

1. Content Standards and Benchmarks/ Objective:

Fifth Grade:

Earth in Space and Time

Solar System

E.ST.M.1 Solar System- The Sun is the central and largest body in our solar system. Earth is the third planet from the sun in a system that includes other planets and their moons, as well as smaller objects, such as asteroids and comets.

E.ST.05.11 Design a model that of the solar system that shows the relative order and scale of the planets, dwarf planets, comets, and asteroids to the sun.

2. Topic:

Solar System: Sun, Planets , and Other Objects

- What does our solar system look like?
- What are the Similarities and Differences between the planets, sun and smaller objects?
- What is the general scale of the planets in relationship to each other as well as the sun?

3. Culminating Outcome: The students will understand the characteristics of “What a solar system are as well as how they interact with each other.”

4. Assessment and Rubric. Assessment will be based on a few factors. Group involvement, Home learning papers and formative assessment. The group involvement I am looking for participation from all group members. It is based off a Check-plus (100%) for exceptional participation Check (85%-95%) for some involvement and 0 for no participation. This scale will be what I will use for home learning as well. I am looking that the students are observing, doing the best work and providing evidence for claims (Check-plus.) If the students complete the home learning without much evidence, but just fill it in it will be a check. If it is not done it's a zero. If turned in late it goes down 10% points each day.

There will also be a formative assessment after “lesson 5 .” (Unit up to point left student teaching)

5. Calendar of Lessons

Wednesday	Thursday	Friday	Monday	Tue
Intro/ Artful Thinking photo	Lesson 1 Intro to terms Size and scale of planets	Lesson 1 Scale lesson	Lesson 1 Finish Scale Lesson	Lesson 2 Intro to Scale and distance
Lesson 2 Scale and distance	Finish Lesson 2 Scale and Distance	Lesson 3 Solar system Note books	Lesson 4 Use Solar system Note books to take notes during movie	Lesson 5 See think wonder using picture “Earth sunrise from moon”
Assessment	Lesson 6 Earths motion in space	Lesson 6 Continue Earths motion in space	Lesson 6 Finish Earths motion in space	... Left for middle school

LESSON PLANS (SEE ATTACHED LESSONS)

Astronomy Unit

GLCE (Earth in Space and Time)

Develop an understanding that the sun is the central and largest body in the solar system and that Earth and other objects in the sky move in a regular and predictable motion around the sun. Understand that those motions explain the day, year moon phases, eclipses and the appearance of motion of objects across the sky. Understand that gravity is the force that keeps the planets in orbit around the sun and governs motion in the solar system.

E.ST.M.1 Solar system- The Sun is the central and largest body in our solar system. Earth is the third planet from the sun in a system that includes other planets and their moons, as well as smaller objects, such as asteroids and comets.

E.ST.05.11 Design a model that of the solar system that shows the relative order and scale of the planets, dwarf planets, comets, and asteroids to the sun

E.ST.M.2. Solar System Motion- Gravity is the force that keeps most objects in the solar system in regular and predictable motion.

E.ST.05.21 Describe the motion of planets and moons in terms of rotation on axis and orbits due to gravity.

E.ST.05.22 Explain the phases of the moon.

E.ST.05.23 Explain the apparent motion of the stars. (Constellations) and the sun across the sky.

