



PA – 3 Region **Mathematics and Science Partnership**

UNIT #1 TITLE: Twinkle Twinkle Little Star

For use with grades: Grade 4-6



Developed by:

Doreen Creighton
Robin Lewis
Donna Jensen

ROLES AND RESPONSIBILITIES

MISSION/TEAM NAME: SPACE CADET'S For Numbers

Team Member	Role	Responsibilities
Robin Lewis	<ul style="list-style-type: none">• Teacher• Lesson Planning	<ul style="list-style-type: none">• Develop Lesson• Gather necessary material
Donna Jensen	<ul style="list-style-type: none">• Teacher• Lesson Planning	<ul style="list-style-type: none">• Develop Lesson• Gather necessary material
Doreen Creighton	<ul style="list-style-type: none">• Teacher• Lesson Planning	<ul style="list-style-type: none">• Develop Lesson• Gather necessary material

Unit #1 Outline

GRADE LEVEL(S):
Grades 4-6
PA Content Standards/Common Core Standards
ELA Standards 1.3. Reading, Analyzing, and Interpreting Literature - Fiction and Non-Fiction Students read and respond to works of literature. 1.4. Types of Writing: Students write for different purposes and audiences. 1.5. Quality of Writing: Students write clear and focused text to convey a well-defined perspective and appropriate content. Mathematics Standards 3.3.4.B1. Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars. 2.3.5.A.1 Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems. 2.9.5A. Give formal definitions of geometric figures. 2.9.5I. Represent and use the concepts of line, point and plane. 2.3.5.F: Estimate and verify measurements of length, perimeter, area, volume, capacity temperature, time, weight, and angles. 4.MD.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. 2.1.5.C Use models to represent the concept of an integer, fraction, decimal, or percent.
ESSENTIAL QUESTION: (DEVELOP A GLOBAL QUESTION THE UNIT IS DESIGNED TO ADDRESS)
How can we use constellations to help understand math?

UNIT OBJECTIVES:

The students will be able to:

- define a constellation
- generalize how constellations have been used throughout history
- design a “new” constellation and create a story identifying the history behind the constellation (i.e. what its name is and how it got its name), and identify how the star is used by people
- write their own myth about the created constellation
- identify coordinates on a coordinate grid.
- plot points on a coordinate grid.
- identify points, line segments, angles, and vertex points within a constellation.
- identify straight, acute, right, and obtuse angles within the constellation they created
- measure and estimate angles
- write a percent for a given situation on a 100 grid and create a 100 grid to show various percents.

GENERAL MATERIALS NEEDED FOR UNIT: (include technology, NASA resources, etc...)

- Zoo In the Sky: A Book of Animal Constellations
- constellation article
(amazing-space.stsci.edu/resources/print/.../scibkgd_cnstlatn_qa.pdf)
- white tempera paint & white chalk
- paint brushes
- newspaper
- Various Paper types: writing paper, graph paper, black construction
- Various Worksheets
- Rulers
- Student Created Constellations
- GoSky Watch Planetarium app for iPad
- Protractors
- Pictures of various constellations (with one or more angles numbered for reference)
- recording sheet
- 1/4 sheet of various angles for Ticket Out.
- Students will access the National Library of Virtual Manipulatives online and use the Percent Grids manipulative
- Promethian board
- Netbooks cart.

MODELING AND GUIDED INSTRUCTION: (the whole class will be involved in the following learning experience)

The teacher will do one of the following:

1. Internet Activities: eclipses, videos, games, iPad apps
2. Introduce vocabulary
3. Activate prior knowledge
4. Model Procedures
5. Read the book Zoo in the Sky.

COLLABORATION/GROUP WORK: (problem-based/inquiry learning)
<p>The students will:</p> <ul style="list-style-type: none"> • Brainstorm • Internet Activities • Use manipulatives to explore concepts • Problem-solving • Various Worksheet activities
INDEPENDENT PRACTICE: (student exploration and elaboration)
<p>The students will</p> <ul style="list-style-type: none"> • Problem Solving • Apply and evaluate taught skills
ASSESSMENT/EVALUATION: (authentic student products and how assessed)
<p>Formative:</p> <p>Class room observation</p>
<p>Summative:</p> <p>Worksheets Ticket out the door Present products</p>



PA – 3 Region
Mathematics and Science Partnership

Participant Portfolio
Unit One: 2012 - 2013

NAME: Doreen Creighton

GRADE(S) INSTRUCTING: Grades K-8

SUBJECT AREA(S): Math – 4th & 5th grade

SCHOOL: Octorara Area School District

COORDINATOR NAME: Dr. Stan Terzopolos

TEAM CONTACT PHONE: 610-593-8242

TEAM CONTACT EMAIL: dcreighton@octorara.org

School MAILING ADDRESS:

Octorara Elementary School

204 Highland Rd

Atglen, PA 19310

PA – 3 Region
Mathematics and Science Partnership

Participant Portfolio
Unit One 2012-2013

Name: Donna Jensen

GRADE (S) INSTRUCTING: Grade 5

SUBJECT AREA(S): Math

CONTACT'S SCHOOL: Octorara Intermediate School

REGION COORDINATOR: Dr. Stan Terzopolos

TEAM CONTACT PHONE: 610-593-4608

TEAM CONTACT EMAIL: djensen@octorara.org

SCHOOL MAILING ADDRESS:

Octorara Intermediate School

221 Highland Rd

Atglen, PA 19310

PA – 3 Region
Mathematics and Science Partnership

Unit One
2012 - 2013

NAME: Robin Lewis

GRADE LEVEL: 5

SUBJECT AREA: Math

SCHOOL: Octorara Intermediate

COORDINATOR NAME: Dr. Stan Terzopolos

YOUR PHONE: 484-354-1808

YOUR EMAIL: rhlewis@octorara.org

SCHOOL MAILING ADDRESS:

221 Highland Rd.
Atglen, PA 19310

Introductory Lessons

Author: Robin Lewis-Lesson 1
Grade Level: Fifth Grade
Topic/Title: Let's Take a Walk through our Sky
Standards: Math - PA Common Core; Science - National Standards
3.3.4.B1.Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
Objectives:
The student will be able to: <ul style="list-style-type: none">• define what a constellation is• generalize how constellations have been used throughout history• design a “new” constellation and create a story identifying the history behind the constellation (i.e. what its name is and how it got its name), and identify how the star is used by people
Materials:
<ul style="list-style-type: none">• <u>Zoo In the Sky: A Book of Animal Constellations</u>• constellation article (amazing-space.stsci.edu/resources/print/.../scibkgd_cnstlatn_qa.pdf)• black construction paper• white tempera paint & white chalk• paint brushes• newspaper• writing paper
Anticipatory Set:
Read <u>Zoo In the Sky: A Book of Animal Constellations</u>
Activities: (modeling, guided practice, independent practice & group work)
<ul style="list-style-type: none">• The teacher will lead a discussion on the various animal constellations mentioned in the book, reviewing the names and shapes of each.• Students will read the NASA constellation article in small groups. When all small groups are done reading the article, the class will discuss what they have read.• Students will create their own constellation by placing newspaper on the floor, placing a piece of black construction paper on top of the newspaper, and creating a “starry sky” by splattering white tempera paint onto the construction paper. Once the paint has dried, the students should create their new constellation by “connecting the dots” with the “stars” they have chosen to be in their constellation.

Wrap-up:

Students will write a short story explaining the background of their constellation. The student should identify the name of their constellation, how it got its name or the significance of its name, what picture is formed when the stars in their constellation are connected, and how the constellation is used by modern day people.

Evaluation / Assessment:

Student's responses to questions asked throughout the discussion of the NASA constellation article can be used as a formative assessment. Student's story explaining their constellation will be used as a summative assessment for the activity. A rubric assessing focus, content, style, and conventions in the story can be used.

Author: Donna Jensen-Lesson 1

Grade Level: Grade 5

Topic/Title: How did the Constellations Get in the Sky?

PA Academic Standards:

1.3. Reading, Analyzing, and Interpreting Literature - Fiction and Non-Fiction

Students read and respond to works of literature.

1.4. Types of Writing

Students write for different purposes and audiences.

1.5. Quality of Writing

Students write clear and focused text to convey a well-defined perspective and appropriate content.

Objectives:

This is an introductory lesson. It will be used to teach the story behind the constellations.

1. The students will create their own constellation.
2. The students will write their own myth about the created constellation

Materials:

- Constellation Legends By Norm McCarter (Naturalist and Astronomy Intern SCICON)
- Zoo in the Sky by Jacqueline Mitton
- Notebook paper

Anticipatory Set:

- The teacher will ask the students: What is a constellation?
- The teacher will ask the students: Name some constellations you have seen?
- The teacher will create a list of all the constellations the students mention.
- The teacher will read the book Zoo in the Sky by Jacqueline Mitton.

