Our Place In Space

Teacher's Guide

The following Teacher's Guide is designed to help you better prepare your students for their upcoming visit to the Northern Stars Planetarium when it visits your school. This program has been designed specifically for kindergarten, first & second grade students. It will introduce them to some basic astronomical principles and give them a sense of size and place in the vastness of space. The students will follow the adventures of Scarlett the Macaw as she interacts with various other animals trying to a solve a crossword puzzle about space. Subjects covered in the presentation will include: Day & Night, Near & Far, Gravity, the Sun & How it Moves, Stars, Constellations, the Planets, Nebulae and Galaxies.

This presentation was written by Kris McCall and Jim Chapman, © 1993, the **Sudekum Planetarium of the Cumberland Science Museum**, Nashville, Tennessee.

Study Questions

Please try to have discussed some of these questions with your class before they visit the planetarium.

1. What makes day and night?
2. Where does the Sun go at night?
3. What is a planet?
4. What is the Sun? Why is it hot?
5. If the Sun is really big, why does it look small?
6. What is the difference between the Sun and the other stars?
7. What is the difference between a star and a planet?
8. The word planet means wanderer, why do you suppose the planets were called wanderers?
9. How many planets are there? Name the planets in order from the Sun out.
10. Can you ever see any planets in the sky? What do they look like?
11. What are constellations? How many can you name?
12. Is Earth a planet? Is the Earth in space?
13. Does the Earth move? How?
14. Is there life on any other planets in our Solar System?
15. Which is further away Pluto or the stars?
16. What is a galaxy?
17. What is the name of the galaxy that we live in?
18. Why do you think they call our galaxy "The Milky Way"?
19. What is gravity? Is gravity pulling on you? Can you feel it?
20. Would you like to go into space someday? Why or why not?
21. Why is Pluto no longer called a planet?

Vocabulary

Asteroid These small objects are also called minor planets. They vary in size from small rocks to objects several hundred miles in diameter. Most (95%) are found in the region of the Solar System between Mars and Jupiter, this region is known as the asteroid belt.

Astronomer A scientist who studies space, planets and stars.

Atmosphere The air. The outer gases of a planet. Not all planets have atmospheres.

Comet A "Dirty Snowball." Usually several miles in diameter and made of water (ice), carbon dioxide, rocks, and dust. The Sun melts the outer layers of a comet to form a huge cloud that surrounds the snowball and forms into a long tail that always points away from the Sun.

Constellation Pictures drawn in the stars similar to connect-the-dot drawings, using the stars as dots. There are a total of 88 constellations. They are used for mapping the sky.

Crater Circular ridges with deep centers. They are caused by either meteorite impacts or volcanic activity. Planets with thin or no atmosphere have more craters than planets with thick atmospheres. Due to friction most meteoroids will burn up as meteors (or shooting stars) as they fall through thick atmospheres like Earth's.

Day One rotation of a planet on its axis. Earth rotates once every 24 hours. The term day can also mean the opposite of night.

Earth Our planet. The third from the Sun and the only known planet to have life.

Galaxy A huge group of billions of stars in space. Our galaxy is called *The Milky Way*. Astronomers have discovered millions of other galaxies.

Gas The air is a gas. The physical state of being gaseous, not gas as in gasoline.

Gravity The force that attracts objects together. All objects have gravity; more massive objects have more gravity that less massive ones, therefore larger planets have more gravity that smaller ones. The Sun's gravity is what keeps the Solar System together.

Great Red Spot A huge red storm in Jupiter's atmosphere. It's over three times larger than Earth and is over 300 years old.

Vocabulary Continued…

Meteor The light that we call a "Shooting Star". Actually this light is caused by a small rock or pebble burning up in our atmosphere due to friction as it falls to Earth from space. In space the rock is called a *meteoroid,* burning in the atmosphere it is called a *meteor,* and if it hits the ground, the rock left behind is called a *meteorite.*

Moon A moon is a small object (like a mini-planet) that is in orbit around a planet. Earth has 1 moon, Mars has 2, Jupiter has 67, Saturn has 62, Uranus has 27, Neptune has 13, Pluto has 5. The difference between a moon and a planet is not size, but what they go around; planets go around the Sun, moons go around planets. Some moons are bigger than some planets, for example, Jupiter's moon Ganymede is bigger than both Mercury and Pluto.

