasses and solar telescopes to look through. Have magazine pages and have them make a mosaic of the planets... The art potential is endless!

5. Here I took a NASA poster of the Moon and glued it to a piece of wood. I made wooden pieces that reflected the black part of the phases and painted them black. They are numbered in the order of the phases and laid on top and people could feel what each lunar phase looks like. I decided to glue foam, for the regolith, and I built up a few of the larger craters with the corona like Tycho and Copernicus. The larger impact basins on the bottom of the foam core was a piece of tulle'.



The black mare is black sand paper and I had cut out some crater holes with a dye cutter and a hammer. By gluing stuff on the full moon when I use the black phase overlays, they can feel what we see on the Moon.

This can be done with out the foam and sandpaper and just a printed copy of the full Moon and cardboard cut in the phases painted black.

6. To make a simple Crater—use a circular donut shaped piece of Styrofoam, and silicon based clay with some gravel and a board you can make a simple crater. Using Styrofoam glue, adhere the Styrofoam to a pre painted board with some sand added to the paint. Using Gesso seal the Styrofoam so that the clay will adhere better to the Styrofoam. Using the clay, build up the walls of the craters and with the crater outside walls make some ejecta piles add some gravel to it. Also seal with glue when it dries. Glue some gravel inside to show the ejecta fall down and sliding into the crater floor. Crater walls painted with white acrylic paint mixed with sand which adds a lot for texture.



The impact basin has rings of debris due to the size of the basin. There really is no walls so pieces of styrofoam need to be glued down mixed with gravel on a pre-sand/painted board. Don't forget to glue the central peak of gravel debris in the center of the basin. Paint with white acrylic paint and sand.

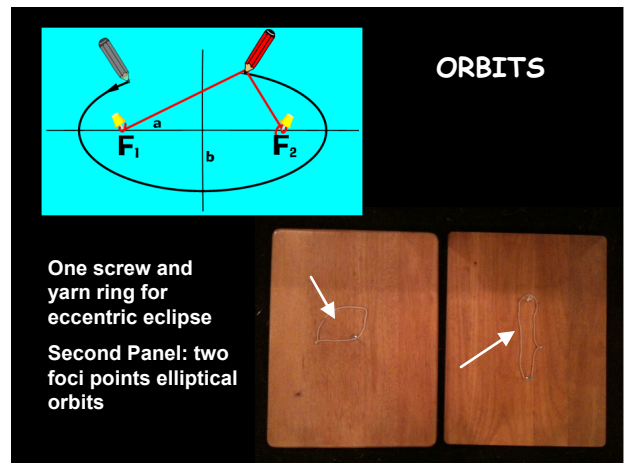
For complex craters pre-paint the board with white paint and sand. Notice these have terraced internal walls and you need to use the same donut piece of Styrofoam and Styrofoam glue. Paint the Styrofoam with Gesso which makes adding silicone clay adhere better. Make some mini shelves out of silicon clay and gravel and form them on the Gesso coated crater walls. Make sure you glue gravel on the shorter walls and on the crater floor. Cover with white sand acrylic paint.



7. Asteroid Orbital paths were made using a chain, gravel; two types of cording, sequence strip, string of small pearls, string of mini pom-poms. Copied a diagram out of a book that shows the asteroid belt— shown with gravel, and the orbital paths of Jupiter, Mars and Earth and how they are crossed by the Atens, Apollos, Amors asteroids. The chain is the Trojan asteroids on the orbit of Jupiter and the purple beads are the Trojan Asteroids. Just rethink two dimensions into three.... And then add materials that have great feel to them.