Activities: (modeling, guided practice, independent practice & group work)

1. The teacher will ask the class how did you get your name?
2. The teacher will ask the class how do you think the constellations got their name?
3. The teacher will ask the class "What is a myth?" Establish that a myth is a story that tries to explain something or a belief. It usually deals with a hero or heroine. A constellation myth tries to explain why that particular constellation is in the sky, and usually contains a moral.
4. The teacher will hand out the attached packet on "Naming the Constellations"
5. The teacher will read the first page with the class.
6. The teacher will then assign each group a constellation. They will become the experts on that constellation.

7. The students will read that short story on the naming of the constellations.
8. Each group will then report out to the rest of the class the story behind the name of their assigned constellation.
9. The group will create a constellation using a name of their choosing using the silver stars.
10. The students will then create a story about that constellation. The myth should include all the parts that a myth has. It should explain how the hero/heroine got put up into the sky and what the moral is. The students should use their imaginations!
11. The students will type up their story in a word document.

Wrap-up:

- The students will share their individual stories.

Evaluation / Assessment:

- The teacher will ask each student to create their own constellation.
They should name it after themselves.
They should create a myth surrounding their own constellation.
- The teacher will collect the student work.

Constellation Legends

By Norm McCarter

Naturalist and Astronomy Intern SCICON

Andromeda – The Chained Lady

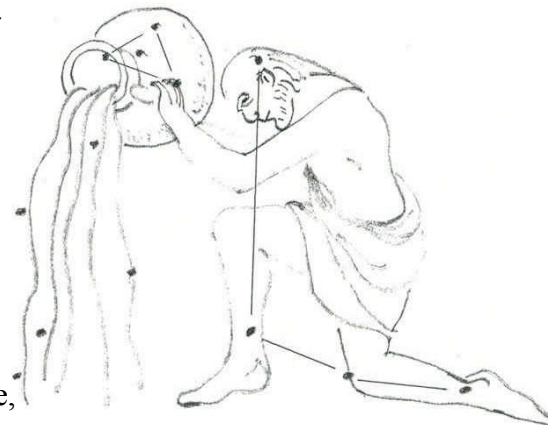
Cassiopeia, Andromeda's mother, boasted that she was the most beautiful woman in the world, even more beautiful than the gods. Poseidon, the brother of Zeus and the god of the seas, took great offense at this statement, for he had created the most beautiful beings ever in the form of his sea nymphs. In his anger, he created a great sea monster, Cetus (pictured as a whale) to ravage the seas and sea coast.



Since Cassiopeia would not recant her claim of beauty, it was decreed that she must sacrifice her only daughter, the beautiful Andromeda, to this sea monster. So Andromeda was chained to a large rock projecting out into the sea and was left there to await the arrival of the great sea monster Cetus. As Cetus approached Andromeda, Perseus arrived (some say on the winged sandals given to him by Hermes). He had just killed the gorgon Medusa and was carrying her severed head in a special bag. When Perseus saw the beautiful maiden in distress, like a true champion he went to her aid. Facing the terrible sea monster, he drew the head of Medusa from the bag and held it so that the sea monster would see it. Immediately, the sea monster turned to stone. Perseus then freed the beautiful Andromeda and, claiming her as his bride, took her home with him as his queen to rule.

Aquarius – The Water Bearer

The name most often associated with the constellation Aquarius is that of Ganymede, son of Tros, King of Troy. Ganymede was an extremely handsome young man, the most handsome the gods and goddesses had ever seen. While attending to his father's flocks on Mount Ida, Ganymede caught the attention of Zeus. Zeus sent his messenger eagle, Aquila, down to earth with instructions to bring Ganymede back up to Mount Olympus. On Mount Olympus, Ganymede served the gods by bringing them water whenever they needed it. He also served as cup bearer to Zeus. He was honored for his service by Zeus, who placed a constellation called Aquarius, which means water carrier, among the stars.



Aquila – The Eagle

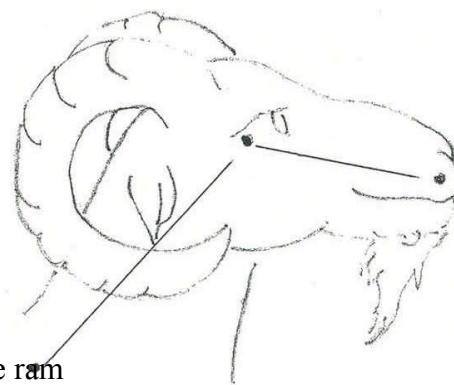
In Greek mythology, the eagle was associated with Zeus (Jupiter), either as a servant who carried Zeus' messages down to humans on Earth or as a disguise taken by Zeus in order to avoid his wife Hera when he was up to some mischief.



One story of Aquila's service to Zeus was that of Ganymede, who was a very gentle, kind shepherd and the most handsome mortal the gods and goddesses had ever seen. One day, the great eagle Aquila swooped down from the sky and, landing near the startled Ganymede, told him that Zeus had sent him to carry Ganymede to Mount Olympus. And so, climbing up on the eagle's broad back, Ganymede was taken up to Mount Olympus where he served the gods by bringing them water.

Aries – The Ram

Athamas, the legendary king of Thessaly, had two children, Phrixus and Helle. He had remarried and Ino, the children's stepmother, began to treat them very badly. They were treated so cruelly that Hermes took pity on them and sent a magical ram to take them away and escape their stepmother's wrath.



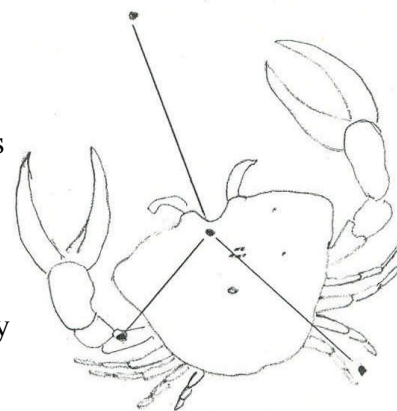
Mounted on the ram's back, the children flew over land and sea to the east. Unfortunately, Helle failed to get a good hold on the fleece of the ram and as they flew over the strait that separates Europe and Asia, she fell off and was drowned in the sea far below. That sea is called Hellespont to this day in honor of her memory.

Phrixus landed safely at Colches, which is on the edge of the Black Sea. In gratitude for his safe deliverance, Phrixus sacrificed the ram and gave its Golden Fleece to the king of that country. In honor of the ram's great sacrifice in saving the children, Zeus placed the ram's constellation, Aries, in the night sky.

Cancer – The Crab

According to Greek mythology, Hercules, Zeus' son, was given 12 labors by Hera, Zeus' wife, which would each test his strength and courage. Hera hoped these 12 labors would prove to Zeus that Hercules was unworthy of his love. The second of these 12 labors was to kill the Lernean Hydra, which had a long snake or dragon-like body and nine heads. If anyone succeeded in cutting off one of its heads, it would grow another one in its place.

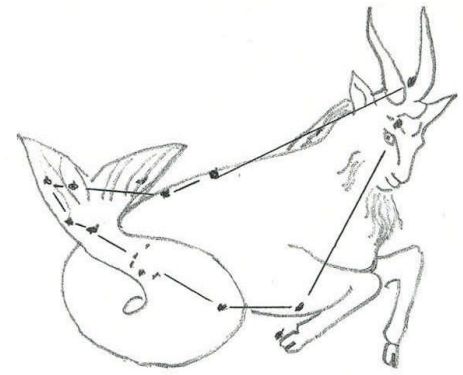
In order to make sure that Hercules failed at this task (Hera was very jealous of Zeus' love for Hercules), Hera sent a large crab to grab Hercules by the heel and distract him while he was fighting the Hydra.



During the fight with the Hydra, Hercules, who took his nephew Iolas along, would cut off one of the Hydra's heads and Iolas would sear that neck with a torch so that no new head could grow back. Fearing that Hercules might indeed defeat the Hydra, Hera sent in the crab to grab Hercules' foot. However, as the crab grabbed his foot, Hercules stomped down with his other foot and crushed the crab. He then cut the final head of the Hydra off and Iolas seared it, thus defeating the Hydra, and Hera. To honor Hercules' great victory and to remind Hera of her failure, Zeus placed the constellation of Cancer the Crab in the sky.

Capricorn – The Sea Goat

Capricorn is one of the earliest constellations and has passed through the ages virtually unchanged, depicting the front half of a goat and the tail of a fish. It is also referred to in Greek and Roman mythology as the “Gateway of the Gods” through which the souls of men released at death would pass to the life hereafter.