Nebula A giant cloud of gas and dust floating in space.

Observatory A building where astronomers use telescopes to study the sky.

Orbit The invisible path that a planet follows around the Sun.

Planetarium A special room with a domed or round ceiling. Using special projectors, the ceiling looks like the night sky. It is an artificial environment. The planetarium is not an observatory. An observatory is a building that houses a telescope for viewing the real night sky.

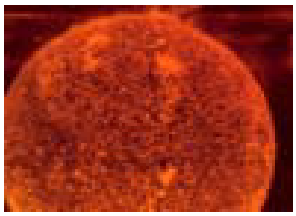
Revolution The motion when one object goes around another. (ie. The Earth revolves around the Sun once every 365.25 days.)

Rotation The motion when an objects spins on an axis going through itself. (ie. The Earth rotates or spins on its axis once every 24 hours.)

Solar System The Sun, the planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, & Neptune), the dwarf planets (Ceres, Pluto, Sedna, Eris), the asteroids, and the comets (like Halley's, Hyakutake, & Hale-Bopp for examples).

Space Probe This is a type of satellite that travels from Earth to explore other planets. There are no people on board a space probe; it is run by computers. Space probes take pictures and do scientific experiments to help us learn about these other worlds. Some examples of famous space probes are: *Voyagers 1 & 2, Vikings 1 & 2, Magellan, Galileo, Mariner, Spirit, Opportunity and Curiosity.*

Sun & Planets Information



The Sun: The Sun is not a planet but a star. It seems bigger, brighter, and hotter than the stars we see at night only because it is closer to us. It is 93 million miles from Earth and has a surface temperature of 12,000°F! The highest temperature of all is in the Sun's core, 27 million °F ! Over one million Earth's could fit inside the Sun if it were hollow!

Mercury: Mercury is a gray planet covered with craters. It looks very much like the Moon and is only slightly larger. During the daytime the temperature will rise to 700°F, while at night it will drop to -150°F. Mercury has no moons.

Venus: Venus is covered with swirling clouds of acid. If you lived on Venus you would never have a sunny day. It is the hottest planet with a temperature of 900°F. There is so much air on Venus that the air's weight would squish you! Venus has no moons.

Earth: Earth is the only known planet to have life. From space it looks like a beautiful blue marble with white swirls; the blue is the oceans, the white swirls are the clouds, and the darker regions the land. Earth has one moon.

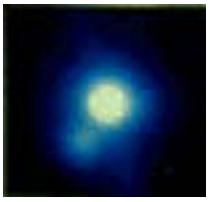
Mars: Mars is called the red planet. It is red because it is rusty. It has craters, mountains, canyons, volcanoes, and a thin atmosphere. Mars has two small moons.

Jupiter: Jupiter is the biggest planet. It has sideways cloud bands of different colors. Jupiter has no solid ground. There is also a huge red spot that is actually a hurricane three times bigger than Earth. Jupiter has 67 moons and one thin ring going around it.

Saturn: Saturn has light yellowish clouds. Like Jupiter, Saturn has no solid ground. Saturn is famous for its thousands of rings. It also has at least 62 moons. Many people think that Saturn is the most beautiful planet.

Uranus: Uranus is light blue in color and is tipped over sideways. It has no solid surface. It has about a dozen thin rings that go around the planet up and down (vertically). Uranus has 27 moons.

Neptune: Neptune is bluish in color and somewhat darker than Uranus. It is just slightly smaller than Uranus. It has no solid surface. It has three brighter rings, and a couple of thin faint rings. It has 13 known moons.



Pluto: Pluto is no longer considered a planet, it is called a "dwarf planet". It is made of ice and rock. It has 5 moons with one that is nearly as big as Pluto.

