# Society and the Solar System

## A Workbook for Teaching Multidisciplinary Elementary Level Astronomy

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# INTRODUCTION

This booklet has been put together to give teachers the option of instructing their students in astronomy using both a multidisciplinary and cultural approach.

The interdisciplinary nature of cross-cultural connections can be advantageous if applied to astronomy. By enlisting the help of many disciplines, the students receive a more hands-on approach to learning the fundamentals of astronomy. The students are presented with many avenues from which to learn. Teaching astronomy using a multicultural approach enables students to learn in a fashion that is best suited to their unique style of learning.

Astronomy has been taught in Canada using a Western approach, but many teachers realize their students would benefit from and enjoy learning this subject if lessons included cultural elements that reflected their own diverse backgrounds. By highlighting the differences between the astronomy of different cultures, this will strengthen the understanding not only of astronomy as a science, but how it has influenced life and the way we perceive the night sky around the world.

# INCORPORATING THE CURRICULUM

The lesson plans contained within this booklet have been designed for the purpose of teaching astronomy using a variety of media and incorporating several disciplines. Approaching the subject of astronomy multiculturally enables the student to build on their communication skills through writing, reading comprehension and creative writing. This is in addition to the science related skills such as analysis, data collection and observation that are traditionally related to learning astronomy. This new format lets students play to their strengths. By introducing new methods of teaching, a greater number of students will be successful in grasping the core concepts of the lesson because they have been given alternative routes by which to learn. Therefore each exercise strives to combine aspects of the curriculum to help each student rise to their potential.

Below is a list of parts of the curriculum that the lesson plans in this booklet fulfill. As well, the introduction of each lesson includes a summary of which aspects of the curriculum it addresses:

*2.2 use technological problem-solving skills (see page 16) to design, build, and test devices (e.g., a sundial, a model of the earth's rotation around the sun) for investigating the motions of different bodies in the solar system*
*Sample guiding questions: In what direction does your sundial fin need to point? Why? In what direction might you expect the shadow to move? How would daylight saving time affect the accuracy of your sundial? How might your model of the earth and sun best be used to explain the reason for day and night? What impact does the tilt of the earth's axis have on cycles on earth? What does the earth do to cause the day and night cycle?*

*2.4 use appropriate science and technology vocabulary, including axis, tilt, rotation, revolution, planets, moons, comets, and asteroids, in oral and written communication*

*2.5 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes (e.g., use a graphic organizer to identify and order main ideas and supporting details for a report about how science and technology can help humans adapt to life in space)*

*3.1 identify components of the solar system, including the sun, the earth, and other planets, natural satellites, comets, asteroids, and meteoroids, and describe their physical characteristics in qualitative terms (e.g., The earth's surface is very young; much of it is covered with water. The moon is the earth's only natural satellite. Comets are the largest objects in our solar system; their centres contain rock particles trapped in frozen liquid; their tails are made up of gas and dust.)*

*3.5 describe the effects of the relative positions and motions of the earth, moon, and sun (e.g., use models or simulations to show solar and lunar eclipses, phases of the moon, tides)*

*A3.1 describe, with teacher guidance, types of dances used among Aboriginal peoples in the past and the present that express aspects of their cultural identity (e.g., dances to express prayers and/or gratitude; initiation dances to mark rites of passage; shamans' dances to assist in*

*physical or spiritual healing; contemporary powwow dances for cultural affirmation and/or revitalization)*

*B3.1 demonstrate an understanding of some drama and theatre themes and traditions from a variety of times, communities, and places (e.g., Aboriginal communities: storytelling forms – the Seven Grandfather teachings, Haida tales, Medicine Wheel stories; theatre forms – Red Sky Performance Theatre, De-ba-jeh-mu-jig Theatre)*

*Teacher prompt: "Different communities have different versions of this shared story. What elements are the same in many versions? What elements are different? How might we explain some of the similarities and differences?"*

*D1.4 use a variety of materials, tools, techniques, and technologies to determine solutions to design challenges*

*D2.3 demonstrate an understanding of how to read and interpret signs, symbols, and style in art works (e.g., symbolism for sending messages and telling stories in Egyptian hieroglyphs, Agawa rock paintings, or graffiti art; symbols on currency or in advertisements that have specific national or other connotations; meanings associated with colour in different cultures [white dresses symbolize purity in Western culture but mourning and death in some Asian cultures])*