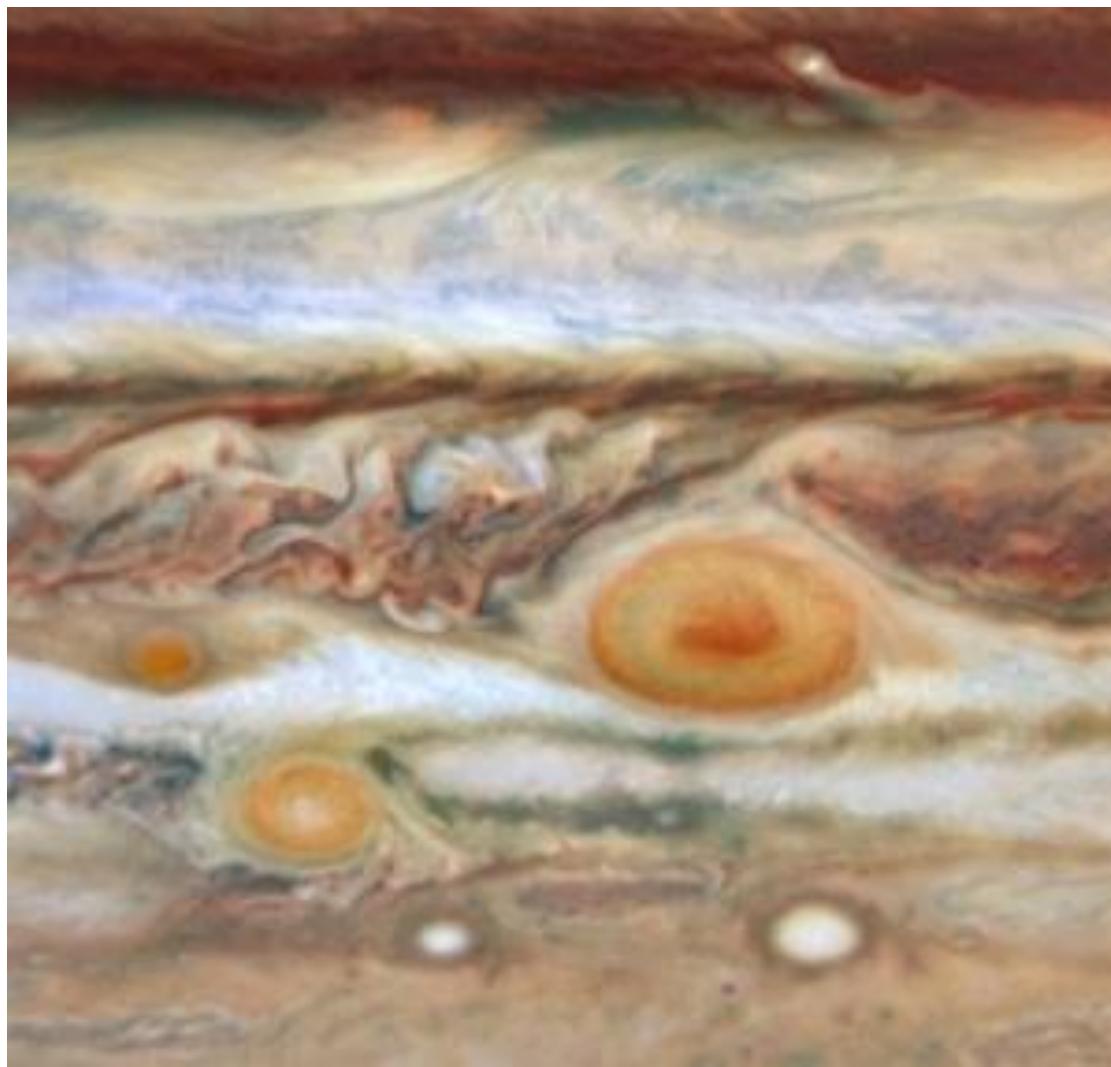
E.ST.05.23 Explain Lunar and Solar eclipses

E.ST.05.24 Explain the tides of the oceans as they relate to the gravitational pull and orbit of the moon.

Time	TASK ANALYSIS	Teaching	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	<p>Play Intro Music</p> <p>Put Up artful Thinking photo</p>	<p>Welcome.</p> <p>I need you to sit for quietly and observe this photo. While looking, make mental notes on what you See. What does it make you think and wonder about.</p> <p>Turn and talk to your table mates and share what you are observing in this photo.</p> <p>What did you observe? What does it make you think and wonder about?</p> <p>(I want more questions to open up their deeper artful thinking “what makes you say that etc.”)</p> <p>Allow the students to form questions</p>	<p>Active listening</p> <p>Active listening</p> <p>Quiet group talking</p> <p>Hands raised participation</p>	<p>CD with space music playing</p> <p>Artful thinking photo</p> <p>Sticky Notes</p>

	<p>Reveal that it is a close up picture of Jupiter and its storms.</p> <p>What wonders are you wondering about?</p> <hr/> <p>Intro to solar system</p> <p>You are all going to be astronomers. You will use the same tools that ancient astronomers used before telescopes. You will make observations of your universe from your backyard.</p> <p>Hand out Solar journal. Split the class into 2 groups, one gets sunrise and one gets sunset forms.</p> <p>Ask what is a sunrise and what direction will it rise.</p> <p>How do scientists decide when a sun has risen?</p> <p>What is a horizon?</p> <p>If we have agreed what a sun rise is, then what is the definition of a sunset and what direction will it set.</p> <p>Go over hand out and what is expected.</p>	<p>Activity form</p> <p>Active listening</p> <p>Active participating, hand raising etc.</p>	
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	<p>We will come back and look at the results and compare the results with each other after 14 days of observations.</p>		
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Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS

	Introduction Intro Vocab: Solar System intro	<p>"Welcome astronomers! Today we are going to get to know our neighbors. By neighbors I mean our celestial neighbors."</p> <p>"What is a solar system?" Write solar system on the board. Have students brain storm what they feel a solar system is. After you get some ideas of what a solar system is, Inform them that a solar system consists of a star and objects that travel around it.</p>	Active listening Students will predict what a solar system is.	None White board/Marker
	Intro to scale of solar system	<p>Draw a Pea sized circle on the board. (Have Ellie grab a pencil eraser) " If the Earth were about the size of a pea, how big would the rest of the solar system be? (allow to speculate for now)</p>	Active listening and predicting in their heads the scale of the rest of the system	Pencil for Ellie
	Intro to Star	<p>If a solar system consists of a star and objects that travel around it, What is a star? (Write star on the board and take ideas under it)</p>	Students will guess what a star is.	WB/Marker
	Sun	<p>What do we call the star in our solar system? What are the objects that travel around the star in our solar system?</p> <p>Write planet on the board. "What is a planet? How is it different from a star, or a moon?</p>	Students will inform the name of our star and objects Raise hands to answer questions	WB/Marker

Planet Orbit Large components Planets Planet size predictions	<p>Write orbit on the board. Hand one student an inflatable Earth. Hand another a ball. Have the one with the ball stand still and have the one with the earth walk around the one with the ball. Explain an orbit is the path followed by an object as it revolves around another body. "What shape is an orbit generally? (Circle, oval, ellipse)</p> <p>What are our solar system's largest and most important components? (Sun and planets)</p> <p>What are the names of our planets in our solar system? (as students name them write it under solar system) (write sun, moon and Pluto at the end of the list and explain why the moon although not a planet is important to earth)</p> <p>How large do you think each of these parts of the solar system is in comparison with the Earth? Two times? Ten Times? (record student predictions beside the planet or other body.)</p> <p>--Activity---. I will need you as group to read the facts of your object then need you to cut it out our object. Before we do this, though, "why might scientists use scale models to help them study astronomy?</p> <p>Write the numbers 1-10 on a big sheet/ magnet to board. Have each team bring up their object and give them some tape to put their object under the number. Bring your object up to the board. Then tape it under the correct number. I would</p>	<p>One student will walk around the other</p> <p>Raise hand and answer questions</p> <p>Raise hand and answer questions</p> <p>Verbally responding</p> <p>Active listening verbally responding</p> <p>Active listening. Verbally responding. Working in group of 2. Cutting object out.</p>	WB/Marker Inflatable earth/ Ball None WB Marker None
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<p>Intro to project</p>	<p>like you to share the facts with the class.</p> <p>“Which major part of the solar system is still missing? How does this last component compare to the planets and Moon in size? Call on a few students to come to the board and have them draw how big they think the sun will be. Unfold the sun you cut out and put it up before Mercury.</p> <p>What are some observations you notice with the model we have created?</p> <p>Put of poster of our solar system, Point out that the sun makes up 99% of the matter in the solar system. Point out relative size.</p>	<p>Putting objects up on the board. Sharing facts.</p> <p>Active listening. Verbally participating. A few will draw on the board.</p>	<p>Solar System Sheets and scissors</p> <p>Paper #1-10</p> <p>Tape</p> <p>Sun</p>
<p>Wrap up /Closing/HL</p>			

Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	Introduction	<p>“Welcome astronomers!(Read fun distance facts to students.)</p> <p>We have a good understanding now of how large our planets are. Lets take a look now at the distance they are from one another. We are going to split into 8 groups. I will split you up by popsicle sticks. I will then give each of you a planet. I want you as a group to figure out your model distance of your planet. The first column is where you will write your answers. I will model for you how to do the math by doing mercury. Have groups raise hands when finished and teacher will check to make sure the answers are correct.</p> <p>When finished students go back to their seats. As the class who can draw a picture of the solar system? (if they don't draw in the orbits draw them)</p> <p>why are these circles here?</p> <p>If planets orbit the sun, What do we mean when we say that planets are at a</p>	Active listening	