Your Complete Address

An activity that will help you know where you are.

Please fill in the missing information. When you're done, turn the paper over and write your complete address on the back. With this address, anyone could find you!

Name:_____

School Room Number:_____

School:_____

School's Street Address:_____

Town:_____

County:_____

State:_____

Country:_____

Continent: (Circle one) Africa Antarctica Asia Australia
Europe North America South America

Hemisphere: (Circle one) Northern Hemisphere Southern Hemisphere
(Circle one) Eastern Hemisphere Western Hemisphere

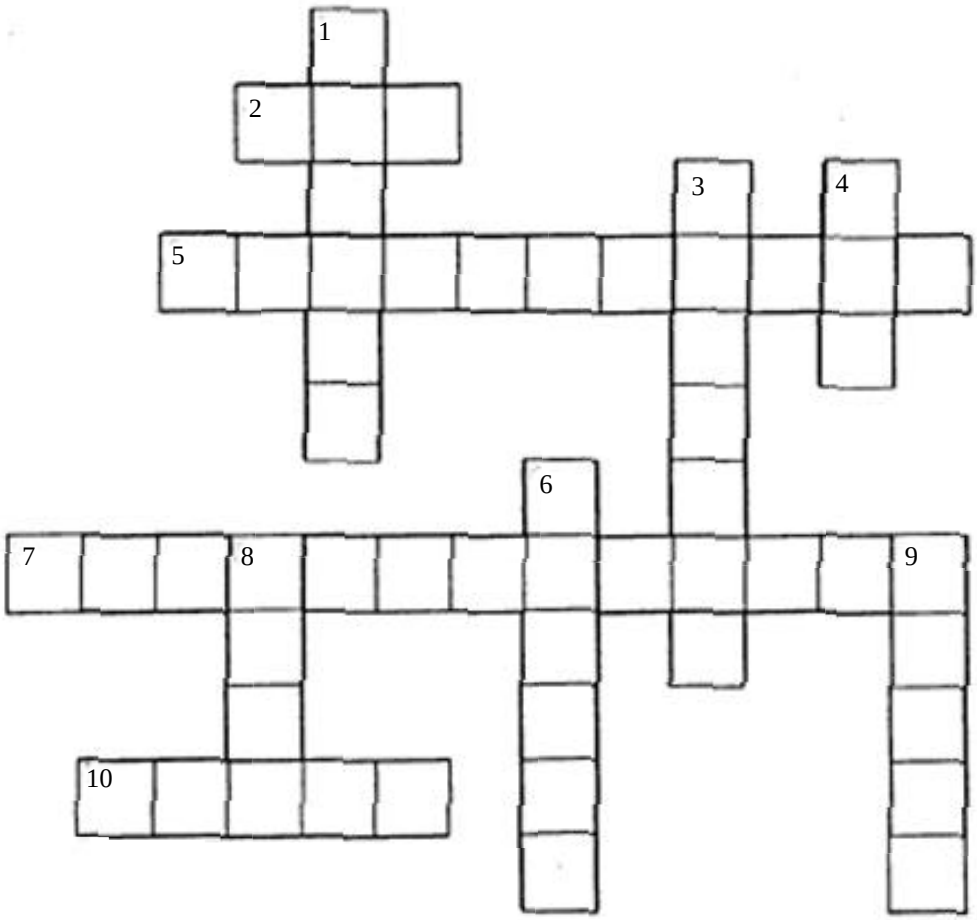
Planet: (Circle one) Mercury Venus Earth Mars Jupiter
Saturn Uranus Neptune

Solar System (Circle one) Sun Pegasus 51 47 Ursa Majorus
(Yes we have found more solar systems!)

Galaxy (Circle one) Andromeda Milky Way Whirlpool
Sombrero Large Megallanic Cloud

Our Place In Space
Crossword Puzzle

This is the puzzle that Scarlett the Macaw works on in the planetarium presentation.