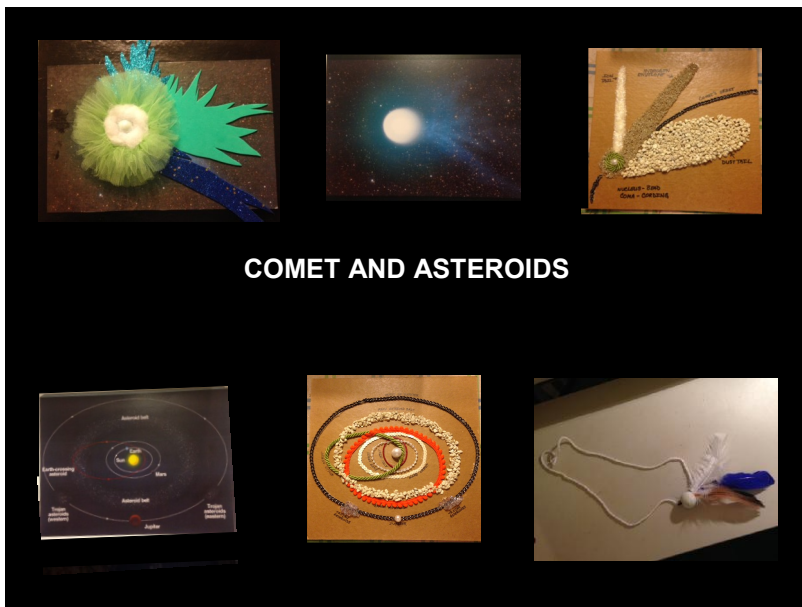
8. Continuing in the same topic as orbits.... make concentric orbits that will be done with only a finger - great interaction on these two..... One finger in the loop around the one central foci which is a screw in the wooden panel. Parabolic and hyperbolic are made by using two screws sent in the wood. The loops are out of yarn and people can really feel the difference in the motion between the two type orbits. course these can be done with cardboard, paper, two push pins, a three different sized loops and pencils.

Hard to see the yarn loops around the screws but these are repurposed t.v. trays that are about 15 by 20 table tops. These have been quite a topic when visually impaired and tactile learners physically sense and feel the change in the shape of the orbits.



Of

9. Make or purchase solar system puzzles. Glue posters of any image galaxy, sun, moon, etc on the same size cardboard (think wood wood if you have the tools). Make sure the image is well glued and start to make cuts with an x-acto knife and divide the poster into pieces. However in many teacher resource stores or on line, there are countless puzzles out there and make sure you find ones with large pieces for children who do not have fine motor skills or others with low vision. The larger ones will be easier to put together and give the visitor a real sense of accomplishment.



COMET AND ASTEROIDS

10. Deep Sky objects just need some Sirius imagination and glue. Notice my images and the materials I used. Hale Bopp to the left is glittered foam core tails, a gathered strip of tulle, a piece of batting cut in a circle and then a large bead. Is it exact—no... but it will show the parts of a comet. The comet diagram to the right of Hale Bopp is a bead nucleus, cording for a coma, glitter ion tail, small beads hydrogen envelope and gravel for the dust tail. The last one was a painted bead, yarn or cording strung through it and three different colored feathers glued inside. White feather is ion tail, any other colored

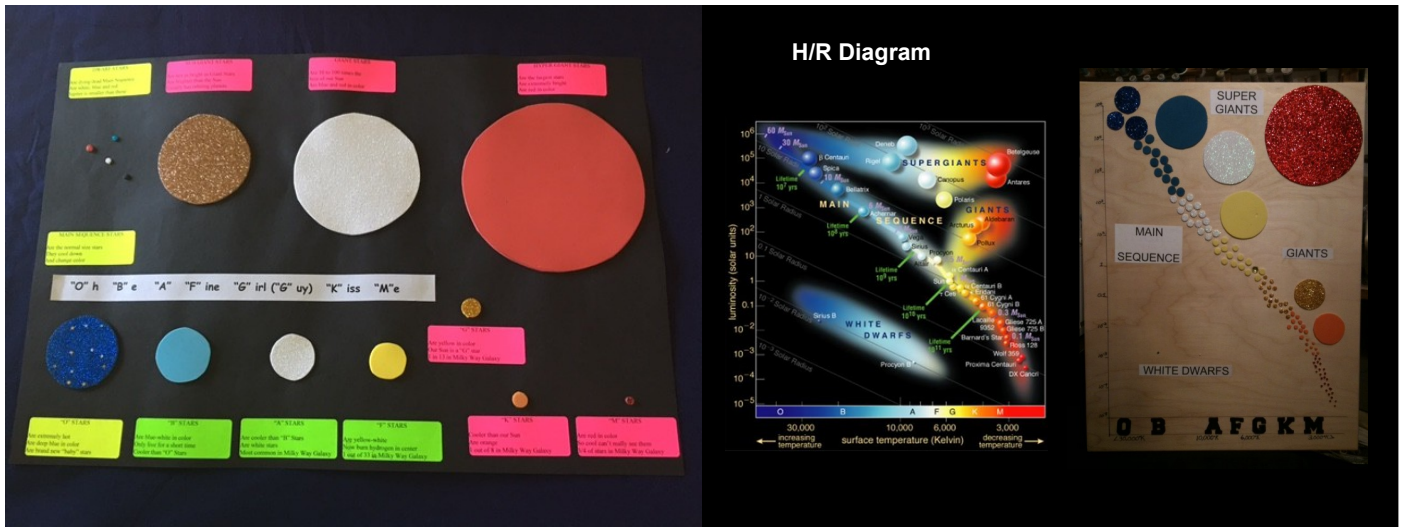
feather for the hydrogen envelope. And of course a black or brown feather for the dust tail. The bead is the coma, the whole is the nucleus and the string is the orbit. String the cording in the bead first then glue the feathers. The comet will not be able to slide on the orbit due to the glue.