*Teacher prompts: "What are some of the feelings and ideas associated with Canadian symbols (e.g., maple leaf, beaver), and what are some of the things that they say about us as a nation?" "What assumptions do you make about a product when its advertisement shows a man and woman holding hands? How can designers change the image to manipulate those assumptions?"*

*D3. Exploring Forms and Cultural Contexts: demonstrate an understanding of a variety of art forms, styles, and techniques from the past and present, and their sociocultural and historical contexts.*

*D3.1 identify and describe some of the ways in which art forms and styles reflect the beliefs and traditions of a variety of communities, times, and places (e.g., art can represent ways in which people view their personal identity; contemporary Aboriginal artists use their artistic traditions to comment on identity, society, and the world; art can be a record of human experience; differences in style among different artists can be associated with a specific reason, intent, or motivation)*

*Teacher prompts: "How do contemporary artists use the influences of various global and/or historical art forms to explore ideas and themes that have personal relevance?" "How does Jane Ash Poitras' combining of autobiographical elements, traditional Cree iconography, text, photographs, newspaper clippings, and painted elements address ideas about identity and acculturation?" "Describe some of the differences and similarities between the depictions of men and the depictions of women in historical and contemporary art works."*

# FIRST NATIONS AND THE SOLAR SYSTEM

This exercise introduces students to Aboriginal constellations and is a steppingstone towards learning about Aboriginal astronomy as a whole. The students will be gaining an understanding of cultural traditions based on stories, which when critically analyzed, demonstrate how they communicate cultural values.

## Goals

- Gain knowledge related to Aboriginal astronomy
- Identify major elements of storytelling including characters, language and structure
- Recognize and duplicate themes eg it is wrong to steal
- Create simple stories about Aboriginal constellations
- Peer review the writing skills of fellow classmates

## Curriculum

- 2.5
- B3.1
- D3
- D2.3
- D3.1

## Materials

- Handout of myths
- Pencils etc
- Grid paper

## Time Requirements

- Reading and discussing thec onstellations and stories - ½ hour
- Drawing the constellation and writing the story - homework
- Peer editing and reading aloud – ½ hour

## Procedure

- Begin by comparing and contrasting our constellations, to those of Aboriginal populations. Ask the students if they are familiar with the stories of how our constellations were named.
- Reading aloud of some of the stories. Ask the students if they can find the moral of the story, or what it is teaching them about nature.
- Make their own constellation on the grid paper. It can be a person or thing, something that is important to them. Have them briefly come up with a short story on how this object became a constellation The students will then name their constellations
- Have them swap their story with a nearby friend in order to peer edit, look not only for spelling and grammar, but the theme of the story as well, which will make sure the student has understood the point of the lesson.
- Have several of the students share their story of how the constellation came to be with the class, asking other students to participate by asking if they can pick out the major theme.

# First Nations and the Solar System

| NATIVE CONSTELLATIONS: | GREEK CONSTELLATIONS |
|---|---|
| Long Sash: A Hero/Hunter | Orion |
| Seven Dancing Girls | Pleiades |
| Great Bear | Big Dipper or Ursa Major |
| Little Fisher | Little Dipper or Ursa Minor |
| The Spirit Path | The Milky Way |
| The Place of Decision | The two stars Castor and Pollux |

The Morning Star and the Northern Lights
(Adapted from a Wabanaki myth from Mark Littman's The People.)

Old chief Morning Star had only one son. Young Morning Star took a strange path northward. This path crossed high over the sky. It was the spirit's path--the Milky Way. When the old chief set foot upon the sacred path, suddenly he could not see or hear. When he opened his eyes, he was in a land of strange glowing lights. There the people all were wearing belts of a rainbow light and colored lights upon their heads. All through the night they played a game with a ball made of changing colors. As the old chief watched the players of the north dodge and leap and chase the ball, he saw his son, Young Morning Star, foremost among the players. He was wearing the most vivid colors. When the game was over, Young Morning Star went home with his father and all his people were glad because Morning Star was with them again--brightening the colored skies of dawn. And when Morning Star cannot be seen, the people know that he is in the northern land of color. So when the special game with the lights is played, and the Northern Lights leap and dance about the sky, the people know that Morning Star lives on and will return.

