Lesson 1: The Earth, Moon, and Solar System

A) LEARNING OBJECTIVE

- Students will be able to explain how the position of the moon causes the phases
- Students will be able to determine the order of the planets in the solar system
- Students will be able to identify the meaning of revolution and rotation

Criteria

- Students will create a model solar system that identifies the positions of the planets
- Students will experiment with flashlights and moon balls to determine the phases of the moon.
- Students will practice revolving and rotating and discuss what these two actions do for our planet and the moon.

B) DESCRIPTION OF YOUR LESSON

ENGAGE (30 minutes)

To start the day, the teacher will conduct an ice breaker activity:

- Everyone will sit in a circle on the floor
- Each person will take one shoe off and put it in the middle of the circle
- I will start by picking a shoe from the middle and whoever's shoe it is must say their name, what school they go to, and one thing they know about space or want to learn about space
- We will continue until there are no more shoes in the middle

After the icebreaker students will stay on the floor to start the next activity in which we will discuss the motion of the earth

- The students will sit as still as possible in the circle for 10 seconds
- After the ten seconds, the instructor will say, "Raise your hand if you think you stayed completely still"
- The teacher will tell these people that they moved, but that we will try again
- After doing this two to three the instructor will ask, "Can anyone tell me why no one was able to stay still?'
- If no one states that the Earth is always moving/rotating, then the teacher will tell the students.
- Students will practice rotating by standing up and spinning in a circle
- Ask, "What does one rotation represent?"
- Next the instructor will instruct the students to start walking around the instructor (in the middle of the circle) and the instructor will ask if anyone knows what this type of motion is called
- If no one says revolution then the instructor will tell the students
- Give the students a chance to revolve once around the sun (instructor)
- Ask the students, " What does one revolution around the sun represent?'

Focus Question: What comprises our solar system?

EXPLORE (45 minutes)

In order to explore the concept of revolution and rotation, the students will examine the moon

- Each student will be given a "moon ball" (Styro Foam ball on the end of a pencil)
- The instructor will ask "What does the moon revolve around?" –the Earth
- The instructor will then ask does anyone know why this is important? –moon phases
- The instructor will then pair up the students and give each group a flashlight flashlight to represent the sun
- The students will take turns acting as the sun and acting as the moon. The pairs will be asked to demonstrate each moon phase (new, first quarter, full, last quarter)
- Gear up: The instructor will introduce the terms waning and waxing gibbous

Students will learn that the revolution of planets/moons is important for various phenomena in our solar system.

EXPLAIN (1 hour)

The students will examine the entire solar system and the location of all of the planets

- The instructor will tell the students, “We are going to examine all the planets and see how far apart they are” (Hand out markers/crayons/coloured pencils and a strip of receipt paper at least 1M long)
- Make sure each end of the paper is straight and ask the students what they think should go at each end (Pluto and the Sun)
- With the introduction of Pluto (dwarf planet), this is a good time to pause discuss what factors decide if an object is a planet or not. (1. Round 2. Clear its orbital path 3. Orbit the sun)
- Next fold the paper in half, unfold and mark this ask the students what planet goes here.(Hint: its is not the first of the last planet) (Uranus)
- Now fold the tape back in half, then in half again. Unfold and lay it flat. Now you have the tape divided into quarters with the Sun at one end, Pluto on the other and Uranus in the middle. Place a mark at the quarter mark and 3/4 mark and ask the students what planets goes here. (Label as Saturn (closer to the Sun) and Neptune (closer to Pluto), respectively.)
- Fold the Sun up to Saturn and crease it. Unfold and lay flat again. Ask the students what planet goes at the 1/8 mark (between the Sun and Saturn), and label it Jupiter.
- If you look at your pocket solar system you will notice that you’ve have the 4 gas giants and Pluto on there. For the remaining bodies in the Solar System, you’ll only need 1/2 of the first 1/8th! That’s the inner 1/16th of your tape length! Fold the Sun out to meet Jupiter to mark the 1/16th spot. Ask the students if anyone knows what goes here (hint: its not a planet!) Mark as the Asteroid Belt (See picture below).
- Now things tend to get a little crowded and it is hard to get precise distances. Fold the Sun to the Asteroid Belt mark and crease it. Ask students what planet goes here. Place a mark for Mars on this fold (between the Sun and Asteroid Belt) and label it.
- There are still 3 more planets to go. Fold the Sun up to meet the line for Mars. Leave it folded and fold that section in half. Unfold the tape and you should have three creases. Ask the students what planets are on these marks (in order). Mark Earth on the crease nearest Mars, Venus on the middle crease and Mercury on the crease closest to the Sun.
- After everyone has marked every planet on their paper, give the students a chance to draw in the planets and decorate their solar system

After the completing this activity, the students will be asked to discuss something that they learned about the solar system or ask any questions they have about the lay out of the solar system. Also, it is important to note that the planets are not all in a straight line like they are in this activity.

