DETROIT THE NEW Science CENTER

DASSAULT SYSTEMES

PLANETARIUM

Zubenelgenubi's Magical Sky

Teacher's Resource Kit

TABLE OF CONTENTS

	Page #
Intro, Info, and Michigan Standards met by Zubenelgenubi's Magical Sky	2
Pre-Visit Activities -- Astronomy Q&A	3 & 4
Post-Visit Activities -- Star Pictures	5
Connect the Dots Constellation	6
Invent Your own Constellation	7
Post Visit Activity - Magical Sky Vocabulary	8
Lists of Astronomical and Space Exploration Web Sites	9

Zubenelgenubi's Magical Sky

Teacher's Resource Kit

Thank you for scheduling a field trip to the New Detroit Science Center and its newest facility, the Dassault Systèmes Planetarium. The Planetarium is a 50-foot wide tilted theater with 115 seats, room for 6 wheelchairs, and assisted listening devices for the hearing-impaired. Using advanced projection equipment, the Planetarium can create virtually any environment. You can be seated in the interior of a spacecraft, witness the birth of a star, stargaze at the night sky over Southeastern Michigan, or travel faster than light among the stars of the Milky Way galaxy.

About the Show

In this lively participatory program, characters come alive as the daytime and nighttime sky are explored. During the show, the audience is introduced to Tracy the Telephone Pole, Hydro the Hydrant, and a talking Sun and Moon. A section for constellation identification is provided, which is followed by a story and a stormy sky. Students pitch in to help to blow the storm away, and the program ends with a peaceful sunrise and a new day.

This show appropriate for

Grade Level(s): **Pre K - 1**
Program Length: **30 minutes**

Michigan Content Standards and Benchmarks

More information can be found at the Michigan Department of Education website at:
http://cdp.mde.state.mi.us/MCF/ContentStandards/default.html

The Detroit Science Center and the Dassault Systèmes Planetarium are dedicated to assisting all educators in building and utilizing curricula based on the above-mention standards and benchmarks. Each of our school shows keep you and your students in mind. For ***Zubenelgenubi's Magical Skies****, the Standards & Benchmarks addressed include:*

Elementary School

Constructing New Scientific Knowledge I-1,5
Matter & Energy IV. 1-1,3,4; 2-1;3-1,2,4; 4-3,4
Solar System, Galaxy & Universe V. 4-1,2

We welcome any suggestions, comments, or tips on the activities and resources in this kit, so we can improve these resources for you and your students in the Southeastern Michigan community! Thanks again for choosing the Detroit Science Center and the Dassault Systèmes Planetarium! Contact us @

The New Detroit Science Center
5020 John R Street
Detroit, Michigan 48202
Phone (313) 577-8400

http://www.sciencedetroit.org/theaters/#Digidome

Todd Slisher - Extension 449
Planetarium Director
tslisher@sciencedetroit.org

John Schroer - Extension 435
Planetarium Education Coordinator
jschroer@sciencedetroit.org

Program Objectives:

Upon completion of this program, students will be able to:

1) Explain perceived and actual movement of the Sun, Moon and stars across the sky;
2) Identify objects in the sky such as stars, planets, and Moon;
3) Identify weather phenomena such as storms, rainbows, & other items seen in the sky;
4) Identify simple star pictures such as the Big and Little Dipper and constellations such Orion and Cassiopeia the Queen.
5) Identify moons phases such as the full and crescent moon.

Pre-visit Activities Zubenelgenubi's Magical Sky - Focus on The Sky! Questions for you and your students to ponder before your visit

Q: What can I see in the Sky?

A: In the daytime, you can see the Sun, the Moon (sometimes), clouds, birds, airplanes, and rainbows. On a clear night away from city lights you can see stars, the Milky Way, the Moon (sometimes), planets, meteors (called shooting stars), and comets.

Q: What are stars, and how far are they from Earth?

A: Stars are suns, many times farther away from Earth than our star the Sun – also known as Sol. The Sun is at the center of the Solar System, with its light and heat warming the planets. The Sun's gravity keeps the planets orbiting around on a consistent basis. The Sun is approximately 93 million miles away, and a beam of light would take 8 minutes and 20 seconds to travel from the Earth to the Sun. The next nearest star, Proxima Centauri, is 24.3 trillion miles, or a beam of light would take four years, two months, and two weeks to reach Proxima. Many of the stars you can see in the night sky range from six light years to over one thousand six hundred light years away from you.

Q: Why don't we see the stars during the daytime?

A. The Sun, our star, is so close to the Earth that it shines much brighter than all of the other stars. This hides the stars, until the Sun sets in the west. Then we can see the other stars in the sky, if it is clear. When it is cloudy, the clouds block our view of the Sun and all the other stars in the sky.