The Milky Way
(Adapted from an Algonquin myth from Mark Littman's The People)
And late at night, as the coals of the fire deepen into black, we tell of ourgreat souls. Silent were their footsteps through the pine forests, across buffalo grass, and into the canyons. Steadfast in their teachings, with their lives they blazed a trail for our people to follow with honor. And when their footsteps brought them to that chasm beyond which men venture only once, they vanished from our midst. It is likely that we shall never see their equal again. But as they left their work and spirit forever with us, their people, so even now as they journey on, they leave an imperishable mark upon the sky. For their arching across the heavens is the pathway of the souls. We do not know where their journey now leads them. Nor do we know what sights they may behold. And in the night each bright star is a campfire blazing in the sky where they have paused in their journey to look down on us, their people, as we huddle for warmth around the campfire.

The Bear and Three Hunters (Big Dipper) By the Musquakie
The stars of the bowl of the Dipper form a bear and those of the handle are hunters. In autumn when the Dipper is low to the horizon the blood from the arrow wounds, drip on the trees and turns them red and brown. It is the story of autumn.

The Boy and the Sun By the Hopi

A boy once lived with his grandmother for he didn't know who his father was. His grandmother said to ask the Sun about his father, surely the Sun would know. One morning the boy made a flour of crushed tortoise shell, cornmeal, coral, and seashells. He threw the flour upwards and it made a path into the sky (Milky Way). He climbed the path and when he found the Sun he asked "Who is my father?" and the Sun replied, "You have much to learn." The boy fell to Earth. He then made a wooden box from a Cottonwood tree and sealed himself in it as it floated west down a river to find the Sun again. The box washed ashore where two rivers join. He was freed from the box by a young female rattlesnake. Together they traveled west to find the Sun. They saw a meteor fall into the sea on its way to the Sun's house. They asked it for a ride. In this way they made it to the Sun's house. There they met the Sun's mother (the Moon) who was working on a piece of turquoise. That evening when the Sun came home from his days work, the boy asked again, "Who is my father?" And then the Sun replied "I think I am."

The Canoe Race (Orion) By the Chinook

A big canoe (Orion's belt) and a small canoe (Orion's dagger) are in a race to catch a salmon in the Big River (Milky Way). The little canoe is winning the race.

Coyote as the Moon (Moon) By the Kalispel

Once there was no Moon for someone had stolen it. The people asked "Who will be the Moon?" The Yellow Fox agreed to give it a try but he was so bright it made the Earth hot at night. Then the people asked Coyote to try and he agreed. The Coyote was a good moon, not to bright - not to dim. But from his vantage point in the sky the Coyote could see what everyone was doing. Whenever he saw someone doing something dishonest he would shout "HEY! That person is stealing meat from the drying racks!" or "HEY! That person is cheating at the moccasin game!" Finally, the people who wished to do things in secret got together and said "Coyote is too noisy. Let's take him out of the sky." So someone else became the moon. Coyote can no longer see what everyone else is doing but he still tries to snoop into everyone else's business.

The Coyote's Eyeball (Arcturus) By the Lummi

The Coyote liked to show off to the girls by juggling his eyeballs. One day he threw one so high it stuck in the sky (Arcturus)

.

The Elk Skin (Cassiopeia) By the Yakima

A Hunter once killed a great elk and stretched the skin to dry. He did this by driving stakes through it. Afterwards he threw the skin into the sky (Cassiopeia) where the light above shines through the stake holes forming stars.

Evening Star wins Morning Star (Venus) By the Skidi Pawnee

In the beginning there was only Tirawahat, which is the Universe and everything in it. Morning Star (Venus) and the Sun and the other males in sky were in favor of creating the world but Evening Star (Venus) and the Moon and the females were against it. To win the debate it was clear that Morning Star would have to win the heart of Evening Star. Many had failed, she was guarded by the Wolf (Sirius), Cougar (Auriga), Bear (Sagittarius), Bobcat (Procyon), and worst

of all the Snake (Scorpius). One by one Morning Star defeated them and won the hand of Evening Star. And so the world was created.