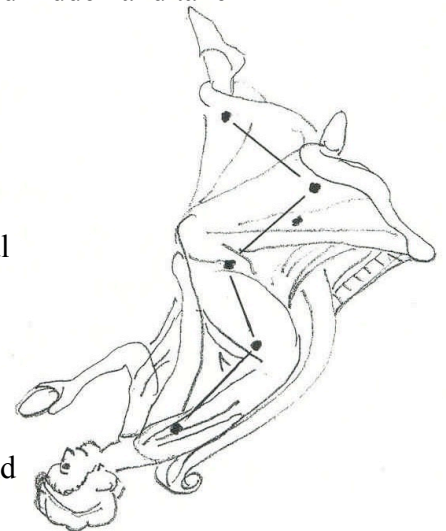


According to ancient Greek legends, Cronus was told by the oracle that one day one of his sons would grow up to be stronger than he and would eventually kill him in battle. In order to keep this from happening, Cronus had every baby boy born to him as a son killed. Some legends say he would swallow them when they were born. Knowing of this curse, Zeus’ mother gave him to some sea nymphs with instructions to take him to a far-away place where Cronus could not find him and raise him there. However, sea nymphs cannot produce milk, and so they brought a very special goat, Amalthea, to nurse him. As Zeus grew older, Amalthea also became his playmate. One day, Zeus was playing with Amalthea and broke off one of her horns. Zeus took this as a sign that he was supposed to break off his relationship with Amalthea and the sea nymphs and go fight his father, Cronus. Zeus gave the horn to the sea nymphs and Amalthea telling them that as they had always provided for his needs, so now this horn, which was now a magic horn, would always provide all the food and drink they would ever need. Zeus then left them to go and fight Cronus, his cruel father. Zeus defeated Cronus and, according to one legend, as Cronus fell to the ground, his head split open and out stepped the brothers of Zeus that Cronus had swallowed. Zeus was now the king of the gods and one of his first acts was to place the constellation Capricorn in the heavens in honor of Amalthea and the sea nymphs who had hidden and taken such good care of him.

Casseopia – Queen of the Night Sky

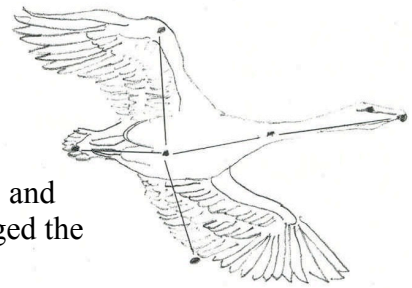
Queen Casseopia, wife of King Cephus and mother of Andromeda, was very beautiful. She boasted that she was the most beautiful woman in the kingdom. As time went by, she began to say that she was the most beautiful woman in the world. Eventually, her boasting proclaimed that her beauty even exceeded that of the gods. Poseidon, the brother of Zeus and the god of the sea, took great offense at this statement, for he created the most beautiful beings ever in the form of his sea nymphs.

In his anger, he created a great sea monster, Cetus (also described as a great fish or whale), to ravage the seas, sinking ships, killing the sailors, and destroying towns and villages along the seacoast. This created great fear among the people of Casseopia’s country. In an effort to stop this tremendous destruction, the people when to Poseidon and asked what could be done to stop this monster. Poseidon replied that if Casseopia would admit that his sea nymphs were indeed more beautiful than she, he would stop the monster. But Casseopia refused. The people asked Poseidon if there were any other way to stop the destruction. He replied that if the beautiful Andromeda, Casseopia’s only daughter, were to be sacrificed to Cetus the destruction would stop. The people took Andromeda and chained her to a rock which projected out into the sea to be sacrificed to Cetus. However, she was saved by Perseus, and Cetus was turned to stone. Poseidon and his brother Zeus decreed that Casseopia be placed in the sky as a constellation, and as punishment for being so conceited about her looks, she would suffer the humiliating position of being upside down in the sky during the fall of the year when her constellation is best seen.



Cygnus – The Swan or The Northern Cross

One story based in Greek mythology told of two Close friends, Cygnus and Phaeton, who were continually competing. One day, they each challenged the other to a race across the sky, around the Sun, and back to Earth. In an effort to gain the advantage, they both cut too closely to the Sun and their chariots were burned up. They both fell to the Earth and were knocked unconscious. Upon recovering, Cygnus began looking for his friend, Phaeton, and discovered his body trapped by the roots of a tree at the bottom of the Eridanus River. In an effort to retrieve his friend's body and give it a proper burial, Cygnus repeatedly dove into the river, but could not reach his friend's body. While he sat grieving on the bank of the river, Cygnus begged for Zeus to help him. Zeus replied that if he gave Cygnus the body of a swan, he would be able to dive deeply enough to retrieve his friend's body. However, if Cygnus did take on the body of a swan, he would also be giving up his immortality and would only live as long as a swan would normally live. Cygnus readily agreed to this in order to retrieve his friend's body and give him a proper burial, allowing his friend's spirit to travel into the afterlife. In honor of this great unselfish act, Zeus placed Cygnus' image (that of a swan) into the night sky.

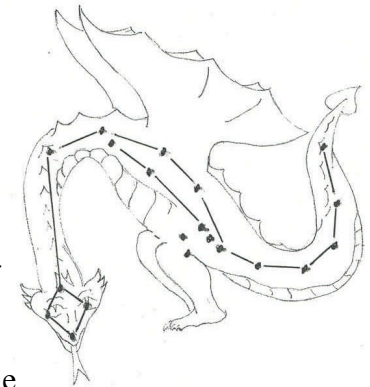


Draco – The Dragon

There are several ancient stories which could be about Draco the Dragon, but the one which best seems to fit with Greek mythology is the story about Cadmus and the Dragon of Thebes.

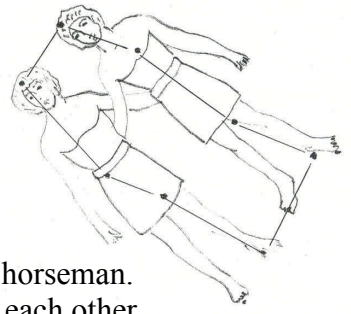
According to this story, Zeus had stolen the young woman Europa from her home country of Phoenicia. Her father ordered her brother Cadmus to go and search for her, and not return until he had found her and brought her back with him.

Cadmus wandered over the whole world looking for Europa, but could not find her. He knew he would never find her because no one can find someone that Zeus has hidden. He decided to look for a country in which to build his city, Thebes, because he knew he could never return to his home in Phoenicia. Following Apollo's advice, Cadmus found a suitable site to build his new city. However, while searching for water, Cadmus' attendants were killed by a large dragon. Cadmus went to fight this dragon, and upon finding the dragon in a cave, was able to kill it with his spear. Cadmus was told by Minerva to plant the dragon's teeth in the ground. From these teeth grew warriors who fought each other until only five were left. With these five, Cadmus was able to build his city of Thebes, and they became its first residents. Because Draco had been so faithful in guarding the caves and their contents, Zeus placed his constellation in the northern sky, where, because his constellation never sets, he can guard all the treasures of Zeus.



Gemini – The Twins

Castor and Pollux were twin brothers, the sons of Zeus and Leda, the wife of Tyndarus, king of Sparta. They sailed with Jason and the Argonauts in search of the Golden Fleece. They were invincible fighters with unparalleled courage. Pollux distinguished himself as a great boxer or fighter and Castor as a great wrestler. Some stories say Castor was a great horseman. These two were inseparable companions and fought their best when they were near each other. Because of the help they gave their fellow Argonauts during a storm which threatened to sink their ship, the constellation Gemini was considered a favorable sign to sailors when they saw it. To commemorate their great feats and the help they gave to the sailors, and because of their great love for each other, Zeus placed their constellation, Gemini, in the sky after their deaths. Today, Gemini can be seen between the constellations of Orion and Cancer, near Leo.

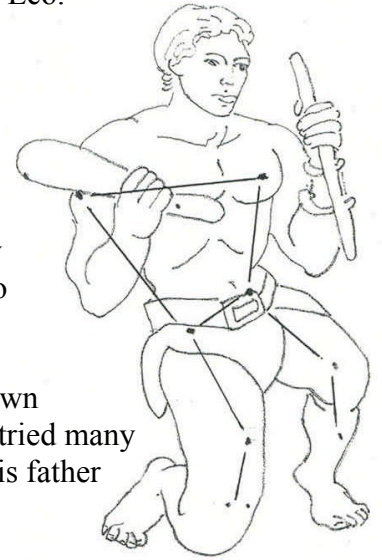


Hercules – The Strong Man

Hercules was the son of Zeus and Alcmene. He was the favorite son of Zeus, who had made special preparations for Hercules' birth so that he would be the mightiest of all the heroes. In keeping with this plan, Hercules would spend the first part of his life living among, and even serving, mortals. He would learn how they lived and what was important in their lives. Then, he would be brought up to Mount Olympus to join the Olympians there, and having lived among the mortals, could help the gods in their discussions and plans.

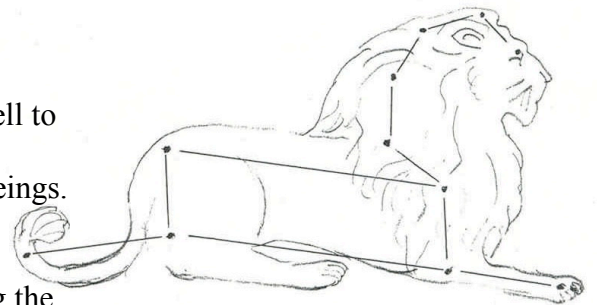
Hercules was known for his great strength, courage, and agility. He was also known for his Twelve Labors, which he undertook as a result of Hera's scheming. Hera tried many times to get Hercules to fail at some task, and as a result, fall out of favor with his father Zeus. However, Hercules not only completed these twelve tasks, but did them in such a way as to win even more favor from his father, and at the same time make Hera look bad.