Q. Why do we see some stars anytime during the year, but other stars are only seen during one or two seasons?

A: From our location on the Earth, the sky appears to be an invisible sphere or ball, with the stars attached to this sphere. The sphere appears to spin once every day, with the stars moving from the left to the right. Anyone watching the stars at night over several hours will see this slow drifting, with stars appearing to rise out of the East, and appearing to set in the West. Only the stars in the Northern sky move differently, circling around a star named Polaris, the North Star. Located in a spot in the sky that Earth's North Pole is pointing towards, Polaris appears to be the anchor around which all other Northern stars spin.

Earth orbits the Sun once a year, moving a little bit each of the 365 days it takes to complete each orbit. As we circle the Sun, our view of the stars also changes a little bit every day. So stars seen in night in the winter are seen close to the Sun in daytime during the summer. Only the stars near the North Star are visible any night of the year.

Q. Why does the Moon appear to change shape from night to night?

A. The Moon travels in a circular path around the Earth that scientists call an orbit. It takes the Moon around 29 and one-half days to go around the Earth. As the Moon goes around the Earth, light from the Sun hits the Moon all the time, but the way the light hits the part of the Moon facing the Earth changes, making it look like the Moon starts small, then grows until it becomes the Full Moon. The Moon then appears to shrink until it is so close to the Sun, as seen from Earth, that we cannot see the Moon until it starts a new trip, or orbit, around the Earth.

What are the planets?

A. Once thought to be gods, the planets (from the Ancient Greek word for wanderer) are worlds made of either solid matter (terrestrial or Earth-like and gas giants). Solid ones include Mercury, Venus, Earth and Mars; Gas Giants include Jupiter, Saturn, Uranus and Neptune. Pluto, while solid, is still unexplored.

Q. How do you tell planets from stars?

A. You can tell a planet from a star by watching its location among the stars every clear night. Stars will remain relatively fixed in one place, rising in the east and setting in the west. Planets move among the stationary stars over days and weeks. The further the planet is from the Sun, the slower it will move in the sky.

Q. What are shooting stars, & where do they go when they disappear?

A. Shooting stars are actually among the smallest particles orbiting the sun, and most are no larger than grains of sand. Scientists call these objects meteoroids while they are in orbit around the Sun. Many of these meteoroids are castoffs from comets melting as they travel close to the Sun. As these meteoroids travel, they are sometimes pulled towards a planet by the force of the planet's gravity. When a meteoroid gets very close to the Earth, the meteoroid enters the Earth's air and rubs against the air particles. This friction produces a lot of heat. The meteoroid is now a meteor, what many call a shooting star. As the meteor moves and heats up, it begins to glow and is sometimes visible from the surface of the earth. In many instances, the meteor melts on its way down towards the surface. The larger the meteor is, the brighter it appears in our nighttime sky. The intense heat melts almost all the meteors before they get close to the ground, and that is why a shooting star disappears from our view after a brief time. But if a meteor is heavier that one kilogram (about 2.2 pounds), there is a good chance that it will survive all the way to the ground. The meteor is now called a meteorite. Rocks from space such as our example meteorite are valued by many cultures around our home planet.

Q. What is in the Solar System?

A. The Solar System refers to our system of one star (the Sun), nine planets, over 100 moons, over 5,000 asteroids, millions of comets, and uncounted bits of dust and rock (meteoroids). Astronomers have found other stars with planets, but our system of one star and nine planets is known as the Solar System.

The Solar System

Q. Where do the stars move?

A. The Earth spins towards the east, so the Sun appears to rise in the east and set in the west. In fact, nearly everything that we can see also rises in the east and sets in the west. Only the stars near the North Star, Polaris, travel in a circle. These northern stars never rise or set.

Q. What are constellations and who made them?

A. Constellations are imaginary pictures made up of stars visible from the Earth. All peoples on Earth devised these star pictures, which were invented to honor heroes (Hercules, Perseus, Andromeda); royalty (King Cepheus, Queen Cassiopeia; animals (Ursa Major and Minor, Leo, Scorpius, Canis Major) among others. Go out on a clear night, and make up your own constellations and stories for each.

Q. Do the stars we see in the sky belong to the Milky Way galaxy?

A. Every star we see in the night sky belongs to the Milky Way, a collection of over 200 billion stars. While every star we see is a member of the Milky Way, there are many, many stars that we cannot see that also belong to the Milky Way galaxy.