ELABORATION/ EVALUATION (20 Minutes)

If there is time left, the instructor will ask the students to consider the location of the planets and ask them what they think this means for the characteristics of the planets. The teacher will write on the board the various characteristics for each planet that the students describe to them. Also, the teacher will show the students pictures of every planet to help them think about the characteristics.

The students will be given formative assessments throughout the various parts of the lesson. While they are building their solar systems by being asked about which planet they think goes next. During the moon phase activity, they are asked what causes the moon phases? And how do we create each phase of the moon? During the discussion on the Earth they are asked what does earths revolution control? And what does Earth’s rotation control?

D) DIFFERENTIATING INSTRUCTION

Students who are excelling with the activity can help other students at their table that may be struggling with the activity.

Students who are struggling will be asked to write down the order the of the planets on a piece of paper so that they can use that as a guide to make the solar system on receipt paper.

E) STANDARDS

Science and Engineering Practices:

Analyze and interpret data to determine similarities and differences in findings.

Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

Disciplinary Core Ideas:

5-ESS1.B: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.

MS-ESS1.B: The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.

Cross Cutting Concepts:

Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.

H) MATERIALS ---

Crayons/markers, receipt paper, Styrofoam balls (1 per student), pencils (1 per student), flashlight

I) HANDOUTS/JOURNALS --- Please include a copy of ALL handouts or journal entry pages that you will be using with each lesson so feedback can also be provided on organizing these documents to meet the needs of your lessons and the developmental level of your students language abilities.

J) REFERENCES ---

- http://www.astro.ucla.edu/~outreach/PocketSolarSystem.pdf

Lesson 2: Stars and Constellations

A) LEARNING OBJECTIVE and CRITERIA FOR DETERMINING IF OBJECTIVES ARE MET (max of 2/ lesson)

- Students will be able to identify various constellations
- Students will be able to determine how scientists determine the make up of stars
- Students will create constellation cups with constellations they normally see at night.
- Students will create spectroscopes to examine spectrums of light

B) DESCRIPTION OF YOUR LESSON –.

ENGAGE (30 Minutes)

To start the day, the instructor will lead the group in an icebreaker activity:

- All of the students will sit in a circle on the floor
- Each student will think of some sort of sign/hand motion
- We will go around the circle and the first person will say their name and do their hand signal
- The next person will say do the symbol and say the name of every person behind them. We will continue until we get back to the original person.

After the icebreaker, the students will head back to their seats and we will start the first activity:

- Each student will receive 4 blank sky maps (1 for each season) and 2 pieces of construction paper.
- The students will then get into 4 groups of 6. (the teacher will put them into groups if necessary)
- I will hand out 1 constellation sky map to each of the 4 tables (each table has a different season) and it is their task to fill out their constellation booklet with the season that they are currently working on.
- Each student will have 10 minutes at each of the stations to fill in all of the constellations for the season at their current table
- Once they are done, the students will rotate to the next table until they have all their sky maps filled out.
- Finally, the teacher will come around and staple their sky booklets together with the construction paper on the outside and the sky maps in the middle.

Focus Question: What comprises constellations and stars?

EXPLORE (30 Minutes)

In order to continue to investigate constellations, the students will create “constellation cups”

- First it is important to ask what makes up a constellation? –groups of stars
- The students will be given a sheet that lists a variety of constellations for them to choose from, but they also may make their own constellation if they so choose.
- Next, the students will be handed 1 dixie cup each as well as 1 wooden skewer each
- The students will mark the design of their constellation on the bottom of the cup (with dots) and then they will poke the holes with the wooden skewer (If the students are struggling, the instructor should assist with this part)
- Once all of the students have finished making their constellation cups, the teacher will turn off the lights and call up one table at a time to see their constellation on a wall
- The teacher will shine a flashlight into the cup and the constellation will be projected onto the wall
- The class will guess which constellation is being projected or the person who designed the constellation will describe what it represents.