The Fifth World (Sun and the Earth) By the Toltec

Five worlds and five suns were created, one after the other. The first world was destroyed because it's people acted wrongfully. They were eaten by ocelots and the sun destroyed. The second sun saw it's people turned into monkeys due to lack of wisdom. The third sun had it's world destroyed by fire, earthquakes, and volcanoes because the people didn't make sacrifices to the gods. The fourth world perished in a flood that also drowned it's sun. Before creating the fifth world, our world, the gods met in the darkness to see who would have the honor of igniting the fifth sun. Tecciztecatl volunteered. The gods built a big fire on top of a pyramid and the volunteer prepared to throw himself into the flames. He was dressed in beautiful hummingbird feathers, and gold and turquoise. Four times he tried to force himself into the suicidal fire but each time his fear drove him back. Then the lowliest of all the gods, Nanautzin, dressed in humble reeds, threw himself into the fire. Teccitztecatl was so ashamed that he too jumped into the fire. The new sun rose into the sky giving light to the fifth world.

The Fox and the Moon (Moon) By the Snoqualmie

Long ago, Snoqualm, the Moon, had a spider make him a rope out of cedar bark and stretch it from the sky to the Earth. One day Fox and Blue Jay found the rope and climbed up to where the rope was fixed to the underside of the sky. Blue Jay pecked a hole in the sky and they climbed through to the sky world. Blue Jay flew to a tree while Fox changed himself into Beaver and swam in a lake. Moon had set a trap in the lake which caught Beaver. Moon skinned him and threw the body in the corner of the smokehouse. That night when Moon was asleep Beaver got up and put his skin back on. He looked around. He took a few of the trees, and the Moon's daylight making tools, some fire, and the Sun which was hidden in Moon's house. He changed back into Fox then he found the hole that Blue Jay had made and took the things to Earth. He planted the trees, made daylight, gave the fire to the people, and put the Sun in it's place. When Moon awoke he was very angry. He found the tracks that led to the hole. He started down but the rope broke and he fell to the Earth in a heap where he became a mountain. One can see the face of Snoqualm on one of the rocky cliffs. Today it is called Mount Si and it is near Northbend, Washington.

Name_____ Date_____

1. Read through several of the stories attached. Choose one and identify what the moral of this story is.

2. Choose an object or person that is important to you and has had a positive impact on your life. On the grid paper attached, draw the object or person as a constellation, with their basic outline being formed by dots on the grid.

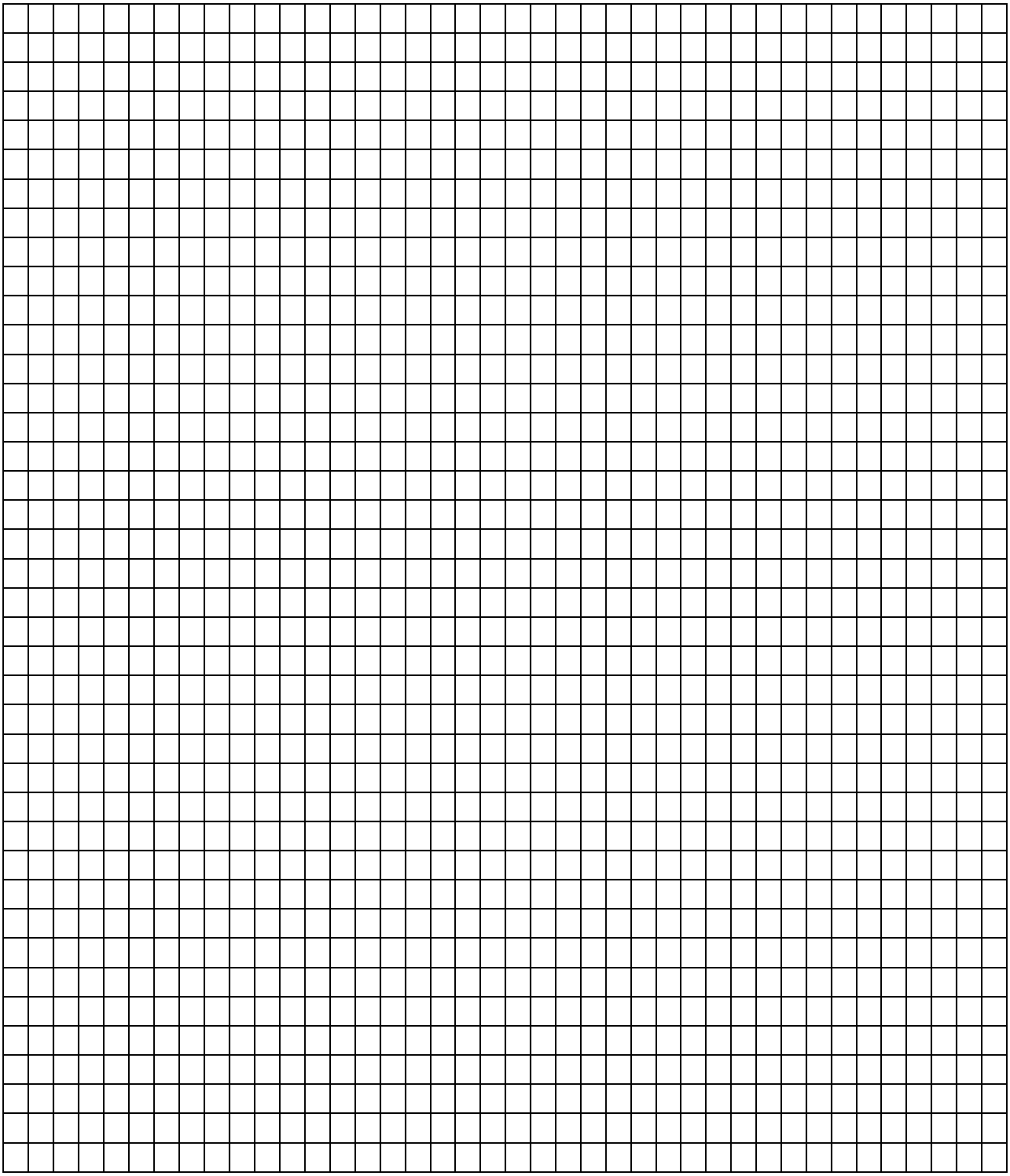
3. Which object or person did you choose and why?