In addition to these famous Twelve Labors, he also sailed with Jason and the Argonauts in search of the Golden Fleece, took part in the war between the gods and the giants, and still had time to sack Troy. Zeus commemorated all the mighty acts of Hercules by placing his constellation in a very prominent place in the sky.



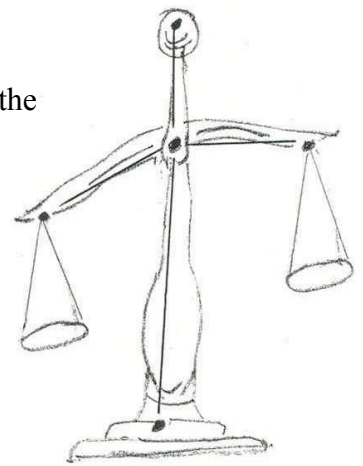
Leo – The Lion

According to Greek mythology, Leo was a ferocious lion who fell to the earth in the forests of Nemea. He feasted on the animals of the forest and also caught and ate many human beings. Many brave men lost their lives trying to kill this giant lion, for its skin was so tough that no arrow or spear could pierce it. Hercules was given the first of his Twelve Labors, that of killing the terrible lion, by Hera the jealous wife of Zeus. She hoped that he would fail and thus lose the love of his father, Zeus. Knowing that no spear or arrow could pierce the lion's skin, Hercules entered the lion's cave and was able to strangle the terrible lion. Hercules then reappeared at the cave's entrance wearing the lion's skin as a robe. Hercules had saved the people of Nemea. This great act of heroism was commemorated by Zeus, when he placed the picture of the defeated lion (Leo) in the night sky.



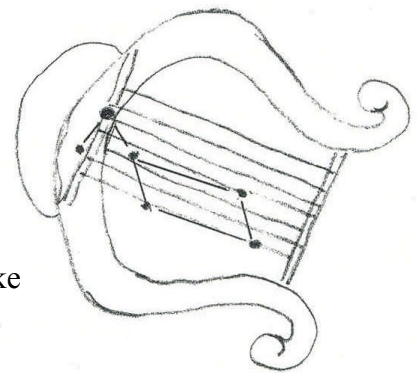
Libra – The Scales

Libra is the only zodiacal constellation that represents an inanimate object. Libra, the scales, represents the equality of the days and nights at the equinoxes. It has more recently come to be associated with Virgo, the goddess of justice, who used these scales as a symbol of her office. Libra is represented in the heavens next to the hand of Virgo.



Lyra – The Lyre (Harp)

Lyra is the celestial harp invented by Hermes, and given to Orpheus by Apollo. It is said that when Orpheus played on his harp, usually love songs to his bride Eurydice, that people and animals would stop what they were doing just to listen. Some stories relate how even the trees would cease movement when he played. One day, Eurydice died suddenly which broke Orpheus' heart. In his loneliness, Orpheus attempted to win her back from Hades, ruler of the underworld. Orpheus began his descent into the underworld playing his lyre. As he approached Hades, he was pleased to see that Hades greatly enjoyed his music. After a while, Orpheus stopped playing his music. Hades asked him to resume playing the beautiful love songs on his lyre. Orpheus agreed on one condition: that when he had finished, Hades would release his beloved Eurydice to him. Hades agreed, and Orpheus again began to play. At the conclusion of his music, Orpheus asked Hades for his wife. Hades replied that she would indeed be released on one condition: that Orpheus would trust Hades to keep his word and would return to the upper world playing his music, not ever looking back to see if she were following. If Orpheus doubted or did not trust Hades and looked back, Eurydice would be taken back by Hades into the underworld. So Orpheus began his return trip playing his music. Behind him he could hear the footsteps of Eurydice, which thrilled him greatly. However, to test Orpheus' trust, the return route Hades insisted on lead through a pine grove. As Orpheus approached the upper world he passed through this pine grove, but he could not hear the footsteps of his beloved Eurydice. Unable to endure the quiet any longer, Orpheus glanced over his shoulder to witness Eurydice fade before his gaze, taken by Hades back to the underworld. Upon Orpheus' death, Zeus placed the constellation Lyra into the heavens in honor of his beautiful music and also to honor the great love Orpheus had for Eurydice.



Orion – The Great Hunter

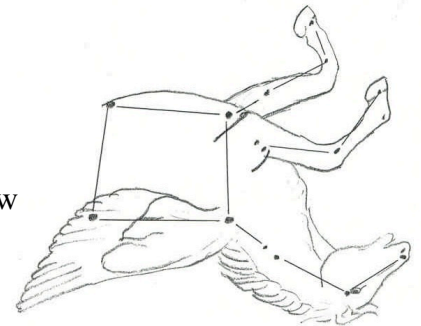
With his great skill as a hunter, Orion provided meat each day for the gods' meals. One day, Artemis (Diana), the moon goddess and goddess of the hunt, asked if she could accompany Orion on his daily hunt. He readily agreed. The next day as they were hunting in the woods, they saw a deer. Orion carefully fitted an arrow to his bow and shot. So sure was his shot that the deer died instantly, which pleased Artemis greatly. At dinner that evening, Artemis told everyone, even Zeus, of Orion's great ability with the bow. All of the praise extremely pleased Orion, who vowed to impress Artemis even more the next day.

Arising at dawn, Orion proceeded again to the forest where he shot every animal he found. He then made a large pile of these animals near the door to Artemis' house. Then, knocking on her door, he asked her to come outside and see the great surprise he had for her. Upon seeing the great pile of dead animals, Artemis was horrified! For you see, Artemis was also the protector of animals and punished those who killed more than they could eat. In her anger, she stomped her foot on the ground and out of the dust came a great scorpion which stung Orion on the heel causing him to die in great pain. But in honor of his great service to the gods, Zeus placed his constellation in the sky.



Pegasus – The Flying Horse

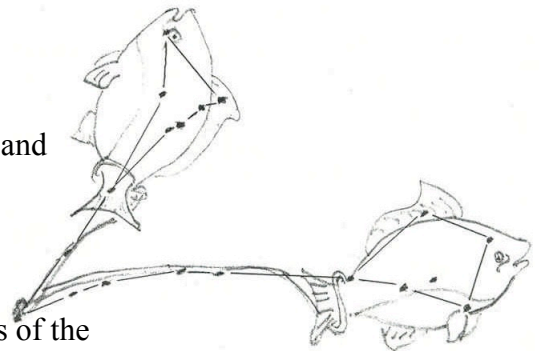
In mythology, Pegasus sprang from the spilled blood of the Medusa, which dripped into the ocean after she was slain by Perseus. Pegasus then flew off into the sky. Returning to earth later and eventually tamed by Minerva, Pegasus was given to Bellerophon to aid him in conquering the monster Chimera. Bellerophon was successful in destroying the monster. He then attempted to fly, riding Pegasus, up to Mount Olympus to live with the gods. Zeus, angered by the presumption of Bellerophon, made an insect sting Pegasus causing him to buck Bellerophon off, who fell to his death. Pegasus continued his flight up to Mount Olympus and was used in several missions to defeat evil aggressors. In honor of his great service, Zeus placed his constellation among the stars.



Pisces – The Fish

One day as Aphrodite and her son Eros (in Roman mythology Venus and Cupid) were in the woods they heard the monster Typhon crashing through the woods towards them. Aphrodite took Eros' hand and they ran away as fast as they could. As they ran, the noise of Typhon's approach got closer and closer.

Finally, Aphrodite and Eros had run so far that they reached the shores of the Great Sea. Knowing that the terrible Typhon would soon be upon them, Aphrodite and Eros changed themselves into two fish and swam away to safety. Zeus later immortalized this great escape by placing the figures of the two fish, Pisces, among the constellations. Other stories say that Poseidon sent two fish (dolphins) to save Aphrodite and Eros, and these were the two fish that became Pisces.



The Pleiades – Seven Sisters

Of all the constellations in the sky, no group of stars has been known longer nor had more different stories, legends, or myths told about it than the Pleiades. There are at least 43 different stories or names for them.

However, there are only two that are closely related to the Greek heroes or gods. The Pleiades, according to the first Greek myth, were the seven daughters of Pleione and Atlas, the giant who bears the world upon his shoulders. These seven maidens, along with their sisters the Hyades, (these are the small stars forming the face of Taurus) were transformed into stars because of their “amiable virtues and mutual affection” and because of their great sorrow at the burden imposed upon their father, Atlas.