Students will learn about the various constellations and that constellations are made up of groups of stars.

EXPLAIN (1 hour and 30 minutes)

During the explain phase, the students will examine what makes up a star. In order to do this, we will make spectrometers, which is the tool that scientists use to determine the make up of stars.

- Start by asking if anyone knows what stars are made of? –various gases
- Next explain that in order to figure this out scientists (astronomers) look at stars using a spectrograph.

The spectrograph tells us what colors of light are being emitted from the star and from these colors, we can tell what the star is made of! (Really cool, I know)

- The first step in making the spectrograph is to hand out all of the materials. Prepare ahead of time black construction paper (cut pieces in half), diffraction grading, scissors, tape for each table.
- Next the students will make a cylinder with a piece of black construction paper.
- Next the students will tape their diffraction grating onto one end of the tube.
- On side opposite of the diffraction grating, the students will glue a the other half of the construction paper.
- The students will then cut a slit in the middle of the construction paper that is big enough to let a small amount of light through.
- After the students have all made their spectrometers, everyone will look at the lights in the classroom to see the light spectrum

ELABORATION

Students will have the opportunity to individually demonstrate what they have learned about the concepts taught in the lesson by using their spectrometers to look at different types of light (neon, fluorescent, incandescent, sunlight). The students will be instructed to note the differences between the various types of light that they look at. After seeing how these different types of light differ in wavelengths, the teacher will lead a discussion about what they think this means for what the light is made of. The students will also complete a worksheet that is attached below. The worksheet allows them to fill out the spectrum for each type of light or element that they are observing.

C) ASSESSMENT/EVALUATION (the 5th "E")

Throughout the lesson, students will be formatively assessed with questions such as: what are constellations composed of? What are stars composed of? What are some different constellations? How do astronomers determine what stars are made of?

D) DIFFERENTIATING INSTRUCTION

- Students who are excelling with the activity will help other students build their spectroscopes.
- Students who are struggling with the activity will receive assistance building their spectroscope from the instructor or another student.

E) STANDARDS---

Science and Engineering Practcies

Analyzing and Interpreting Data

Cross-Cutting Concept:

Structure and Function

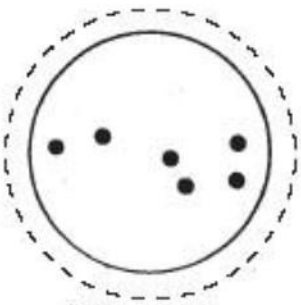
Disciplinary Core Ideas

5-ESS1-2

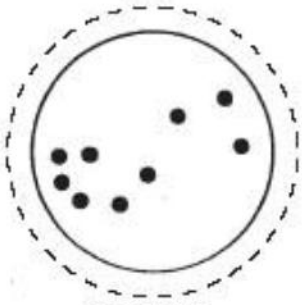
H) MATERIALS

Dixie cups (1 per student), wooden skewers (1 per student), constellation cups worksheet, black construction paper (2 sheets per student) diffraction grading (1 small piece per student), clear plastic knives (1 per student)