4. Create a story surrounding your constellation. Make sure it has a beginning, middle and end. It should strive to explain a phenomenon found in nature, eg how the robin has a red chest, or else teach a moral, eg that stealing is wrong. Write this story on a separate piece of paper.

5. Have one of your neighbours or classmates read your story, and you read theirs. Can you find the moral of their story or what it is in nature their story seeks to explain?

Name_____ Date_____

Constellation_____



# ASTRONOMICAL INFLUENCES ON OTHER CULTURES

It is assumed that the students have some background learning in these cultures due to the grade 5 ancient civilizations unit. This project is great for getting the students to do some in depth research. Due to its umbrella nature, students will be using many methods of communication. The written portion of this assignment will develop writing skills where they will have to synthesize and summarize, whereas the research component will build on their reading comprehension. The second major component of this project is the visual display where the students will have to show creativity in a chosen arts field.

**Curriculum**

- *2.4*
- *2.5*
- *B3.1*
- *D3.*
- *D2.3*
- *D3.2*

## Goals

- Learning about another culture
- Demonstrate ability to do research
- Communication: visual, oral, written
- Ability to draw on other fields
- Use proper scientific terminology
- Include primary sources
- Use appropriate examples
- Describe accurately proceses, ceremonies etc

## Materials

- Handout
- Books and websites where they can procure information about their chosen culture
- Classroom materials they could use for their visual project including glue, paint, wooden dowels, construction paper, scissors etc

## Time Required

- Minimum one month
- Classroom time may be given to work on it
- Excellent project for students if a substitute teacher is needed
- Possibly 4 groups can present during one period. Depending on number of students, budget classroom time at the end of the semester/year accordingly

## Procedure

- Books and websites where they can procure information about their chosen culture
- Classroom materials they could use for their visual project including glue, paint, wooden dowels, construction paper, scissors etc
- Conference with students weekly to make sure they are on track

# Astronomical Influences on Other Cultures

Astronomy is an important part of every culture, but it impacts every culture differently. In this project, students will choose one civilization, ancient or modern, where they will study how the solar system, planetary bodies, sun and moon has had an effect on this society. You will also look at how their effect on earth (eg solstices, equinoxes, eclipses etc.) impacted this society. It is important to understand not only how astronomy influenced these cultures, but how in doing so, has had an impact on our own.