The second myth concerning the Pleiades tells how they were so beautiful that Orion was constantly chasing them, which caused them a great amount of discomfort. They appealed to Zeus for help and in pity for them he changed them into doves. As doves they then flew up into the sky and found a hiding place among the stars.

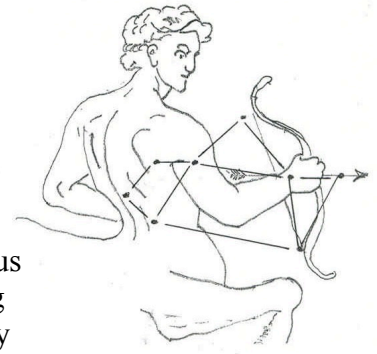


Sagittarius – The Archer

Sagittarius is usually described as a centaur, horse from the waist down and man above the waist. The constellation was placed in the night sky by Zeus to honor Chiron, the king of the centaurs.

Chiron had galloped into a battle where some bad centaurs were attacking Hercules, and a good centaur, Pholus. Hercules was defending Pholus from the bad centaurs by shooting poison-tipped arrows at them. Not knowing that Chiron was there, Hercules shot one of his poison-tipped arrows at him by mistake and hit him. When Chiron fell to the ground, all of the other centaurs galloped away.

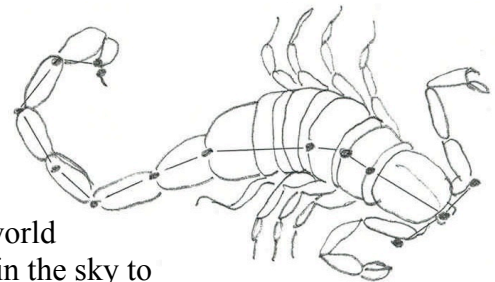
Because he had been made immortal long before, Chiron did not die. He would have to live in horrible pain forever. Zeus took pity on him and ended Chiron’s great pain by allowing him to die.



Scorpio – The Scorpion

This is the famous Scorpion, which came up out of the ground and was commanded by Artemus to sting Orion, the mighty hunter, and caused him to die. That was the punishment Orion received because he had killed so many animals for no reason, except to try to impress her.

Scorpio was then placed into the sky on the opposite side of the world from Orion so as to avoid any further conflict. It was also placed in the sky to remind all of us that it is okay to kill animals for food, but it is wrong to kill them just for the fun of it.



Tarus – The Bull

According to Greek mythology, Tarus is the bull that carried the beautiful Europa over the seas to the region of the world that now bears her name. Europa was the beautiful daughter of Agenor, King of Phoenicia. It is said that Europa was so beautiful that Zeus fell madly in love with her. So Zeus changed Himself into a snow-white bull and mingled with the herds of Agenor for which Europa was caring.

Europa was charmed by the beauty of this great white bull and she began to stroke its neck and pat its shoulders. Finally, she climbed onto its broad back. The bull immediately began to move out across the sea to Crete where he (Zeus) reassumed his divine form right before Europa's startled eyes. Zeus had successfully kidnapped Europa. To commemorate his feat, he placed the picture of Tarus among the constellations, and on earth a continent was named for Europa.



Ursa Major – The Big Bear (Dipper)

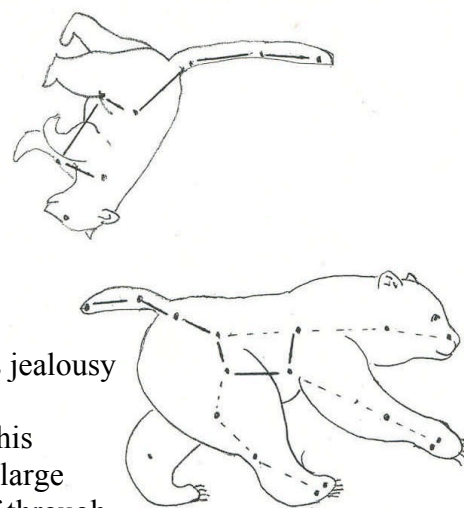
and

Ursa Minor – The Little Bear (Dipper)

Ursa Major is one of the oldest known constellations and has more named stars in it than any other constellation. It has been known by many names, but the form of the bear has become the most common, even though it's quite difficult to see this image in the stars. In Greek mythology, Zeus had many human girlfriends, But his favorite was the beautiful nymph Callisto. His secret visits to earth to meet with her only added to Hera's jealousy and determination to get revenge against these women.

One day, as Zeus was walking through the forest with Callisto, he saw his wife Hera coming. Unable to hide Callisto in time, he turned her into a large brown bear. When Hera arrived, she saw only Zeus walking by himself through the forest. She looked around, searching for someone with Zeus, but saw only an old brown bear. She still did not trust Zeus and insisted that he return to Mount Olympus. Zeus did not want to go because he wanted to change his girlfriend Callisto back into her human form before leaving. But Hera insisted. So Zeus went with Hera, leaving Callisto as a large brown bear. Unknown to Zeus, Arcas, Callisto's son who was a great hunter, was out in the woods hunting that day. As chance would have it, he saw this great big brown bear. He put an arrow to his bow, took careful aim, and shot that great bear through the heart. Right before his startled eyes, Arcas watched the bear as it died change back into the form of his mother Callisto with an arrow through her heart.

Arcas began to cry loudly for his mother and what he had done to her. When he realized that it was Zeus that had changed her into the bear, he grew even angrier. Zeus, fearing that Hera might hear the cries, went down to earth to try to appease Arcas. In order to hide what he had done, Zeus changed Callisto back into a bear and placed her form, as a constellation, into the northern sky as the Big Dipper. He then changed Arcas into the small bear (the Little Dipper). As Arcas was being placed into the sky, he turned to look at his mother Callisto (now the Big Dipper). That is why the Little Dipper is curved toward the Big Dipper, so that Arcas can watch over his mother Callisto for all eternity.



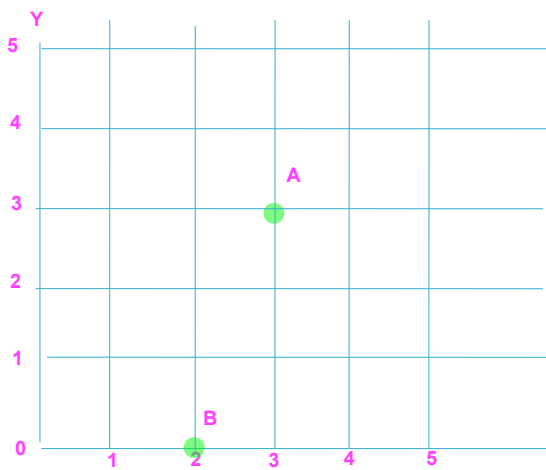
Math Lessons-Grade 4-5

Author: Donna Jensen-Lesson 2
Grade Level: Grade 5
Topic/Title: Constellations Creation
PA Academic Standards:
CC.2.3.5.A.1 Graph points in the first quadrant on the coordinate plane and interpret these points when solving real world and mathematical problems.
Objectives:
<ol style="list-style-type: none">1. The students will identify coordinates on a coordinate grid.2. The students will plot points on a coordinate grid.
Materials:
<ul style="list-style-type: none">• Powerpoint on coordinate grids• Constellation Coordinates• Self-created constellation from introductory lesson• Graph paper• Rulers
Anticipatory Set:
<ul style="list-style-type: none">• The teacher will show a small video on constellations. http://www.5min.com/Video/Stars-and-Constellations-93889705
Activities: (modeling, guided practice, independent practice & group work)
<ol style="list-style-type: none">1. The teacher will use the powerpoint on coordinate grids to teach the subject to the students.2. The teacher will then pass out the constellation coordinate page.3. The class will together name the points on the crab.4. The class will together plot the points on The Fish.5. The class in groups will finish the cup and the Swan.6. The teacher will review the student's work.
Wrap-up:
<ol style="list-style-type: none">1. The students will be given graph paper.2. The students will use the constellation they created in the previous lesson.3. They will plot the points of their constellation on the graph paper.4. The students will then name the ordered pairs of their constellation5. We will share our graphs.

Evaluation / Assessment:

1. The teacher will collect the student graphs to verify they named their ordered pairs correctly.

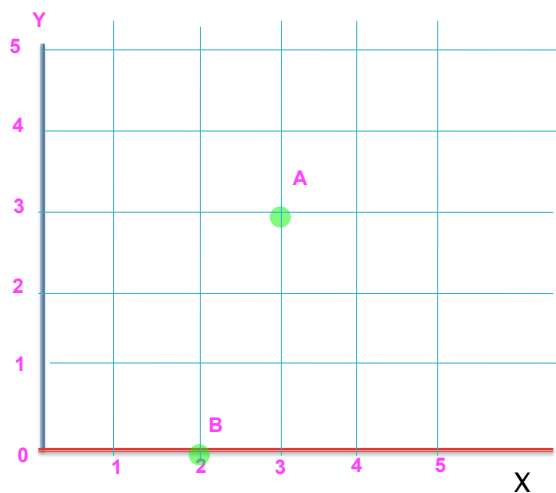
Powerpoint on Coordinate Grids



How would you describe where point A is located?