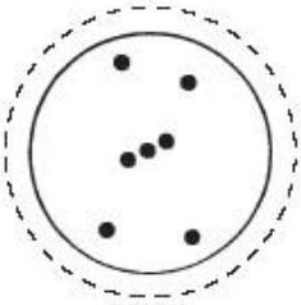
I) HANDOUTS/JOURNALS



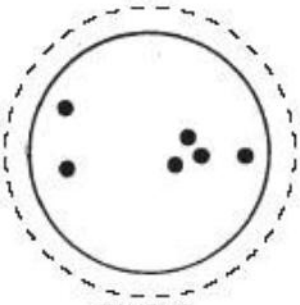
URSA MAJOR,
the Great Bear



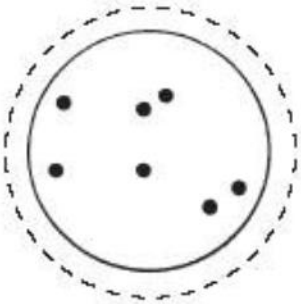
SCORPIUS,
the Scorpion



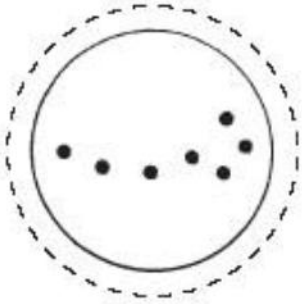
ORION,
the Hunter



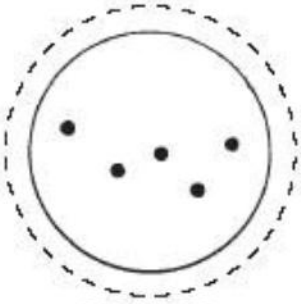
TAURUS,
the Bull



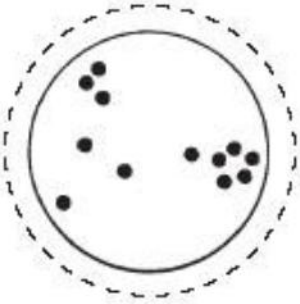
PEGASUS,
the Flying Horse



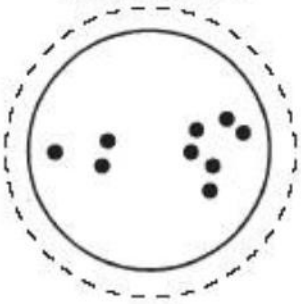
URSA MINOR,
the Little Bear



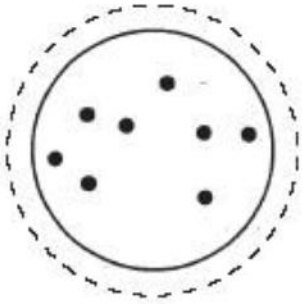
CASSIOPEIA,
the Queen



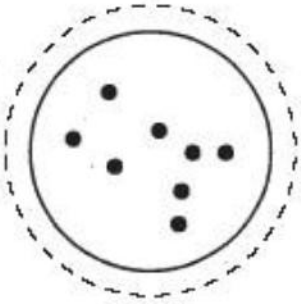
PISCES,
the Fishes



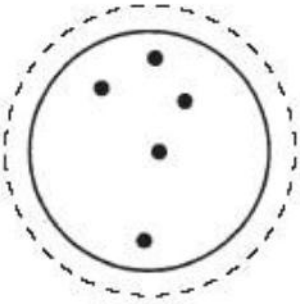
LEO,
the Lion



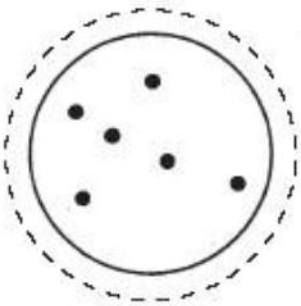
SAGITTARIUS,
the Archer



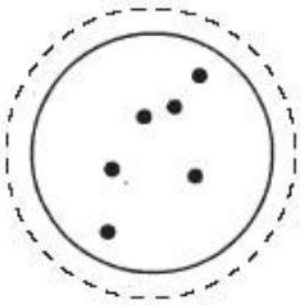
GEMINI,
the Twins