Students are to complete this project in pairs, with no two groups researching the same culture. All questions are to be answered thoroughly, with use of diagrams and illustrations where appropriate, and handed in in a separate duotang. Where books and websites have been consulted, appropriate bibliographical references are expected. Each pair of students will give a brief summary of their research in a presentation lasting approximately 15 minutes. This presentation must include a visual display.

## Choice of Cultures

African
Indian (Hindu)
Australian aborigines
African American slaves
Babylonians
Egyptians
Native Americans
Chinese
Celtic
Nordic/ Scandinavian
Greek/ Roman
German
Mayan/ Incan
Maori/ Polynesian
Early Islamic

1. Describe major roles astronomy played in this society, both practical and ceremonial.

2. How did astronomy influence their society? What kind of connections were made between astronomy and the world around them?
   a) Religion
   b) Economy
   c) Everyday life
   d) Structure of society
   e) Art

f) Literature
g) City planning

3. Now that you have done a great deal of research on your chosen culture, you must write a brief story. Write it from the point of view of an individual from this culture. Make sure that this story includes at least two situations in which your character uses astronomy. These situations should illustrate how their life uses or is affected or influenced by astronomy.

4. Find a piece of literature, art or artifact from this culture that has an astronomical component. Think about it and try to describe in your own words why the piece was made. If it art, include a picture. If it a book/poem etc, include a bibliographical reference.
   a) What is the piece? (when was it made, by whom, for whom)
   b) Why do you think the artist/ writer chose to include that specific component?
   c) What is it's purpose? Does it properly fulfill that purpose?

5. Create a visual display that demonstrates to your classmates the relationship between astronomy and your culture. It could be in the form of a diagram, diorama, model, skit, computer graphics

# CONSTELLATIONS ACROSS CULTURES

Emphasizing what makes humans the same and yet different is an important part of our society. In this exercise, students will be comparing and contrasting two famous constellations amongst many cultures. It will give them the opportunity to brainstorm and think critically. Having them make an illustration is an excellent opportunity for them to work on their artistic skills.

## Goals

- "Connect the dots" to form constellations from stars
- Recognize a few well known constellations, and know the myths behind them, western or otherwise
- Compare their perspectives to the perspectives of other students and ancient peoples
- Develop artistry and association skills
- Develop critical thinking

**Curriculum**

- *2.4*
- *2.5*
- *B3.1*
- *D3.*
- *D2.3*
- *D3.2*

## Time Required

- One class period + optional time
- Assign the illustration as homework
- Present and discuss illustrations briefly at the beginning of class the next day

## Materials

- Handout
- Crayons or markers, pencils etc
- Paper for drawing

## Procedure

- Begin by making the Big Dipper through connecting the dots on the papers provided.
- Then introduce them to the constellation Ursa Major, of which the Big Dipper is an asterism.
- Move on to discussing how constellations reflect important part of many cultures and histories.
- As a class, read through some of these alternate versions of this constellations. Discuss why this name and/or story may be important to the culture.
- Repeat for the constellation of Orion.
- After having read through all of these histories, have them pick one, from either Orion or the Big Dipper for which they will create an illustration. Try to have them include elements from that culture that are easily recognizable.
- Make a class book out of the illustrations or put them up around the classroom

http://www.teachervision.fen.com/astronomy/lesson-plan/1679.html#ixzz16WbEo2Ay

Can you make the
Big Dipper?
A
B
C
D
E
F
G

In Canada and the United States the Big Dipper is named due to the resemblance of the the major stars to a large ladle or dipper. This figuration appears to be derived originally from Africa, where it was sometimes seen as a drinking gourd. In the 19th century, runaway slaves would "follow the Drinking Gourd" to the north and freedom. Among Native American there is a widespread conception of the bowl as a bear. Some groups considered the handle to be three cubs following their mother, while others pictured three hunters tracking the bear. The Anishinaabe or Ojibway First Nation know the Big Dipper as Ojig-anang or the Fisher Star.

Ireland and Great Britain: This pattern is known as the Plough or sometimes the Saucepan. It is also occasionally referred to as the Butcher's Cleaver in northern England. In Ireland the figure is sometimes called the Starry Plough.

Scandinavia: Karlavagnen, Karlsvogna, or Karlsvognen. “Charles’ Wagon”

Romanian and most Slavic Countries: it is known as "the Great Wagon", as opposed to "the Small Wagon," the Little Dipper.