How would you describe where point B is located?

- ▶ **Coordinates:** Locations on a grid identified by an ordered pair.
- ▶ **Ordered Pair** - two numbers that identify a point on a grid.
- ▶ You read the numbers over then up and they are written like this (X, Y) . You have to have the **comma** and the **parentheses**.



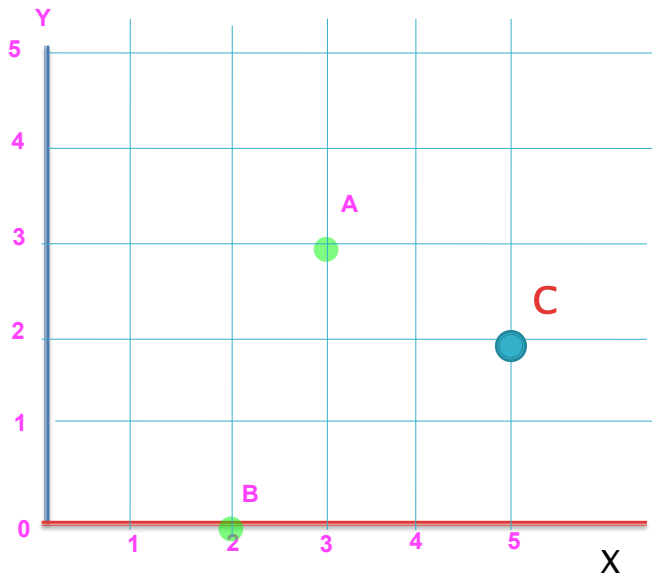
Point A is located at (3,3)

First, we go over

Second, we go up

When we write an ordered pair, we must go in a very particular order!



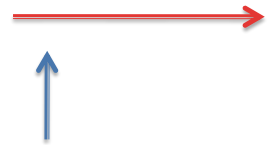


How would we name point C?

First, we go over

Second, we go up

5,2



What is wrong with the way I wrote my ordered pair?



Name _____

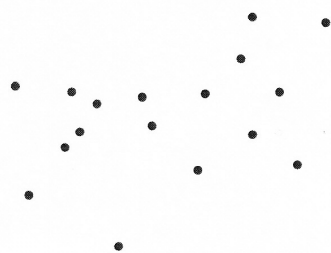


GEOMETRY

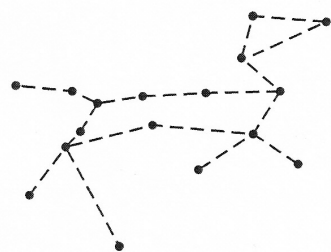
Constellation Coordinates

What do you see when you look at the night sky? The same stars people have looked at for thousands of years! There are millions of stars. But some groups of stars seem to form pictures in the sky. Those groups are called **constellations** (KON-stuh-LAY-shuns).

One constellation looks like this:



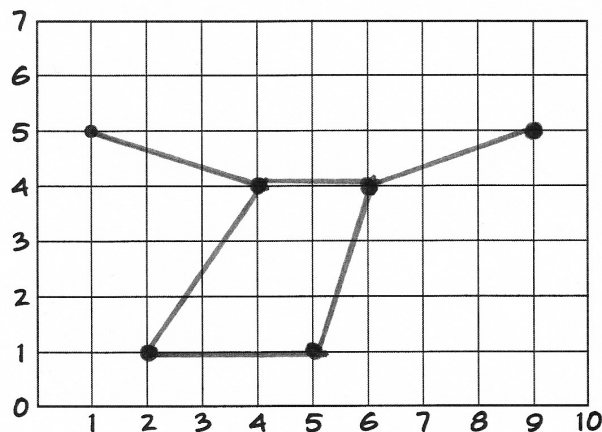
Long ago, people in Greece and Rome imagined that those stars were connected, like this:



They called the constellation "The Big Dog." They named other constellations after people, animals, and objects. Today, we find many constellations by looking for the shapes the ancient Greeks and Romans found. You can use math to see some of them.

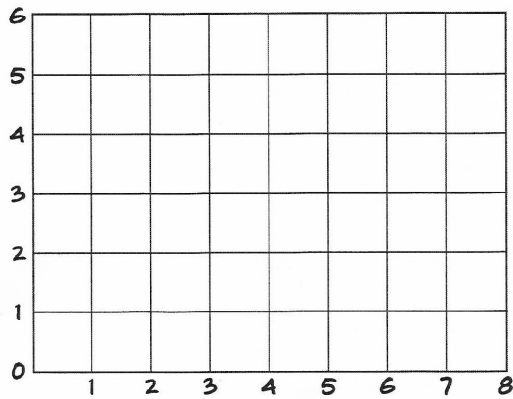
What to Do:

- Under each grid is the name of a constellation. Each pair of numbers under the name stands for one star in that constellation. The numbers are called **coordinates**.
- The first number in each pair tells you how many numbers to go across from left to right on the grid. The second number tells you how many numbers to go up. The first pair of coordinates under The Crab, (1,5), tells you to go across 1, then up 5. We put a point on the grid to represent that star for you.
- Make a point on the grid for each pair of coordinates. After you find each star using the coordinates, draw a point on the grid and cross off those coordinates. When you finish, connect the points to make a picture of the constellation.



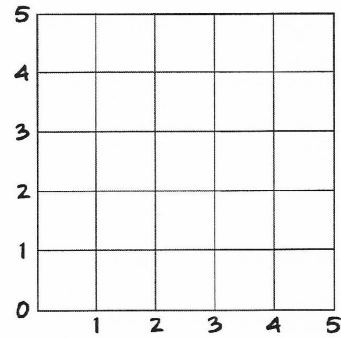
The Crab

Constellation Coordinates (continued)



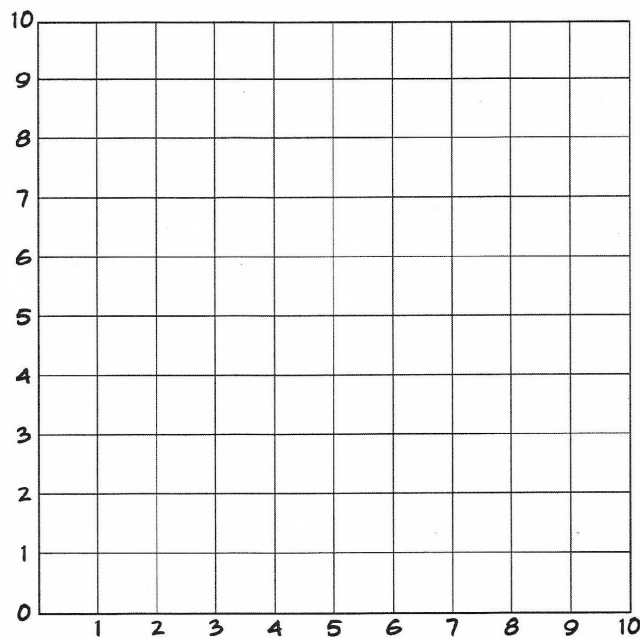
The Fish

(1,3) (3,3) (5,2) (7,1) (3,5) (1,4)



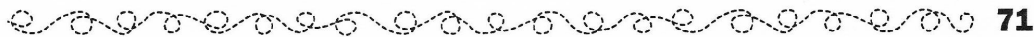
The Cup

(1,4) (1,3) (4,4) (2,2)
(2,1) (3,1) (3,2) (4,3)



The Swan

(3,4) (3,8) (9,10) (6,5) (1,9) (5,6) (8,7) (5,4) (7,9) (3,2) (2,1)



Author: Robin Lewis-Lesson 2
Grade Level: Fifth Grade
Topic/Title: Measuring Angles Within Constellations “Celestial Angles”
Standards: Math - PA Common Core; Science - National Standards:
<p>2.9.5A. Give formal definitions of geometric figures.</p> <p>2.9.5I. Represent and use the concepts of line, point and plane.</p>
Objectives:
<p>Students will be able to:</p> <ul style="list-style-type: none"> • identify points, line segments, angles, and vertex points within a constellation. • identify straight, acute, right, and obtuse angles within the constellation they created
Materials:
<ul style="list-style-type: none"> • constellations created in “Let’s Take A Walk Through Our Sky” lesson • GoSky Watch Planetarium app for iPad • Photocopies of the student’s created constellations • Protractors
Anticipatory Set:
<p>The teacher will illustrate the constellations visible in the student’s current sky through demonstration of the GoSky Watch planetarium app. A discussion regarding why the constellations are visible on the iPad app during the daytime hours but not visible during the daytime hours may need to occur..</p>
Activities: (modeling, guided practice, independent practice & group work)
<ul style="list-style-type: none"> • The teacher will introduce the geometric concepts of points, line segments, angles, and vertex points through the use of constellations. The teacher will demonstrate how points, line segments, angles, and vertex points are named through making a connection to the naming of individual stars within a constellation, and the use of those names to illustrate: how points can be named, how points can be connected to create line segments, how segments can be named, how two line segments can be connected at a common point (star) to create an angle, and how that common point (star) is considered a vertex point. The teacher can use the Orion constellation to demonstrate these concepts. The teacher should highlight each geometric concept within the Orion constellation as it is taught. • Students will name each point (star) within the constellation they created. • Photocopies of student’s constellations with named stars will be made at this point.