	<p>certain distance from each other?</p> <p>-----(Depending on Time/Whether Take students to field.)-----</p> <p>If not enough time or weather is bad have read time magazine or astronomy movie.</p> <p>Take students outside to field. Set the sun from last lesson down on ground.</p> <p>Have students guess how far away Mercury is. Have the Mercury team give info. Place dowel with Mercury's flag on it where it is. Continue on till you reach Pluto.</p> <p>When done laying it out. What does the solar system consist of mainly?</p> <p>Have them walk the planets one more time. Then have them help clean up.</p> <p>What questions do we still have?</p>		<p>Cloth sun, Dowels with planet names on them</p>
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Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	Creating the books	<p>"Welcome astronomers! We are going to create our own Solar System Note Books.</p> <p>Hand out paper. Make sure scissors are on each desk. Put folding sheet example on the viewer. Model folding the paper with the students.</p> <p>Show them where they will make the cut. Have the students turn and help their neighbors if they need it.</p> <p>Put Directions on the Viewer.</p> <p>Read through directions with the students.</p> <p>Let students work Independently with this project</p> <p>-----</p> <p>Have students use this books as a way to take notes and put their own definitions on the right pages.</p>	<p>Students will be active listening</p> <p>Students will be mirroring by folding along</p>	<p>Crayons, Colored pencils, glue sticks construction papers scissors</p>

Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS

30 mins	Movie	<p>Clear off your desks except for a pencil.</p> <p>I would like for you to take notes during the movie. I have for you a topic wheel. I would like for you to put the big idea of the movie in the center. As you are watching you can put what you feel is important in the spaces provided. You can organize it anyway you would like. You need to take notes as you watch though.</p> <p>Discuss what were something you didn't know and found interesting. What did you observe from the movie?</p>	Clear desks minus a pencil	Wheel chart Movie
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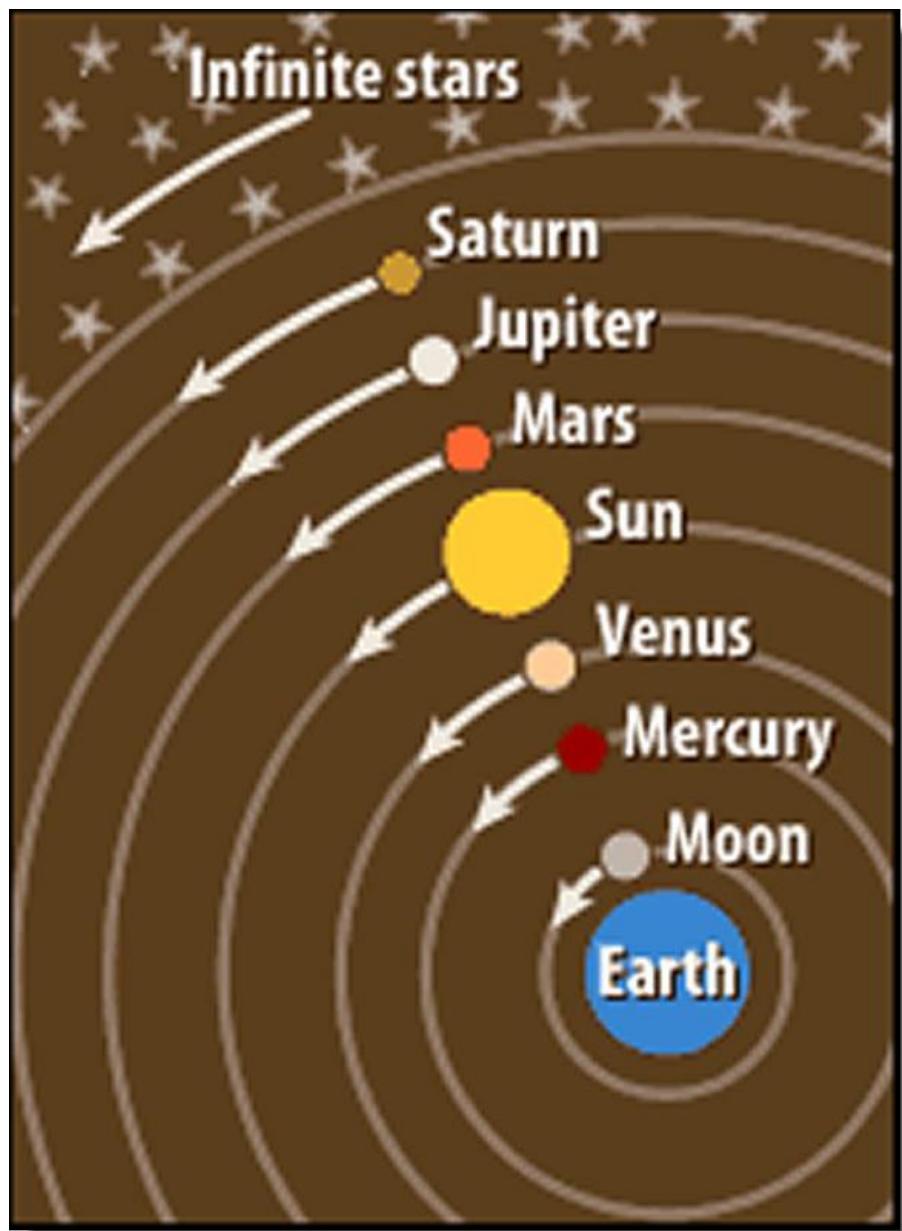
Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	Prep See think wonder 20-30 mins	<p>Load picture from desktop titled “earth sunrise from the moon.”</p> <p>Have students look at this photo for 30 seconds.</p> <p>Ask, “What do you See?” Have students make statements on what they “See.”</p> <p>If students want they can come up and use the “Magic window” to show what they see. If Students make a conjecture about something ask them “What Makes you Say that?”</p> <p>When most students have participated in “See”</p> <p>Ask them, “what do they think about when looking at this image?” Again have students raise their hand and share what they think about. They can use the magic window again to help share what they think about.</p> <p>Once most has shared their thinks ask them “ What do you wonder about?” have the students continue with their wonders. They can use the magic window to come up and zoom in on their wonders.</p>	<p>Students quietly observe for 30 seconds</p> <p>Students raise their hands sharing what they see.</p> <p>May use magic window</p> <p>Raise hands and share what they think about.</p> <p>Raise hands and share their</p>	<p>Image “earth sunrise from moon”</p> <p>Magic window is two pieces of paper taped to a yard stick</p>