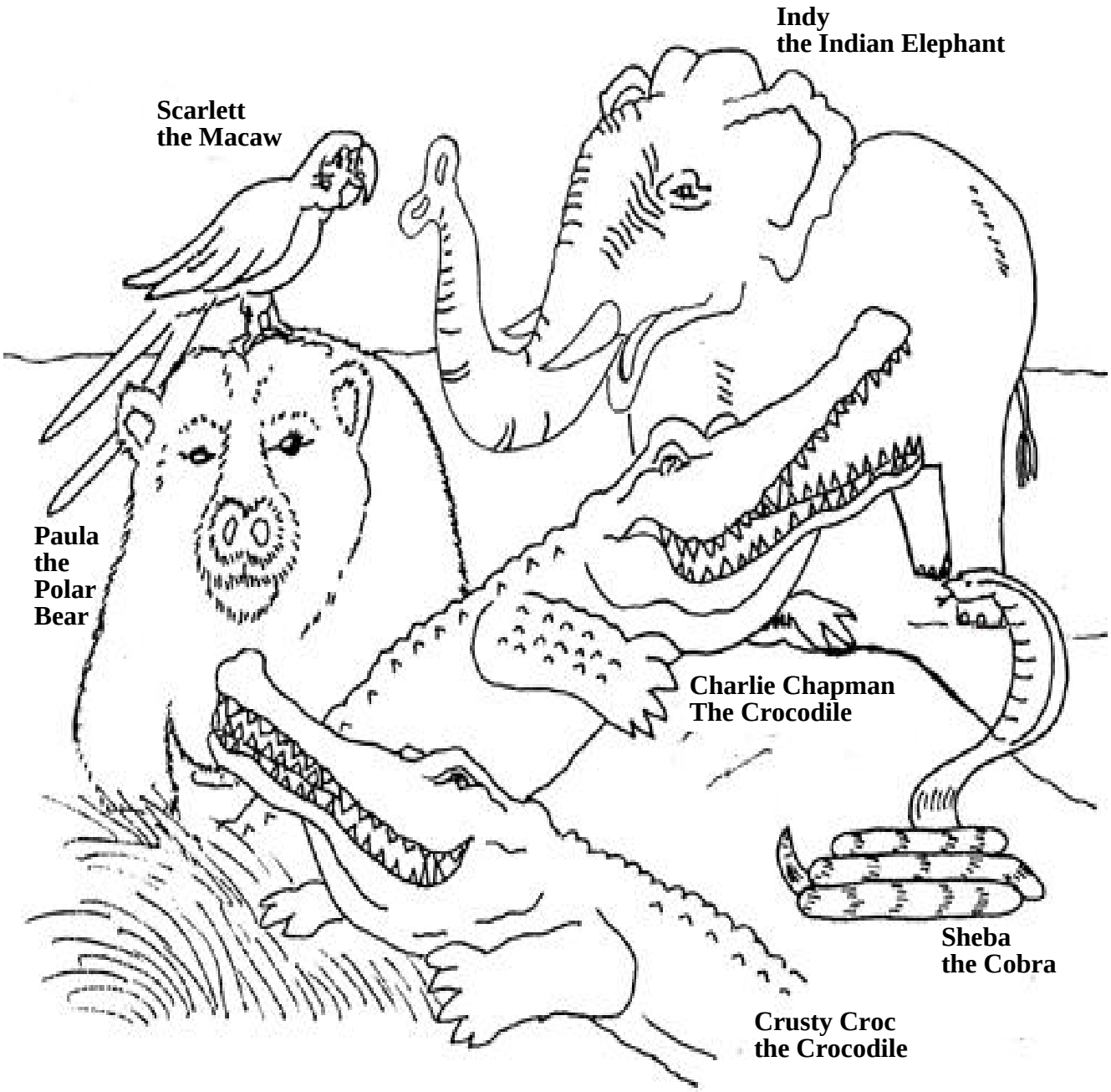


Clues:

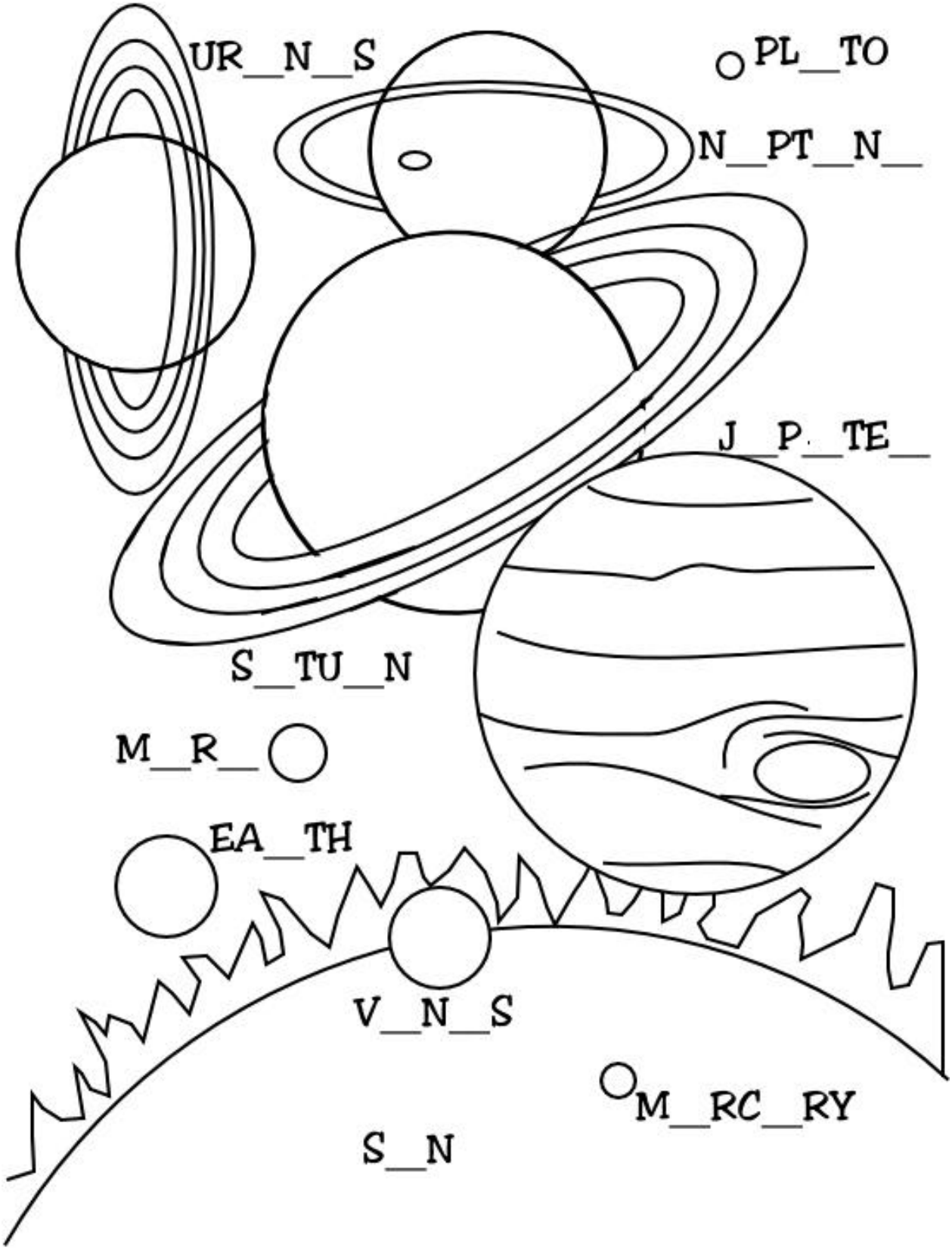
1. A Milky Way that's not a candy bar.
2. The opposite of night.
3. A weighty subject.
4. What makes it daytime?
5. A fun place to learn about space.
6. The Earth is one that goes around the Sun.
7. Star picture.
8. The Sun is one.
9. The opposite of day.
10. The planet we live on.