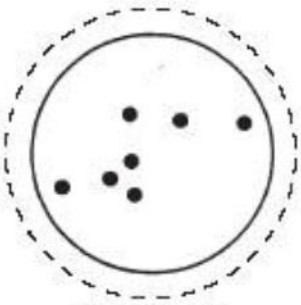
BOOTES,
the Herdsman



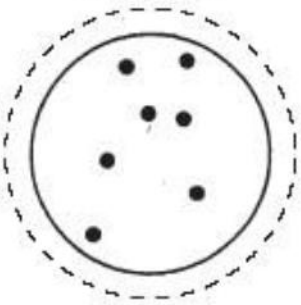
CYGNUS,
the Swan



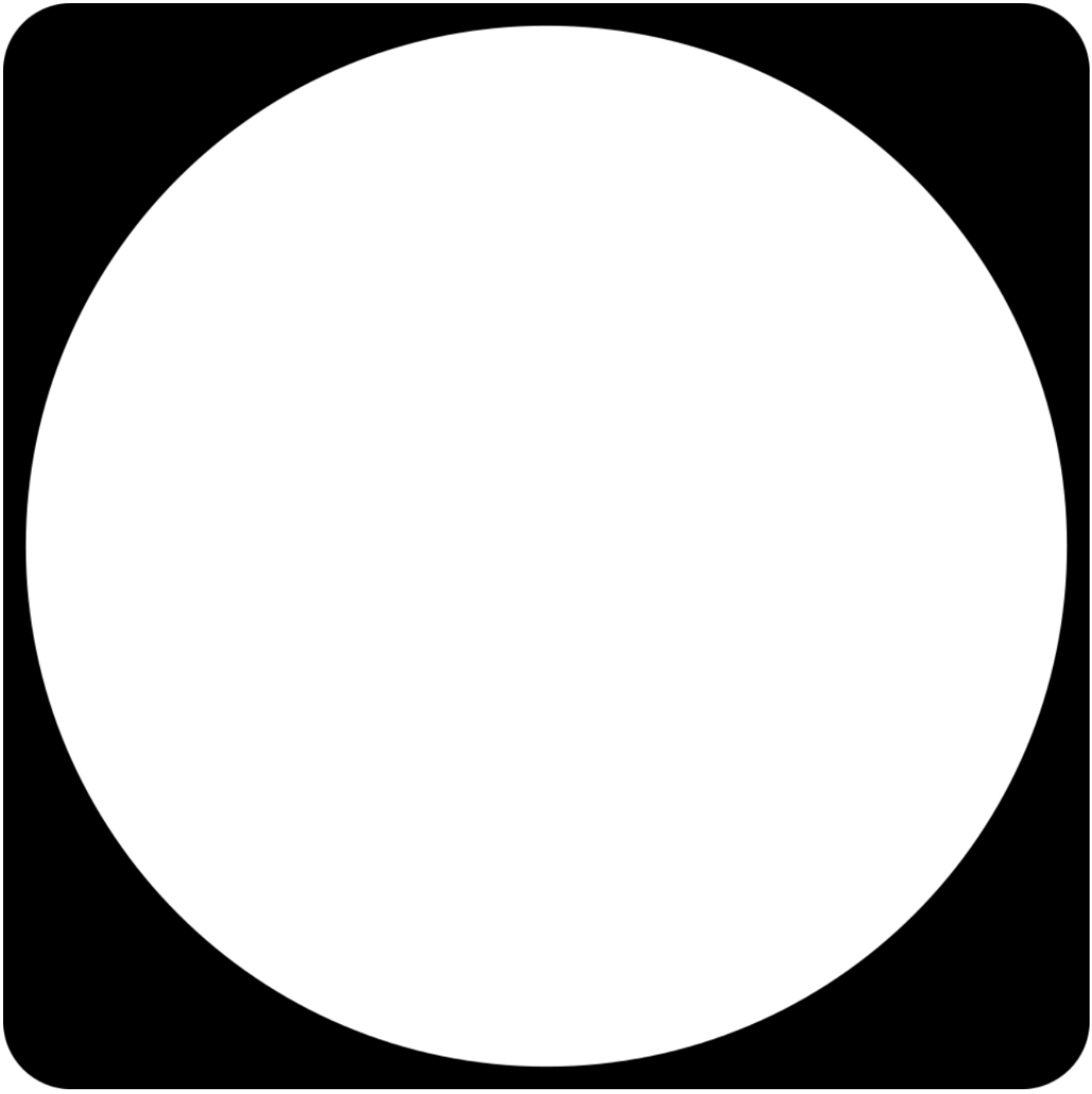
PERSEUS



CANIS MAJOR,
the Big Dog



HERCULES



Spectra Drawing Activity

Astronomers compare spectra for things like stars and planets to figure out what elements they're made of. We're going to use the spectroscope we made to see how different elements would look to an astronomer using a spectroscope. Color in the spectrum for each element that you see with the spectroscope that you created.

Hydrogen (H)

Helium (He)

Argon (Ar)

Neon (Ne)

Mercury (Hg)

Nitrogen (N)

Water (H_2O)

Krypton (Kr)

Mystery element

What do you think the mystery element is? Which other element does it look most like?