- Each student will choose 3 different constellations created by their peers.
- The student will then choose one of the constellations and highlight in yellow all points (stars) within the constellation. The student will then name each point within the constellation by listing the name of each star within the constellation.
- Then the student will choose another constellation and highlight in pink all line segments within the constellation. The student will name each line segment using the names of the stars as point names.
- Finally the student will highlight in green all vertex points within the final constellation they chose. The student will name the vertex points by listing the common star where two “line segments” meet.
- At this point the teacher will teach the concept of an interior angle, again using the Orion constellation as a model. Straight, acute, right, and obtuse angles will be introduced. Naming an angle will also be taught.
- The student will now go back to the constellation they highlighted the vertex points on and highlight in orange the interior angle created at each vertex point. The student will name each angle they highlighted 3 different ways (i.e. <Meissa Betelgeuse Bellatrix, <Bellatrix Betelgeuse Meissa, or <Betelgeuse)

Wrap-up:

The teacher will present outlines of the constellations that the students viewed in their current sky through the GoSky Watch Planetarium app. The student will choose one outline and name 3 points, 3 line segments, 3 vertex points, and three angles within the chosen constellation.

Evaluation / Assessment:

The student’s naming of points, line segments, vertex points, and angles within a chosen constellation from the GoSky Watch app will serve as a formative assessment for the lesson.

Author: Doreen Creighton-Lesson 1
Grade Level: 5 (PA); 4 (CCSM)
Topic/Title: Angle Measurement
PA Academic Standards: 2009
<p>PA: 2.3.5.F: Estimate and verify measurements of length, perimeter, area, volume, capacity temperature, time, weight, and angles.</p> <p>CCSM: 4.MD.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.</p>
Objectives:
Students practice measuring and estimating angles.
Materials:
Pictures of various constellations (with one or more angles numbered for reference); protractors; recording sheet; 1/4 sheet of various angles for Ticket Out.
Anticipatory Set:
<p>Introduce some of the storyline background of various constellations. Information can be found at: http://www.comfychair.org/~cmbell/myth/myth.html</p> <p>Explain that we will be measuring parts of various constellations.</p>
Activities: (modeling, guided practice, independent practice & group work)
<p>Review how to draw, label, and name segments, rays and lines.</p> <p>Draw a 60° angle on the board. Explain how two rays form an angle. Describe and label the sides, vertex, interior and exterior angles.</p> <p>Show students a protractor and how it is used to measure an angle. Demonstrate measuring the angle. Ask students what they think (estimate) the measurement of the angle on the board would be.</p> <p>Ask what kind of an angle a 60° angle would be (Acute). Repeat by drawing a couple of other angles and measuring (continue to classify angles as acute, obtuse, right, straight). Ask how they know the angle shown (60°) measures 60° and not 120° (its opening is less than a right angle).</p> <p>Using a drawing of the constellation Leo, the Lion(see below), ask students to estimate how much they think a certain angle measurement might be. Students record their estimate and then record what they measure the angle to be. Discuss as a class.</p> <p>Students pair up to estimate and measure angles of drawings of constellations, recording both on sheet.</p> <p>(pictures found at: http://stardate.org/nightsky/constellations - see below)</p>

For pictures of night sky with outline of constellations, see:

<http://space.about.com/od/starsplanetsgalaxies/ig/Constellations-Pictures/>

Large group: Students share the results of their activity, comparing and justifying their answers.

Wrap-up:

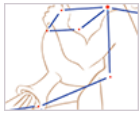
Do you think the measurement of the angle changes between the picture you measured and the much larger, real constellation? Why or why not.

Evaluation / Assessment:

Ticket out: Students are given an angle to measure and record what they estimate it to be and what the true measurement is.

Constellation Guide:

Here is a selection of the most familiar and easily seen constellations in the northern sky.



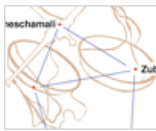
[Aquarius](#)



[Boötes, the Herdsman](#)



[Cassiopeia, the Queen](#)



[Libra, the Scales](#)



[Perseus, the Hero](#)



[Taurus, the Bull](#)



[Aquila, the Eagle](#)



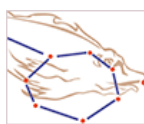
[Cancer, the Crab](#)



[Cygnus, the Swan](#)



[Lyra, the Harp](#)



[Pisces, the Fish](#)



[Ursa Major, the Great Bear](#)



[Aries, the Ram](#)



[Canis Major, the Great Dog](#)



[Gemini, the Twins](#)



[Orion, the Hunter](#)



[Sagittarius, the Archer](#)



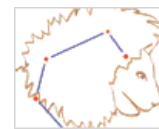
[Virgo](#)



[Auriga, the Charioteer](#)



[Capricornus, the Sea-Goat](#)



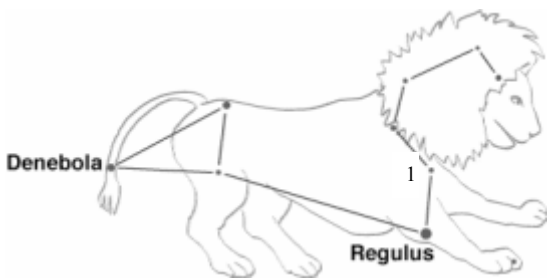
[Leo, the Lion](#)



[Pegasus, the Flying Horse](#)



[Scorpius, the Scorpion](#)



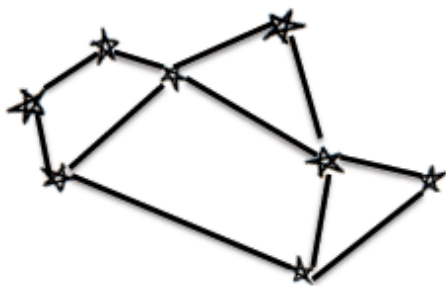
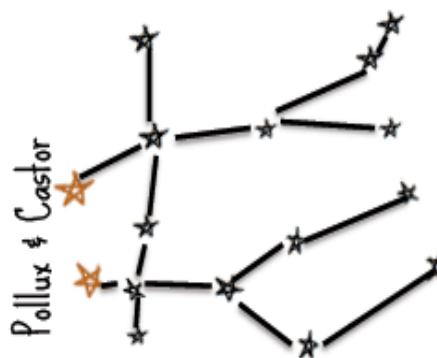
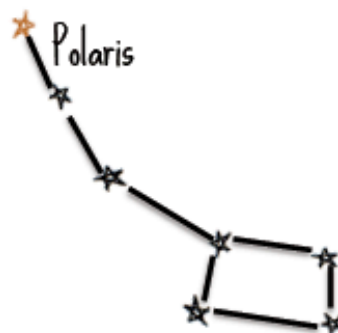
Name: _____

Measurement

Name of Constellation	Angle #	Estimated	Actual
Leo, the Lion	1		

Author: Doreen Creighton-Lesson 2
Grade Level: 4th and 5th
Topic/Title: Percent on a Grid and corresponding fractions.
PA Academic Standards:
5 th Grade Standard: Numbers, Number Systems and Number Relationships 2.1.5.C Use models to represent the concept of an integer, fraction, decimal, or percent.
Objectives:
Students will be able to write a percent for a given situation on a 100 grid and create a 100 grid to show various percents.
Materials:
Students will access the National Library of Virtual Manipulatives online and use the Percent Grids manipulative; Promethian board, Netbooks cart.
Anticipatory Set:
<ol style="list-style-type: none"> 1. Students will access the internet and navigate to the National Library of Virtual Manipulatives at http://nlvm.usu.edu/en/nav/vlibrary.html. 2. Click on the 3-5 level for Number and Operations. Find the “Percent Grids” manipulative. 3. Start with a discussion on what the word percent means (Ex.: Circle the <i>cent</i>. Who remembers what this word part means? (<i>Cent means 100.</i>) What sign means percent? (%) Define <i>percent</i> as <i>per hundred or out of every hundred.</i>) Let students give examples of where they have seen percent used (10%off sale, paper got a 95%, etc.).