11. Hercules Cluster glued five different sized beads and colored and even shape. Blue hexagonal shaped ones indicate the blue young, hot stars. Has yellow pearl beads and the micro small beads as a fill in. The Pleiades Cluster is cotton batting and large white pearl beads. Taurus Nebula with plastic feeling turquoise fabric base and woody moss and more green smooth mosses. Don't forget to add a few stars and the Crab Pulsar Neutron star in the middle. The Orion Nebula was chiffon, tulle, netting, organza all that have different feels to them.



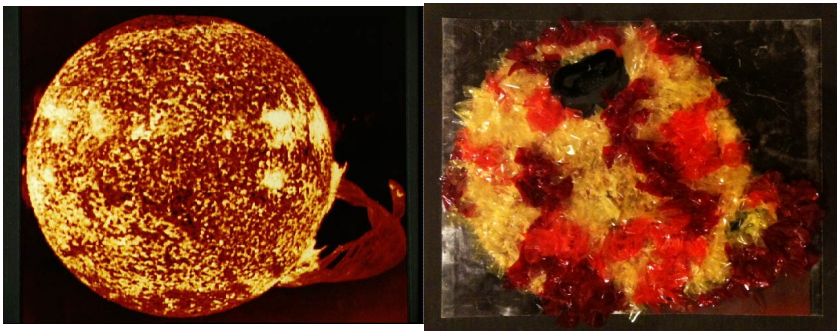
Twisting the dark nebula and in the center of the white tulle and the black netting is the trapezium stars glued white medium pearl beads. And don't forget a small foam underneath for the Witch Head Nebula. The ring Nebula is a series of foam core but starts with the same blue fabric at the center like the Taurus Nebula. Then I used lime green foam core, then yellow satin fabric then orange foam core but used orange beads to show a particular piece of gases and then the red tulle on the edge. Is it an exact match, NO, but it does present the deep sky object in a way for the imagination to take over. Especially if the person is visually impaired. These were well received by the Tulsa Council for the Blind.

Remember it is to spark a conversation of astronomy and no one will judge your artwork or gluing skills. They will just be so thankful you were thinking about them.



12. Here are two versions of the Hertzsprung Russell Diagram and both are great to use for the right group of people. The black poster board on the left has pre cut stars out of glitter foam core and a sticker with a few comments on each star. The sun is raised above the bottom row not only because of no room but because it sets our Sun apart. The labels on the bottom are O...B...A...F...G...K...M. The class can assemble these poster board ones fairly quickly when they are pre cut. Just glue and talk about the type of stars. Across the top are the dwarf stars cut with the metal dye cutters from Harbor Freight made white, red and blue. Then a sub-giant, then giant and the large hyper giant star at the top. For the smaller stars I used dye cut tubes from Harbor Freight. You can get some pretty small stars which is quite a great topic of conversation.