J) REFERENCES –

https://www.youtube.com/watch?v=YStZk2zANvk
http://space.about.com/library/graphics/constellation_patterns.jpg
http://mrscienceut.net/StarryNight1.html (See this page for the constellation handouts)

Lesson #3 Rocket Ships and Space Stations

A) LEARNING OBJECTIVE and CRITERIA FOR DETERMINING IF OBJECTIVES ARE MET (max of 2/ lesson)

- Students will be able to identify different parts of a rocket
- Students will be abele to describe what is necessary to live in space
- Students will be able to identify the structure and function of the ISS

B) DESCRIPTION OF YOUR LESSON –.

ENGAGE

To begin the day the teacher will lead an icebreaker:

- Have all of the students stand in a circle (the teacher should be in the circle as well)
- The teacher will start with a ball of yarn and will toss it to one student, but still hold on to a piece of the yarn
- That student must say their name and an interesting fact and then toss the yarn to another student, while still holding onto part of the yarn.
- Once every student has a piece of the yarn (it should look like a web), the person with the ball of yarn will start to unravel the web by tossing it to the person who tossed it to them and saying their name and interesting fact. (the student should no longer have any yarn in his or her hand)
- Keep unravelling until the person who started with the ball of yarn ends up with the yarn.

After this is finished, all of the students will return to their seats

- **Each table will discuss what it takes to get into space**
- **They will write their ideas onto a large piece of poster paper**
- **Each group will then share with the class what they think it takes to get into space**

Focus Question: What does it take for an astronaut to get to and live in space?

EXPLORE

The instructor will start by showing the students a picture of the international space station (ISS) and ask the students "Does anyone know what this is?"

- **If no one knows then tell them it is the international space station**
- **Ask the students "What goes on at the ISS?"**
- **If no one knows tell them science experiments to learn information about space and living in space.**
- **Ask the students "How do we get to the ISS?"**
- **Answer: Space Shuttles**

The students will each get to make their own rocket that will help to propel a space shuttle into space

- **Show a picture of a space shuttle attached to a rocket and ask the students to identify various parts of the rocket.**
- **As the students identify each part of the rocket, hand out the material that corresponds with that part of the rocket**
- **Cardboard Tube: External tank**
- **Straws: Solid Rocket Boosters (2)**
- **Circle of paper: cone on top of the external tank**
- **Fin: Triangle of paper**
- **The students will then thake the cardboard tube and tape the two straws onto it (on opposite sides)**
- **Next they will cut a slit in the circle to the center and then make the circle into a cone and tape or glue it onto the top of the cardboard tube**
- **Finally they will attach a fin in between the 2 straws and decorate their rocket**

EXPLAIN

Now that the students have their rockets to get them into space, they now need to have a space station to stay on

The students will work in teams of 5-6 to build a space station out of recycled materials, aluminium foil, pipe cleaners, and tape
The students, as a class, will first come up with what they think is important to include in a space station
From this list, have the students vote on 4 that they think should be the criteria to focus on
After the criteria have been selected, each group will draw a blueprint for what they want their space station to look like and what materials it will consist of.
Once the group has finished the blue print, they may get materials from the instructor and start building
After everyone has completed their space station, each group will present about their space station and why they believe it should be the one we construct in space.
The students will then vote for their favourite (you cannot vote for yourself) and a winner will be chosen

ELABORATION
Now that the students have thought about what it takes to get to space and live in space, they will now think about what it takes to make it to Mars and live on Mars. The students will work in groups again to create a plan to get humans to Mars and start a colony. They will draw their design as a group and present on their ideas.

C) ASSESSMENT/EVALUATION (the 5th "E")
Throughout the lesson, students will be formatively assessed with questions such as: What is necessary to get to space? What is necessary to live in the ISS? What aspects are important to have a working space station? What material represents what part of your space station?

D) DIFFERENTIATING INSTRUCTION
- Groups that are struggling will be assisted by the instructor as to what materials they should focus on using
- Groups that are excelling will be given additional parts to include on their space station such as a dock for the space shuttle.