Objective: To introduce the concept of constellations
Activities:

- Class or group discussion about what a constellation is
- Showing drawings of a few constellations
- Having each child complete a dot-to-dot paper of two constellations

Materials: For each student:

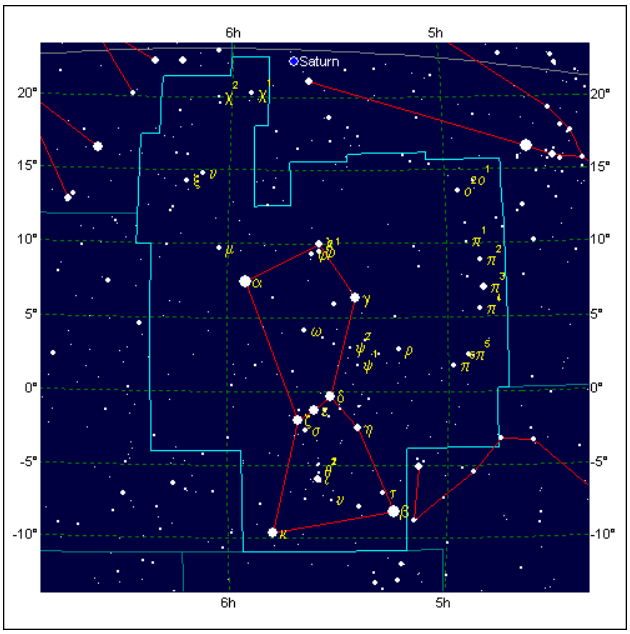
- Worksheets (one copy of each included in this packet)
- Dot-to-dot worksheet
- Make Your Own Constellation worksheet
- Pencil, crayon or marker

For lesson:

- Pictures of constellations (a few included in this packet; can also use a book or sky map that shows them)

Procedure:

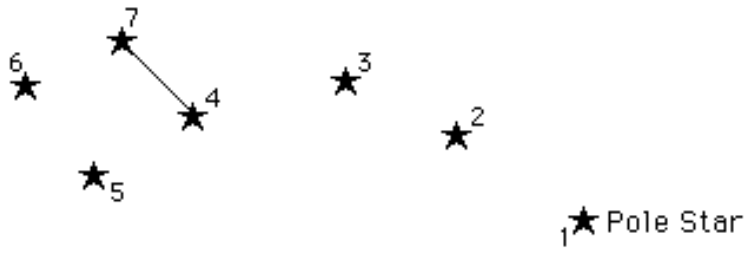
1. Explain that constellations are groups of stars that can be seen in the night sky. People draw imaginary lines between the stars to make pictures of animals, people or things. Each picture is a constellation. Some of the more famous constellations are The Big Dipper and Orion, the Hunter (or name the constellations you have pictures of). Show the children pictures or drawings of constellations.
2. You can continue by saying that there are many constellations in the sky, but you can't see all of them at once. Which constellations you will see depend on the time of year, time of night and where you are on the Earth.
3. The students can complete the dot-to-dot worksheet of The Little Dipper and Draco the Dragon, two constellations that can be found in our sky.
4. The students can complete the Make Your Own Constellation worksheet.



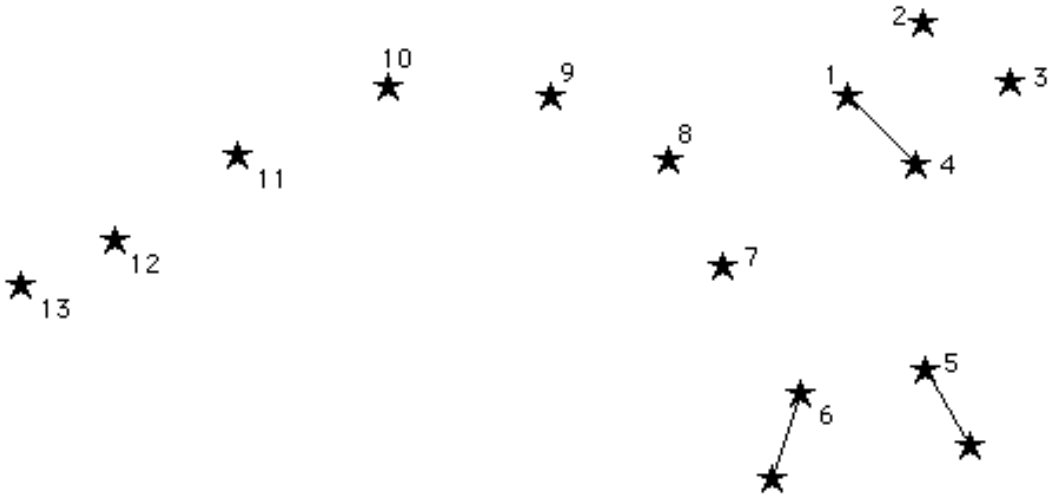
Name_____

Can you connect the stars in number order?