Activities: (modeling, guided practice, independent practice & group work)
<p>4. Model finding 50% through the virtual manipulative on the Promethian board (must click on 'Explore' button on manipulative). Ask students what they observe about the area or the colored amounts (is 50 units, is 50/100 of the grid). Reduce percent to 10% and ask students what they observe. Let student explore the virtual manipulative for 10-15 minutes.</p> <p>5. Model the 'Show' button on the manipulative. Let students explore creating the given percent on the 100 grid for 10-15 minutes.</p> <p>6. Model the 'Name' button on the manipulative. Let students explore naming the given percent on the 100 grid for 10-15 minutes.</p> <p>7. Hold a group discussion on what students have discovered about percents and fractions using the virtual manipulative.</p> <p>8. Challenge students to create three sets of matching fractions and percents without using the manipulative, then checking their answers with the manipulative. (ex: fraction is $\frac{32}{100}$, percent is 32%).</p> <p>9. Hold a group discussion on what students have discovered about percents and fractions using the virtual manipulative to solidify their thinking.</p>
Wrap-up:
<p>Students use Constellation Cards (see attached) and determine what percent each constellation is, (out of the group of 100 stars in all 8 constellations combined), create a 100 grid to show the percentage, and note what fraction it is.</p>
Evaluation / Assessment:
<p>Ticket Out: Students must write create a 100 grid to show a percent of their choice, then swap theirs with someone else to write the corresponding percent and fraction they were given. Teacher evaluates tickets after class to determine needs of students.</p>



Ursa Minor

ur-suh mahy-ner

- ✧ the Little Bear or the Little Dipper
- ✧ found in the northern sky, year-round

Gemini
jem-uh-nahy
✧ the Twins
✧ found in the southern
sky in the Winter

Cygnus

sig-nuhs

- ✧ the Swan or the Northern Cross
- ✧ found in the southern sky in the Summer

Scorpius
skawr-pee-uhs
✧ the Scorpion
✧ found in the southern
sky in the Summer

Ursa Major

ur-suh mey-jer

- ✧ the Big Bear or the Big Dipper
- ✧ found in the northern sky, year-round

Canis Major

key-nis mey-jer

- ✧ the Big Dog
- ✧ found in the southern sky in the Winter

Orion
uh-rah-y-uln
✧ the Great Hunter
✧ found in the southern
sky in the Winter

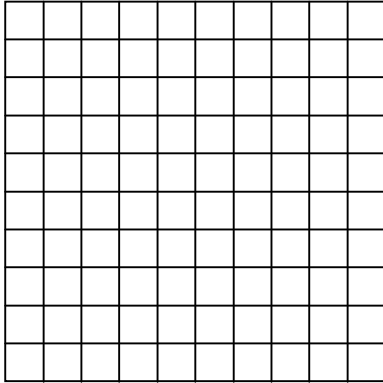
Sagittarius

saj-i-tair-ee-uhs

- ✧ the Centaur or the Teapot
- ✧ found in the southern sky in the Summer

Constellation Cards

Constellation Name: _____

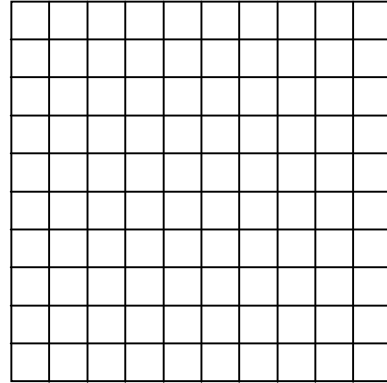


Number of Stars in Constellation: _____

Fraction: _____

Percent: _____

Constellation Name: _____

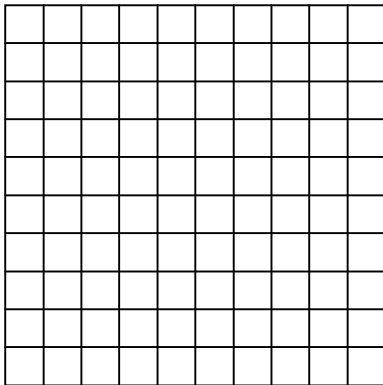


Number of Stars in Constellation: _____

Fraction: _____

Percent: _____

Constellation Name: _____

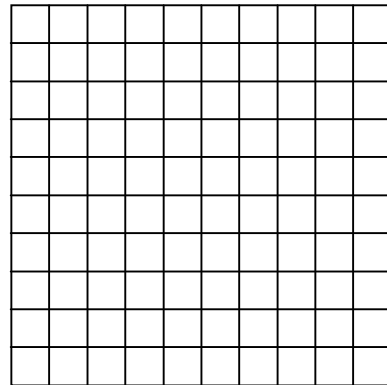


Number of Stars in Constellation: _____

Fraction: _____

Percent: _____

Constellation Name: _____



Number of Stars in Constellation: _____

Fraction: _____

Percent: _____

IMPLEMENTATION PLAN

Unit #1

A. One videotaped lesson is required per unit, saved on CD-ROM (include in CD ROM sleeves in portfolio).

Anticipated Lesson for Taping }
Planned Taping date(s) } CD Included

B. A professional development component is required for each unit. This requirement may be met in any one of the following forms (or another of your choice):

- Professional development training to colleagues
- Local program to share with community
- Presentation at a conference
- Video documentary to duplicate and share with others
- Online resources and video for district website
- Professional publication
- Other: _____
- Other: _____

C. Plan of implementation (Meetings, events, etc.):

School Level implementation:

- Teachers will meet with individual grade levels.
- We will share our portfolio with our colleagues

District Implementation:

We will share our portfolio with our Assistant Superintendant

UNIT PROGRESSION FORM: Unit # 1

Group/Coordinator: Stan Terzopolis

Date: January 2013

UNIT ASSESSMENT

The degree to which the lesson(s):	√	Write a statement to describe how this item was met.
Identified the prior knowledge required by the students.		This was done during the anticipatory set and teacher questioning
Identify and/or provide an authentic real-world problem relevant to the students for them to solve		This is embedded throughout our lessons.
Was aligned with PA standards.		Lessons are in accordance with PDE SAS
Followed problem-based/inquiry learning model.		Lessons followed the Gradual Release Method
Allowed for student exploration and elaboration.		Lessons followed the Gradual Release Method Allowed for independent practice and extension activities
Required authentic student products.		Assessments included: quiz, graphs, games, predictions, interpreting data
Integrated PIMS technology into the lesson(s).		Lessons include: NASA e-clips, internet websites, NASA lithographs, NASA data, NASA posters., Ipad to show e-clips
Clearly defined how students would be assessed.		These were defined in the objectives
Utilized and incorporated NASA resources throughout lesson(s).		Lessons included: NASA e-clips, internet websites, NASA lithographs, NASA data, NASA posters

GROUP ASSESSMENT (see next page for details)

The group showed:	√	Write a statement to describe how this item was met.
Contributions/participation, Attitude		The entire group collaborated effectively to produce this unit.
Cooperations/Working with others		
Focus on task/commitment		
Team role fulfillment		

Group Signature: _____ Date: _____

Coordinator Signature: _____ Date: _____

Group Work Rubric

Team Participant Names: Robin Lewis, Donna Jensen, Doreen Creighton

Skills	Basic	Sound	Thorough	Extensive
Contributions/participation Attitude	Seldom cooperative, rarely offers useful ideas. Is disruptive.	Sometimes cooperative, sometimes offered useful ideas. Rarely displays positive attitude.	Cooperative, usually offered useful ideas. Generally displays positive attitude.	Always willing to help and do more, routinely offered useful ideas. Always displays positive attitude.
Working with others/cooperation	Did not do any work – does not contribute, does not work well with others, usually argues with teammates.	Could have done more of the work – has difficulty, requires structure, directions and leadership, sometimes argues.	Did their part of the work – cooperative. Works well with others, rarely argues.	Did more than others – highly productive. Works extremely well with others, never argues.
Focus on task/commitment	Often is not a good team member. Does not focus on the task and what needs to be done. Lets others do the work.	Sometimes not a good team member. Sometimes focuses on the task and what needs to be done. Must be prodded and reminded to keep on task.	Does not cause problems in the group. Focuses on the task and what needs to be done most of the time. Can count on this person.	Tries to keep people working together. Almost always focused on the task and what needs to be done. Is very self-directed.
Team role fulfillment	Participate in few or no group meetings. Provided no leadership. Did little or no work assigned by the group.	Participated in some group meetings. Provided some leadership. Did some of the work assigned by the group.	Participated in most group meetings. Provided leadership when asked. Did most of the work assigned by the group.	Participated in all group meetings, assumed leadership role as necessary. Did the work that was assigned by the group.
Communication/listening Information sharing	Rarely listens to, shares with, or supports the efforts of others. Is always talking and never listens to others. Provided no feedback to others. Does not relay any information to teammates.	Usually listens to, shares with, and supports the efforts of others. Sometimes talks too much. Provided some effective feedback to others. Relays some basic information – most relates to the topic.	Almost always listens to, shares with, and supports the efforts of others. Seldom talks too much. Provides good feedback to others. Relays solid basic information – usually relates to the topic.	Always listens to, shares with, and supports the efforts of others. Provided effective feedback to other members. Relays a great deal of information – all relates to the topic.

<http://www.google.com/#hl=en&q=group+work+rubric&aq=f&oq=&aqi=g4&fp=flbC24gbdiA>