Our Place in Space Coloring Page

Color Scarlett the Macaw and her friends. You will meet them all when you go to the Planetarium.



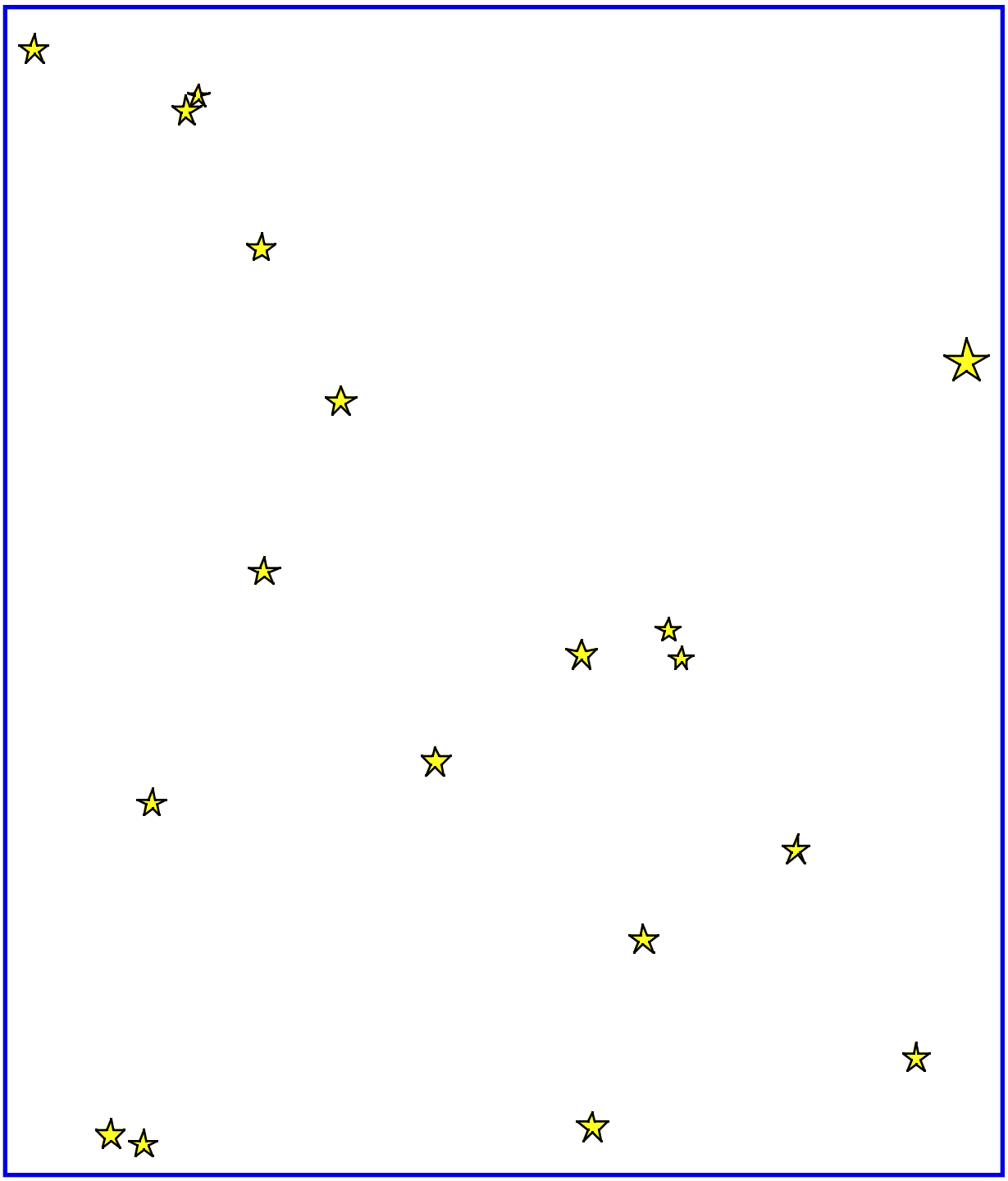
Color & Name the Planets



Create A Constellation Name_____

What do you see in the stars? Some people look at these stars and see a dipper, some people see a great bear, some people see a wagon, some a plough, and some a gourd. What picture do you see when you look at these stars?