Germany: it is called Großer Wagen (Great Cart).

Netherlands: its official name is Grote Beer ( Big Bear), but often called Steelpannetje (saucepan), because of its resemblance to the utensil.

Finland: known as Otava and widely used as a cultural symbol. In Finnish dialects, the word *otava* means a 'salmon net', but this word is largely obsolete in modern Finnish.

Hungary: it is commonly called Göncölszekér ("Göncöl's cart") after a figure in Hungarian mythology, a táltos who carried medicines in his cart that could cure any disease.[4]

Hinduism: It is referred to as *(Vrihat)* Sapta Rishi meaning "The Seven (Great) Sages".

Eastern Asia: these stars compose the Northern Dipper. They are colloquially named "*The Seven Stars of the Northern Dipper*":

- Chinese: **北斗七星**; pinyin: *běidǒu qīxīng*
- Japanese: **北斗七星**, *hokutoshichisei*
- Korean: 북두칠성, *Bukduchilseong*
- Vietnamese: *chòm sao Bắc Đẩu*

In Taoist astrology. there are said to be nine stars — besides the seven visible stars, two invisible ones on either side of the star Alkaid. Legend has it that there used to be 9 stars (北斗九星) but 2 had since faded and that those that can see the 2 unseen stars will lead a long life. The Goddess Doumu is said to have given birth to the nine stars which make up the constellation.

Malaysia: the formation's name is *Buruj Biduk* (The Ladle)

Mongolia: it is known as the Seven Gods (Долоон бурхан)

Arabia: there is a story has the four stars of the dipper's bowl as a coffin, with the three stars in the handle as mourners, following it.

Can you make Orion?
1
2
3
4
5
6
7
8
9
10

Babylon: The Babylonian star catalogues of the Late Bronze Age name Orion $^{MUL}$SIPA.ZI.AN.NA, "The Heavenly Shepherd"

Egyptians: The stars of Orion were associated with Osiris, the sun-god of rebirth and afterlife, by the ancient

Greek and Roman
Orion's current name derives from Greek mythology, in which Orion was a gigantic hunter of primordial times. Some of these myths relate to the constellation; one story tells that Orion was killed by a giant scorpion; the gods raised him and the Scorpion to the skies, as Scorpio/Scorpius. Yet other stories say Orion was chasing the Pleiades

Hungarian
In ancient Hungarian mythology, Orion is also a great hunter and warrior, his name is Nimród and he's the mythological father of Hungarians.

Scandinavia
In Finnish mythology the constellation of Orion is called the scythe of Väinämöinen. The term most likely comes from the fact that it can be seen in the sky in early autumn in the Northern Hemisphere, the time of harvesting crops. In pre-Christian Scandinavia, "Orion's belt" was known as Frigg's Distaff (*Friggerock*) or Freyja's distaff.[24]

Indian
In Indian mythology, the Rig Veda refers to the Orion Constellation as Mriga (The Deer)

Chinese
In China, Orion was one of the 28 lunar mansions *Sieu (Xiu)* （宿）. Known as *Shen* （參）, literally meaning "three", it is believed to be named so for the three stars located in Orion's belt. (See Chinese constellations)

Native American
The Yokut Native American tribe of the California Central Valley saw the three bright stars as the foot prints of the god of the flea people. According to legend, when his five wives became itchy and ran away, three times the god of the flea people jumped into the sky to look for them. When his footprints are seen (stars are visible in the winter months) the flea people grow afraid and go into hiding (i.e. dormant). This helped explain to the tribal people why they couldn't count on those stars for guides in the summer months, and why there were no fleas about.
The Aztecs called the belt and sword of Orion the Fire Drill. Its appearance over the horizon served as the signal of the start of the New Fire ceremony.

Australian aboriginal
Orion is also important in Australian Aboriginal Astronomy. For example, the Yolngu people of Arnhem Land say that the constellation of Orion, which they call Julpan, is a canoe. They tell the story of two brothers who went fishing, and caught and ate a fish that was forbidden under their law. Seeing this, the Sun sent a waterspout that carried the two brothers and their canoe up into the sky where they became the Orion constellation.

# UNDERSTANDING OBJECTS IN SPACE

The brightest elements of the night sky are easy to observe and also the most prominent in the astronomy of every culture. They are a perfect starting point to begin having students becoming interested in astronomy. If we include cultural elements, students will learn early on that astronomy is much more meaningful than merely things in the sky, especially to the development of all cultures.