Make the Little Dipper.



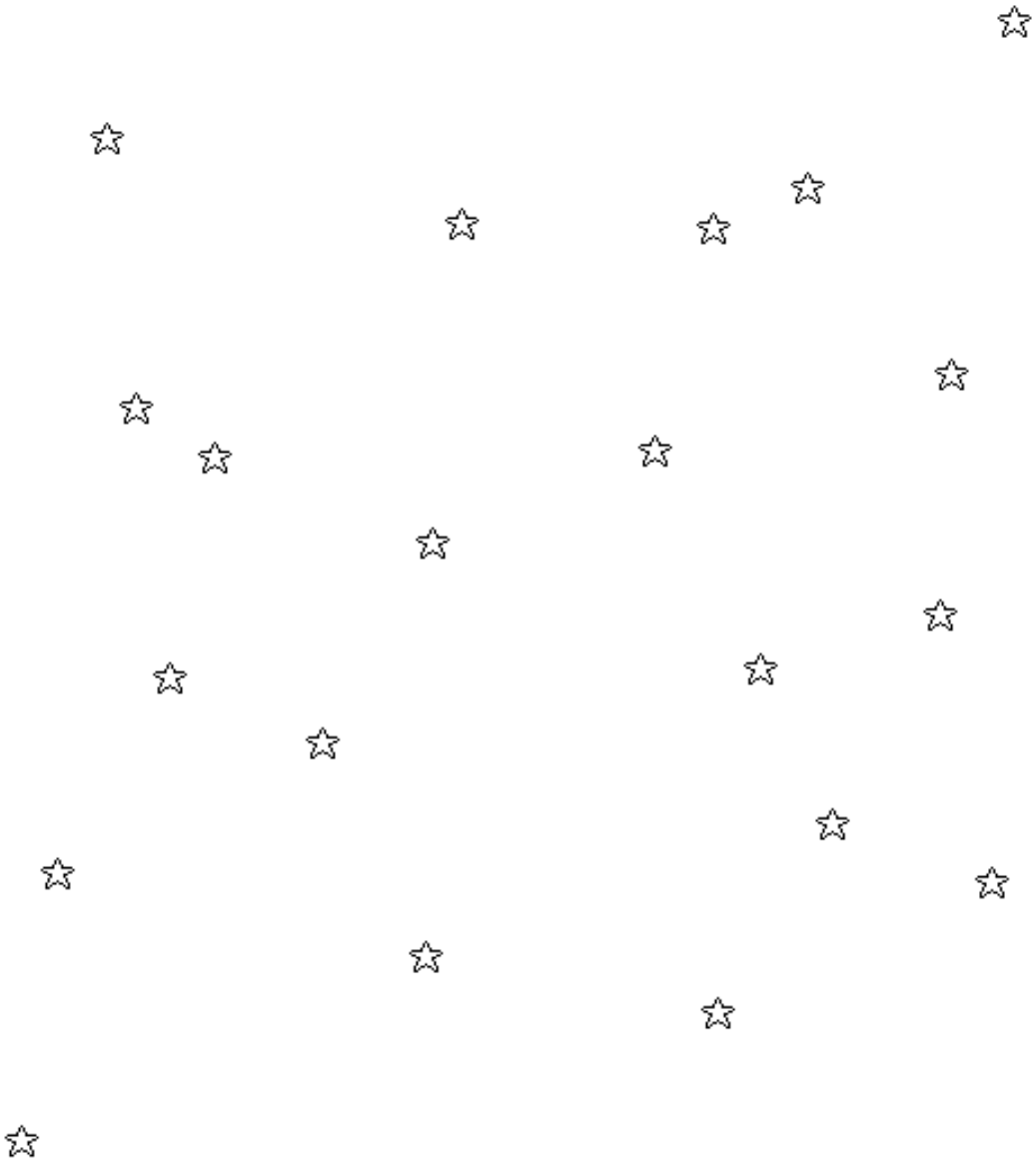
Make Draco, the Dragon.



Your Own Constellation worksheet

Name_____

You can make your own constellation.
Draw lines between some of these stars to make a picture.
What did you draw?
Can you give your constellation a name?



Zubenelgenubi's Magical Sky
Famous Word List

Red - the color of the sun at sunset.
Green - the color of leaves, grass, and other plants.
Blue - The Color of the Sky during the day

Mr. Sun - the Day Star that lights up and warms the Earth and the other planets of our Solar System. Mr. Sun's pull, or gravity, keeps the planets going around him.