Draw lines between the stars and make a picture of your own!



Bibliography

For Students (and grown-ups too!)

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---------- *The Sky is Full of Stars,* New York: Harper and Row, Harper Junior Books, 1981.

Cole, Joanna, *The Magic School Bus, Lost in the Solar System,* New York: Scholastic, Inc., 1990.

Dickerson, Terrence, *Night Watch, An Equinox Guide to Viewing the Universe,* Toronto: Camden House Publishing, 1983. (This is an adult book that kids will like. A good introduction to the night sky.)

Fradin, Dennis B., *Comets, Asteroids, and Meteors,* Chicago: Children's Press, New True Books, 1984.

Gallant, Roy, *Our Universe,* Washington D.C.: National Geographic Society, 1986.

Rey, H.A., *The Stars, A New Way to See Them,* Boston: Houghton Mifflin Co., 1976. (This is probably the best book for learning constellations for any age level.)

Ride, Sally & Okie, Susan, *To Space and Back,* New York: Lothrop, Lee & Shepard Books, 1986.

For Teachers:

Braus, Judy, Editor, *NatureScope: Astronomy Adventures,* Washington, D.C.: National Wildlife Federation, 1986.

Fraknoi, Andrew, Editor, *The Universe At Your Fingertips: An Astronomy Activity and Resource Notebook,* San Francisco: The Astronomical Society of the Pacific, 1995. (Highly Recommended. A resource designed for teachers)

Harrington & Pascuzzi, *Astronomy for All Ages, Discovering the Universe through Activities for Children and Adults,* Old Saybrook, CT: The Globe Pequot Press, 1994.

Mayo, Gretchen Will, *North American Indian Stories: Star Tales,* New York: Walker & Co., 1987. (Be sure to pre-read any stories before you read them to your class.)

Universe in the Classroom, Astronomical Society of the Pacific, Teacher's Newsletter, Dept. N. 390 Ashton Ave., San Francisco, CA 94112 (free to all teachers, request on school letterhead.)

Answers to the Crossword puzzle on page 6.

Clue:	Answer:
1. A Milky Way that's not a candy bar.	GALAXY
2. The opposite of night.	DAY
3. A weighty subject.	GRAVITY
4. What makes it daytime?	SUN
5. A fun place to learn about space.	PLANETARIUM
6. The Earth is one that goes around the Sun.	PLANET
7. Star picture.	CONSTELLATION
8. The Sun is one.	STAR
9. The opposite of day.	NIGHT
10. The planet we live on.	EARTH

We Hope You Enjoy "Our Place In Space"

Planetarium Program Evaluation

After the Northern Stars Planetarium has visited your class, please take a moment to fill out this evaluation regarding *Our Place In Space.* Your suggestions are very valuable to us!

Mail the completed evaluation to :.....Northern Stars Planetarium
15 Western Ave.
Fairfield, Maine 04937
Or Email To :.....info@northern-stars.com

1. Show Name: _____

2. Group grade/age level:_____

3. Was the material presented at an appropriate level for your class? _____

_____

4. Was the amount of material discussed: Enough Overwhelming Not Enough

5. Should any parts of the presentation be developed further? _____. If so, which parts?

6. Was there sufficient time for questions and answers? Yes No

7. Were you studying astronomy or another related subject at the time of the planetarium's visit?
Yes No
If so, was the planetarium visit helpful? _____

8. Was the Teacher's Guide helpful in preparing your class for the planetarium visit? Yes No
Which parts were most helpful? _____
Which parts were least helpful? _____

9. Did the presenter present the material in a clear and understandable fashion? _____

10. How would you rate the overall program given to your class in the planetarium? _____

_____

_____

11. (Optional) Your name & school:_____

Please feel free to write any *further comments* on the back.

Thank you for your time! Your Comments Make a Difference!