The wooden panel on the right is on a 20 by 30 inch board and is much more tactile since the stars rotate from glitter, to non glitter, and glitter, and non-glitter etc... as the size and color changes. In the center of the yellow I glued a yellow rhinestone and I have them try and find our star in the main sequence. On the board when I got to the "M" and "L" stars I resorted to small red beads and extremely tiny brown beads instead of dye cuts because these are way too small.



13. The Sun is pretty easy..... draw a circle with a large prominence and cut tissue paper squares of yellow, orange and red. Have them crush the 1 inch by 1 inch squares and glue them down in the circle. This one has a foam core sun spot but you can use black tissue paper glued down instead.

The next one is a sunspot idea that came at 1:00am and I have used it a lot. It takes lots of cutting BUT..... People are amazed at what it looks like when it is assembled. What is great is you start with a sheet of black construction paper. Nothing is done with this so set it aside. The brown and orange are cut in the same manner. Keep these in place and make a line around the edge of the paper because once the cutting starts and you have a triangle, people forget what was the edge of the paper. On the brown and orange sheet make a big "X" from corner to corner. Once you have cut the brown triangles cut from the center point down to the line do not cut through to the edge of the paper. You are basically making eye lashes.... Once done glue brown triangles on black construction paper just along the edge of the paper. Do the orange in the same manner. The yellow sheet has granules' shapes so cut about four curvy shapes—keeping them together and do not cut through the edge. Cut in at arrow and keep cutting but keeping it in one piece. Glue this down along the edge on the orange construction paper. Staple through all four layers along the edge. All the way around. Curl the brown and orange eye lashes back and the yellow granule. You see the umbrella of the sunspot and the eyelashes are the convection tubes! Now take pipe cleaners—take one of two different colors because the magnetic loop is positive on one end and negative on the other end. So when you twist the two together it is cool to show magnetic shifting in the magnetic loop. Now find tennis balls or these mini Earths and show how big these guys truly are!



This is a more labor intensive tactile model I made is of the sun. I use it ALL THE TIME—everyone loves touching this thing. I made a few holes in the Styro-foam painted them black and glued black pipe cleaner pieces around the edge. Made flames out of the plastic quilters use to make patterns. And of course yellow beads, orange beads and red ones too. You will need a few bottles of Styro-foam glue because this will keep the beads on especially after pressing them down in place. Of course it is most important to let it dry section by section overnight. Because if you don't, and you turn it to work another section—the whole patch of beads will be on the floor!

14. This is a large repurposed piece of thin wood about 3 by 5 feet and it represents the atmosphere of Jupiter. The materials were thick white cotton cording the type used for home decoration which represents the white zones of ammonia ice clouds that are higher altitude and denser. The smaller orange cording for the Great Red Spot and mini orange pom-poms, is for the belts of thinner lower clouds made of sulfur, phosphorus and carbon. The 3 inch burlap lace for the lower tan clouds near the poles, and a string of pyramid shaped beads on string to represent the jets that control the east to west flow from zones to belts and the westward flow from belt to zones. Cording sewn in a circle of various sizes represents the cyclonic and anti-cyclonic storms.