E) STANDARDS---
Science and Engineering Practcies
Analyzing and Interpreting Data
Constructing Explanations and designing solutions

Cross-Cutting Concept:
Structure and Function

Disciplinary Core Ideas
3-5 ETS 1-1 Engineering Design

H) MATERIALS – **cardboard tubes (1 per student), construction paper (30 sheets), straws (1 for each student), sctoch tape, glue, recycled materials (cardboard boxes, cans, egg cartons, milk jugs etc), aluminium foil, duct tape, masking tape, pipe cleaners**

I) HANDOUTS/JOURNALS

https://www.youtube.com/watch?v=SGP6Y0Pnhe4

Lesson #4 Telescopes

A) LEARNING OBJECTIVE and CRITERIA FOR DETERMINING IF OBJECTIVES ARE MET (max of 2/ lesson)

- Students will be able to identify different parts of a telescope
- Students will be able to distinguish the two different types of telescopes
- Students will be able to describe the way a solar eclipse works

B) DESCRIPTION OF YOUR LESSON –.

ENGAGE

To begin the day the teacher will beak the students into 4-5 groups (depending on number of students)

- **Each group will be asked to draw what they think a telescope look like and to identify as many parts as they can**
- **If some groups finish earlier than others, they will be asked to draw what a solar telescope looks like.**
- **Each group will then present their drawing and then post their drawing at the front of the classroom.**

After this is finished, all of the students will return to their seats

- **The instructor will inform everyone that we are going to the observatory to how a telescope and a solar telescope function.**

EXPLORE

The instructor will start by showing the students a PowerPoint that introduces the two different types of telescopes (reflection and refraction)

- **Ask the students if they know the difference between the two telescopes**
- **Go through the PowerPoint and identify the basics of each telescope.**
- **The purpose here is to give the students some background information before they go see the telescope.**
- **After going over the PowerPoint, inform the students that we will be looking at a reflection telescope**
- **The instructor will then lead the students on a walk to the observatory**
- **While on the walk, the instructor will do a solar system walk to review what was learned in lesson one**

REAL DISTANCES		PLANETS	MODEL DISTANCES	
Diameter	Orbit Radius		Diameter	Orbit Radius
average	average		average	average
km	km		cm	m
1,392,000		Sun	38.14	
4,879	57,910,000	Mercury	0.1337	15.87
12,100	108,200,000	Venus	0.3315	29.64
12,740	149,600,000	Earth	0.3490	40.99
6,779	227,900,000	Mars	0.1857	62.44
950.0	413,800,000	Ceres	0.02603	113.4

		Asteroid Belt		
139,800	778,600,000	Jupiter	3.830	213.3
116,500	1,433,000,000	Saturn	3.192	392.6
50,720	2,877,000,000	Uranus	1.390	788.2
49,250	4,503,000,000	Neptune	1.349	1,234
2,372	5,874,000,000	Pluto Kuiper Belt	0.06499	1,609

- **The instructor will follow the last column on this table to know how far to walk for each planet and will use a surveyor's wheel to keep track of the distance they have gone.**
- **The sun will be the school of education and Pluto will be the observatory**

EXPLAIN

Now that the students have arrived at the observatory, they will first examine the solar telescope.

- **The astronomy graduate student that operates the telescope will tell the students the different parts of the telescope**
- **He will then demonstrate how it works (if the weather cooperates)**

After seeing the solar telescope, the students will go see the telescope used for night time viewing

- **The students will be asked if they can identify any of the parts of this telescope**
- **The astronomy grad student will point to the various parts as the students identify them**
- **The astronomy grad student will then demonstrate who the telescope functions**

The instructor will then lead the students back to the classroom

ELABORATION

Now that the students have seen two example of telescopes, they will get back into their original groups and revisit their drawings from the beginning of the lesson. Each group will have the opportunity to redraw/revise their drawing and add more parts of the telescope that they learned from today.

C) ASSESSMENT/EVALUATION (the 5th "E")

The drawing of the telescope as well as the identification of various parts of the telescope will serve as the evaluation for this lesson.

D) DIFFERENTIATING INSTRUCTION

- Groups that are struggling will be assisted by the instructor as to the appearance of the telescope.
- excelling will be instructed to go into more detail with their drawings and include different types of telescopes.

E) STANDARDS---

Science and Engineering Practcies

Obtaining, Evaluating, and communicating data

Cross-Cutting Concept:

Scale, proportion, and quantity

H) MATERIALS – **Giant post its**

I) HANDOUTS/JOURNALS

Lesson #5 Meteorites and Comets

A) LEARNING OBJECTIVE and CRITERIA FOR DETERMINING IF OBJECTIVES ARE MET (max of 2/ lesson)

- Students will be able to describe a comet
- Students will be abele to differentiate a meteorite from a normal rock
-

B) DESCRIPTION OF YOUR LESSON –.