	<p>The teacher may want to make notes on what they are observing on a sheet with all the students names.</p> <p>If with this image the students move quickly through the see thinks and wonders. I would load on the screen a game called “Gravity launch.” www.scienzenetlinks.com/interactives/gravity.html</p> <p>As a class you can have the students raise their hands and suggest throttle speed and angle as you try to launch a space ship to the space station. They will see the effects of gravity on their space ship. Use the mouse to move the throttle up and down as well as to change the angle. Once the throttle and angle are set click launch. You will have to adjust one or both until your space ship docks with the space station. The artful thinking and the gravity launch will be a great intro into the Earth Moon Relationship.</p>	<p>wonders.</p> <p>Students raise hand suggest throttle and angle</p>	<p>Computer. Load website</p>
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Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	<p>Greeting/ Procedures</p> <p>Hand out quiz</p> <p>Quiz pick up</p>	<p>Greet students. Have them clear desks of anything other than pencils and either solar system books or note page. Inform them for the back of the quiz that they are to use the picture to answer the questions. (Picture has been uploaded to the classroom computer and is shown with the projector.)</p> <p>Use complete sentences and explain your thinking “what makes you say that?” Take time. When finished look over your answers and make any corrections. Then quietly read.</p> <p>Hand out quiz's (Eli will need test read to her)</p> <p>When you notice that the last quiz is done. Have the person that is closest to the outside exit door (back left person) at each table collect the quiz's and set them in a pile on desk. Have those students pick up “Use to think about now think about sheet” for their table.</p> <p>When finished same student at the table will collect them and pile them on the</p>	<p>Active listen</p> <p>Taking quiz</p> <p>Quietly Read</p> <p>One student from each table collects quiz's</p> <p>Hands out artful thinking</p>	<p>Artful thinking picture” Geo centric” Quiz</p>

	<p>Artful thinking sheet</p> <p>Extra time ideas</p>	<p>desk.</p> <p>When finished. If time Pull students to whole group and read Everest to 5L. When finished, if time Read Ralf Ralf and Ralf to 5W class.</p>	<p>sheet.</p>	<p>Use to think now think sheet</p> <p>Everest</p> <p>Ralf Ralf and Ralf</p>
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Name _____

Mailbox Number _____

Make sure to write in complete sentences and explain your answers.