Foam Core Planetary Structures – planets not to scale

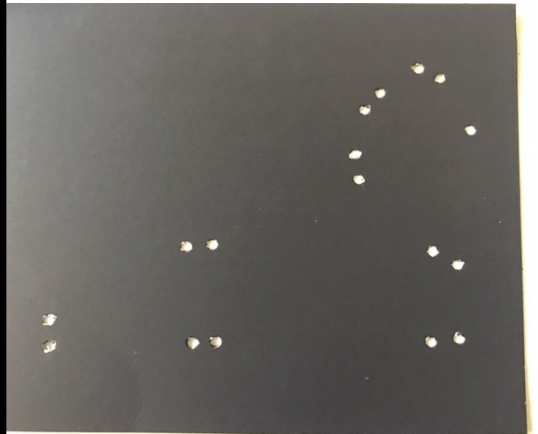
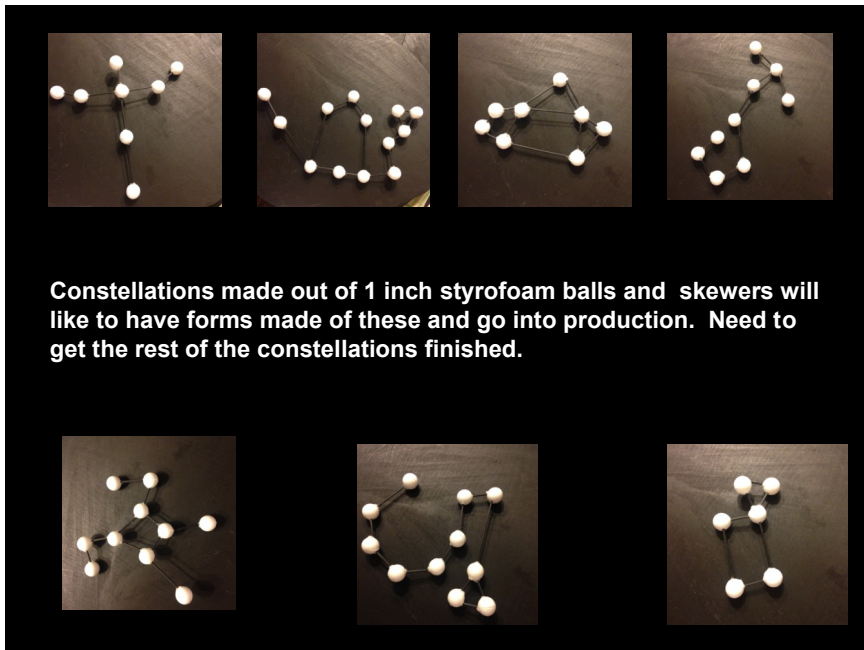
Terrestrial on top

Gas Giants on bottom



15. These are planetary foam core disks that use smooth foam core, glitter foam core and sandpaper. I used colors to best represent the planet: smooth white, silver glitter and white sandpaper for Mercury; smooth pink, glitter pink and white sandpaper for Venus; smooth green foam core, green glitter foam core and white sandpaper for Earth, smooth red foam core, glitter red core and white sandpaper for Mars; smooth black foam core, black glitter foam core and black sandpaper for Pluto. Make sure you start with the smooth core for the terrestrial crust. Shown on top.

Now for the gas giants shown on the bottom row—start with the glitter foam core since they do not have a crust. Orange glitter foam core, orange foam core and white sandpaper for Jupiter; Yellow glitter foam core, smooth yellow foam core and white sandpaper for Saturn, Teal glitter foam core, teal foam core, white sandpaper for Uranus; and purple glitter foam core, purple smooth foam core and white sandpaper for Neptune. This is great for visually impaired and children who learn from tactile and visual learning techniques.



16. As far as constellations go.... Wooden skewers and small Styrofoam balls made in the shape of the constellations is simple. Just precut the pieces and pick a constellation or two. If working with autistic or blind or legally blind make them in advance and let them feel the shape while you talk about mythology of each constellation.

To the right, make a simple stencil out of cardboard and make sure you make double the holes one to go down BEFORE the star and one on the back side of the star for the cording to come up. In that small space between the holes glue a bead to represent a star. Here again, if you made up a few of these, for the various constellations these can be felt by the visually impaired.

There are countless ideas on the Night Sky Network that would be good to use like the pocket solar system using register tape and pencils and folding it in a particular way, Play Doh Planets from the NASA/JPL website; the Pinwheel Galaxy pin wheel from NASA as well. Take a CD and a small Styrofoam ball and cut the ball in half. Glue one half the ball on the top and the other half on the bottom have Saturn! Use some glitter and make sure you show them the rings!! You can have them decorate it in any fashion. Glue Styrofoam balls to small dowels and give them many crafting goodies like paint, cotton balls, glitter, sand, gravel and let them make their own planet. There are many, many other sites that can offer other fun and engaging ideas. But make sure you have some things already assembled for those not able to glue but may be able to feel.....

What ever you decide to do..... just get out there and engage this often over looked segment of our population. Ask for permission or have permission sheets for photographs to be taken. If you are allowed to take pictures and make sure you post them on our Facebook page.

Hope you got some good ideas.

Peggy Walker
 Program Manager Sidewalk Astronomers
 President BA Sidewalk Astronomer at BASidewalkastro@yahoo.com
 CEO OK Astronomy Education & Outreach Association non-profit