## Goals

- Analytical skills
- Drawing skills
- Research Conducting Skills
- Writing skills
- How to conduct observations and make hypotheses based on these observations
- Thinking Critically

**Curriculum**

- 2.2
- 2.4
- 3.1
- 3.5
- D1.4

## Materials

- Handout
- Paper with Observation Chart
- pencils etc
- Access to the internet or library where they can find material on ancient cultures

## Time Required

- At least 8 days to complete the chart
- Class time for reading about their chosen object, observing it if it is the sun, and fo asking questions

## Procedure

- Go through the list of choices with the children. Explain each one thoroughly and attend to their wuestions as necessary. Clarify that only the brightest planets will be observable for them in their study.
- Read through the entire handout with the class, explaining how they should be answering each question.
- Analytical skills

# Understanding Objects in Space

Choose one of the following objects. If you choose to do the Planets, select one. You will be observing it in the sky for one week, and then answering a series of short questions related to furthering your understanding of it as well as its importance.

## Moon

- The Moon is Earth's only natural satellite and is the fifth largest satellite in the Solar System. It is the largest natural satellite in the Solar System relative to the size of its planet, a quarter the diameter of Earth and 1/81 its mass. It is the brightest object in the sky after the Sun.

## Sun

- The Sun is the star at the center of the Solar System. It has a diameter of about 1,392,000 km, about 109 times that of Earth, and its mass accounts for about 99.86% of the total mass of the Solar System. About three quarters of the Sun's mass consists of hydrogen, while the rest is mostly helium. Less than 2% consists of heavier elements, including oxygen, carbon, neon, iron, and others.

## Planets

- A celestial body orbiting a star or stellar remnant that is massive enough to be rounded by its own gravity. there are eight planets in the Solar System. In order of increasing distance from the Sun, they are the four terrestrials, Mercury, Venus, Earth, and Mars, then the four gas giants, Jupiter, Saturn, Uranus, and Neptune. Six of the planets are orbited by one or more natural satellites.

## Constellations

- A group of stars, which appear to form a pattern in the sky. Examples include Bootes, Cepheus, Cygnus, Leo, Lyra, Orion, Pegasus, Perseus, Sagittarius, Ursa Major and Virgo.

## Milky Way Galaxy

- the galaxy in which the Solar System is located. It is one of hundreds of billions of galaxies in the observable universe. All the stars that the eye can see in the night sky are part of the Milky Way Galaxy, It appears as a hazy band of white light arching around the entire celestial sphere.

Now that you have chosen your object, you should do some background research on it. Perhaps look at its distance from earth, the materials it is composed of and its size.

You are going to observe it each night (or day) for one week, so long as it is visible. Draw a picture for each observation using the attached page If you can't see it on a particular day, then observe it for one day more and use the extra box in the observation chart.

In observing your object, remember to take into account at what time you are doing so and the direction from which the observation comes (eg north, east, south, west.

1. Describe your chosen object.

a) Why does it appear to us the way it does in the sky? Use the information you gathered in your background research to answer this question.

2. Describe any changes you find in its patterns, if any, such as brightness and movement. If there are, why do you think that they are they occurring? If there aren't, why not?

3. Explain the cultural connection this object has to earth. Have past societies found it important

4. Find story from another culture (eg. Egyptian, Chinese, that includes your chosen feature. Retell it in your own words.

a) What is the theme of this story?

b) What does it explain to us about life on earth?

c) Is there a moral to the story? If so, why would this moral be important to teach?

Name_____ Date_____

# Observation Chart

| | |
|---|---|
| Day 1 | Day2 |
| Day 3 | Day 4 |
| Day 5 | Day 6 |
| Day 7 | |

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## SOLAR SYSTEM

- Excellent resource, very detailed, includes planets: http://www.starteachastronomy.com/solar.html
- Has lots of information on the moons of the planets especially, and includes pictures: http://www.kidsastronomy.com/solar_system.htm
- how it was formed: http://www.buzzle.com/articles/how-was-the-solar-system-formed.html

## INFORMATION ON CULTURES

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**Africa**:

- History of astronomy in Africa: http://www.saasta.ac.za/astronomy/story.shtml
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