- 1) What are at least 5 main parts of a solar system? Explain in words or you can draw the main parts of a solar system below. If you draw, make sure to label the parts.

- 2) How are planets and moons similar?

- 3) How are planets and moons different?

Name: _____ Mailbox # _____

Think back at what we have learned so far in astronomy, and answer in complete sentences.

1) What did you *use* to think about our solar system?

#2) What do you *now* think about our solar system?

#3) What lingering questions do you still have? (Feel free to write on the back.)

Time	TASK ANALYSIS	TEACHING STRATEGIES	CHECK FOR UNDERSTANDING	RESOURCES/ MATERIALS
	Prep Circle around light source	<p>12 sheets of paper with each month on it taped around the walls January in front and at 11 February etc. On a big piece of paper have the earth drawn to the best of ability. Put a desk in the center of the room with a light bulb on it. (tape cord or put a rug over it so one trips on it)</p> <p>Have two light sources opposite ends of room with globe and stand ready</p> <p>Center of the room on a desk put a light source. (Have 12 sheets of paper with each month written on it taped up around the room.)</p> <p>Have the students circle around the light source.</p> <p>Remind them of their observations they made for sunrise and sunset and for the shadow projects they worked on.</p> <p>“Does the Sun actually move across the sky every day? Why does it appear so?”</p> <p>Write Rotation on big sheet of paper (Have an earth drawn on it). Grab a globe or earth. Rotate the earth clockwise and then counter clock wise. Which way do you feel the earth should rotate. (Explain the shadow to eli) How should we move in order to simulate the rotation of the earth?</p> <p>Have the students stand and turn counter clockwise.(rotation is the earth spinning on the axis)</p>	<p>Students circle the light source.</p> <p>Active listening and participation. Raise hands to answer questions</p>	<p>Light bulb on a table center of reading area.</p> <p>Big sheet of paper 2 light bulbs and stand</p> <p>Globe</p>

<p>Rotation</p> <p>Axis</p> <p>Revolution</p>	<p>Write axis on the sheet. What is earth's axis?</p> <p>Darken room have students face the light source.</p> <p>Imagine your head is the earth and your neck is the axis. (Use Eli as an example so she can experience it too) There is a tiny person on your nose experiencing day light. Top of your head is the north pole Which ear is east and which ear is west? (left ear east right ear west)</p> <p>Have students turn slowly counterclockwise (to their left) observe the change in view of the sun “To you and the tiny person on your nose, how does the sun appear to move?” Have them continue turning counter clockwise until the sunlight is barely visible in the corner of their right eye. “What time is it?” (Sunset) What direction does it appear to be setting (west) Have them continue rotating ..what time is it now? When the sun is directly behind their head ask them what time it is.</p> <p>Have them continue rotating until the sun is in the left corner of their eye. Ask them what time it is now.(Sunrise) What direction is that?</p> <p>Write Revolution on the board (means orbit around the sun)</p> <p>Remind the students like all the planets in the solar system, earth revolves around the sun.</p>	<p>Active listening raising hands</p> <p>Students turning counterclockwise observing</p>	
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	<p>Look across the sun to the month that is on the wall. Their position represents the current date on Earth at their position.</p> <p>Have the students move to their right. Continue moving and paying attention to the month they are looking at.</p> <p>There are two motions continue moving to the right but for each month you reach you should rotate once</p> <p>“how is this model different from the actual rotation and revolution of the earth. (the earth makes slightly more than 365 rotations for each revolution)(we rotate roughly 30 per each month) (axis is angled)</p>	Active listening
Rotation/revolution	<p>The reason for the season is the tilt of the earth (show on globe)</p> <p>Rotate with angle of globe and have students observe suns location on earth.</p>	Students look at their month (show eli) Students revolve around light source.
Angled axis	<p>Have Students whose mail box number is even stay at the light source they are at, and odd mail box numbers go to a table at the other end of the class that has globes Have half a stack of page 8 at each station. Students can work in groups to answer the questions on activity sheet 8.</p> <p>When finished have them turn into the black hand in bin.</p>	<p>Students make observations of where the shadow of the sun is with the earth tilted</p> <p>Students split up work in small groups to</p>

answer questions on sheet 8

Turn into black hand-in bin

Sheet 8