Craters - holes in the ground make by rocks falling from space that hit a planet or moon.

Ms. Moon - A small, rocky, and dusty world that goes around the earth. It has no air and lots of holes that we call craters. Twelve astronauts have walked on the Moon.

Rainbow - Usually seen after a storm or rainfall, the airborne water acts like a prism, splitting sunlight into its separate colors.

Mercury - closest planet to Mr. Sun. Hot in day, very cold at night. Many craters.

Venus - The hottest planet with lots of clouds and rocky ground. The clouds let the Sun's heat in, but do not let any heat get away.

Mars - The Red Planet with huge volcanoes, a long canyon, and orange colored dirt and rocks.

Jupiter - The largest of all the planets with lots of colorful clouds and a big red storm called the Great Red Spot.

Saturn - The Ringed Wonder with 30 moons. The rings have lots of ice and rock and dust. Saturn is so light it would float in a bathtub, if you have one big enough!

Uranus - The Side-ways planet. It has lots of blue clouds. It has one special moon that fell apart, but pulled itself back together again!

Neptune - Blue Planet with no water. Faint rings and very cold.

Pluto - The farthest planet. No air, with one little moon. A year is 248 Earth years long.

Astronomy & Space Exploration Web Sites

http://www.boonhill.net - Master Web Site for **Michigan Astronomical Societies**, including the Warren Astronomical Society and the Ford Amateur Astronomy Club

http://www.nasa.gov - ***NASA HQ's*** Web Site. A great place to start your research!

http://www.jpl.nasa.gov/forum/indexpg.html @ **NASA's Jet Propulsion Laboratory** (JPL) supplies a master list of web sites for astronomy and space exploration!

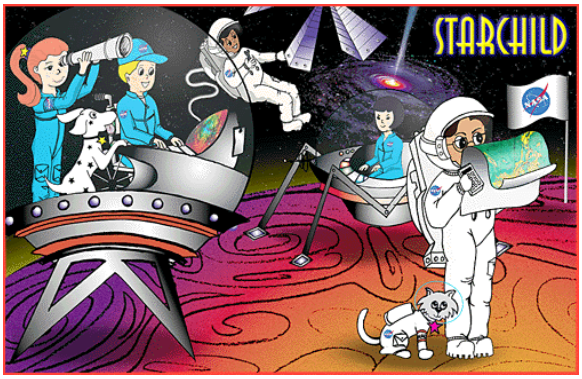
http://www.stsci.edu - ***Hubble Space Telescope*** (HST) HQ. Movies & pictures!

http://amazing-space.stsci.edu/ - ***Amazing Space*** a site with lots of Web-based activities designed for classroom use and for the general public.

http://origins.stsci.edu - *The Origins Program* studies events starting at the birth of the universe in the Big Bang, the forming of galaxies, stars, & planets, & the start of life on Earth and possibly elsewhere.

http://www.stsci.edu/exined - Welcome to ***Education, Please*** stop and take a look at our latest electronic offerings of Macintosh, Windows, and DOS software available for downloading!

http://photojournal.jpl.nasa.gov @ NASA's Jet Propulsion Laboratory (JPL) - ***The Planetary Photojournal*** will provide you with easy access to the images from various Solar System exploration programs.



http://imagine.gsfc.nasa.gov/docs/homepage.html ***Go Imagine the Universe*** is a learning center for **high school students** 14 years and up.

http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html ***Starchild*** is a learning center for **Elementary or Middle school** astronomers.

http://www.skypub.com - Home site for ***Sky and Telescope magazine***, started in 1936. S&T is the oldest and longest running astronomy magazine in the US

http://www.astronomy.com - ***Astronomy Magazine***, started in 1973, and is published by Kalmbach Publishing.

http://www.jpl.nasa.gov/cassini/Kids/ ***Cassini for Kids*** , a site just for kids where they can explore the beautiful ringed planet Saturn and learn about the spacecraft currently on their way there!

http://www.jpl.nasa.gov/galileo/education.html ***Galileo K-12 Educator's Resources*** The materials gathered in these pages are aimed at K-12 teachers and students for NASA's The Galileo mission to study Jupiter and its moons.

http://www.estec.esa.nl/outreach **European *Space Agency***. The main education and outreach web site for ESA missions and activities.

http://www.astronomy.com/Content/static/parentsteachers/default.asp - ***Astronomy Magazine's*** web site for Parents and Teachers

http://www.heavens-above.com **Heavens Above**, an Astronomical web site with current sky maps, along with information on how to observe satellites from your backyard, including the International Space Station!