ENGAGE

To begin the day, the instructor will ask the students if they know of some other objects in space that we have not talked about yet (write the responses on the board)

- If people mention meteorites, meteoroids, meteors, or comets circle them on the board as this what we are talking about today
- Ask the students if they know the difference between a meteor, meteoroid, and meteorite
- Take some of their answers and then tell them to think of 3 possible locations of the rocks to help guide their answers
- Finally, write down what makes the 3 types (meteor, meteoroid, and meteorite) different on the board

Focus Question: What are characteristics of other objects in space?

EXPLORE

Meteorites versus meteor-wrongs

The instructor will lay out 6 objects (4 that are rocks and 2 that are meteorites) and give each student a piece of paper and something to write with

- **The students will work in groups of 6 to make observations about each object (they will have magnets and magnifying glasses to help make observations)**
- **The will spend 5 minutes at each object and then rotate to the next object until every group has examined each object**
- **After each group has made their observations, they will work to identify which of the objects are a meteorite and which are not.**
- **Next, the instructor will write each groups classifications for each object on the board.**
- **Then the instructor will ask for characteristics that separate a regular rock from a meteorite**
- **The instructor will then tell the students any more remaining characteristics that they did not mention**

EXPLAIN

Now that the students have idenitified one object in space, they will look to identify and differentiate it from another object – comets!

The instructor will lead the students in forming comets, but before he/she starts be sure to ask the students "What is a comet made of?" for each description they give you, pull out the ingredient that goes along with that characteristic.

- The first step in making the comet is to gather the materials listed in the "materials" section
- Cut open one garbage bag and use it to line your mixing bowl.
- Have all ingredients and utensils arranged in front of you.
- Place water in mixing bowl.
- Add sand or dirt, stirring well.
- Add dash of ammonia
- Add dash of organic material (e.g. corn syrup), stirring until well mixed.
- Place dry ice in 3 garbage bags that have been placed inside each other. Be sure to wear gloves while handling dry ice to keep from being burned.
- Crush dry ice by pounding it with hammer.
- Add the dry ice to the rest of the ingredients in the mixing bowl while stirring vigorously.
- Continue stirring until mixture is almost totally frozen.

- Lift the comet out of the bowl using the plastic liner and shape it as you would a snowball.
- Unwrap the comet as soon as it is frozen sufficiently to hold its shape.

Side activity: To better explain the properties of dry ice and sublimation, the instructor can take the students outside and make dry ice rockets with film canisters.
The students will learn that dry ice turns straight into a gas at room temperature, which causes pressure to build up in the film canister, forcing the lid to pop off and the canister to rocket through the air.

ELABORATION
If there is time remaining, the students will look at the comets and meteorites side by side and make comparisons between the two. The instructor will call on students and ask them to give them a similarity or a difference. The instructor will write these down on the board.

C) ASSESSMENT/EVALUATION (the 5th "E")
The students will be formatively assessed when making their hypothesis about the meteorites and listing the characteristics for meteorites and comets.

D) DIFFERENTIATING INSTRUCTION
- Groups that are struggling will be assisted by the instructor as to what to observe with the meteorites.
- Groups that are excelling will be asked to assist other groups in determining characteristics of a meteorite

Science and Engineering Practcies
Analyzing and Interpreting Data
Engaging in argument from evidence

Cross-Cutting Concept:
Patterns

H) MATERIALS – 2 cups of water
2 cups dry ice (frozen carbon dioxide)
2 spoonfuls of sand or dirt
a dash of ammonia
a dash of organic material (dark corn syrup works well)
an ice chest
a large mixing bowl (plastic if possible)
4 medium-sized plastic garbage bags
work gloves
a hammer, meat pounder, or rubber mallet
a large mixing spoon
paper towels
safety goggles
Film canisters (at least 1 per 3 students)
Rocks
Meteorites
Magnifying glasses (1 per student)
Magnets (1 per student)

I) HANDOUTS/JOURNALS

Schedule:

9:35-9:45- Engage
9:45-10:15- Explore
10:15-10:40- Snack (take kids to get bagels from just outside the classroom)
-Cosmos episode 3 from beginning to 12:45 and then 35:45 to the end
10:45-11:45 – Explain
11:45-12- Elaborate (if time, explain may take you till 12)