Pre-Assessment: Our Solar System

1. List the planets in order.
   __________________________________________
   __________________________________________
   __________________________________________

2. How many phrases does the moon go through? ___________________

3. How are the inner and outer planets different?
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

4. What is the difference between revolution and rotation?
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

Use these terms to fill in the blanks:

<table>
<thead>
<tr>
<th>Sun</th>
<th>Axis</th>
<th>Orbit</th>
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<tbody>
<tr>
<td>Asteroid</td>
<td>Solar System</td>
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5. The Earth spins on its ________________.

6. A ________________ is a group of planets and their moons that orbit a central star.

7. A/An ________________ is a rocky object that orbits the sun in a path between Mars and Jupiter.

8. The path a planet takes around the sun is its ________________.

9. The ________________ provides most of the energy to the solar system.
Science Lesson Plan

Activity Name: Solar System Unit: Lesson 1 – Moon and Earth Orbits

Grade Level: 4th Grade

Major Concepts:
SD State Standards: 4.E.2.1. Students are able to describe the motions of Earth, Sun, and Moon.

CC.4.RL.4.5: Explain major differences between poems, dramas, and prose, and refer to the structural elements of poems and drama when writing or speaking about a text.

Materials and Resources:
• Interactive Video
• Flashlight, Basketball, and Smaller ball
• Sun, Moon, and Earth Model Template
• Colors, Pins, Glue, and Scissors
• Moon Poem
• Science Book

Rationale: According to my pre-assessment, six out of the twenty-seven students knew how many phases the moon goes through; because of this data I believe it is important we cover this material. The Constructivist Approach believes that children must be actively engaged in developing their own understandings of concepts. They believe it is the teacher’s role to support the students as they develop their understanding. Teachers can do this by providing students with opportunities to have higher level of thinking, responsibility, interaction with materials, and frequent group work. In the lesson, students are not only expected to be actively engaged, but they are visually witnessing the concept and using hands on manipulatives.

Objectives:
By the end of the lesson, the students will be to demonstrate the motions of the Earth, Sun, and Moon to accurately display the moon phases.

Assessment:
After the lesson, as a class we will take a quiz using the Smartboard. Students will use their models to demonstrate the motions of the Earth, Sun, and Moon to create the different moon phases. I will keep track for their understanding by asking them to leave them on the desk for me to review.

Procedure:

1. Anticipatory Set – Moon Poem
   • Talk about which lines rhyme and what pattern it creates. 5 minutes
2. We will read pg D70 talking about Our Solar system, and what is the center of our solar system. I want the students to know that the Sun is a huge source of energy, and is the reason we can see the moon at night. We will then read page 64 to learn important vocabulary words.

3. Model – Using a flashlight, basketball, and smaller ball, I will demonstrate how the earth casts a shadow over the moon causing us to only see a portion. I will have a picture on the smartboard showing the different phases with labels. 10 minutes

   - Talk to the students about how the sun lights up the moon and we are seeing the part that is lit up. (5 minutes)

5. The students will then create the Sun, Earth, and Moon model. Put 10 minutes on the smartboard for the students to see how much time they have. 10 minutes

6. Once the models are made, I will have pictures of the Moon in a certain phase and the students will use their models to show the alignment of the earth, moon, and sun. 15 minutes

7. Closure – We will review the moon phases, and talk about what we will learn the next science period. 5 minutes

Reflection:
How did the students respond to the poem at the beginning of the class?
Some of the students were confused by the poem, while others were interested in the labels of the moon phases especially gibbous. I think the poem would have been a better lesson closure than a lesson introduction. I wish I would have watched the e-learningforkids.org video as in introduction to the lesson. The video would have given the students a better glimpse to what was going to come in the lesson especially important vocabulary. The more the students hear the vocabulary being used and the more the students use the vocabulary they will remember what the word means. I also think it is was important for the students to have the opportunity to not only hear and see the motions of the earth, moon, and sun, but it is important for them to manipulate the motions for themselves. The students did well working with the materials to demonstrate the motions of the earth, sun, and moon.
Science Lesson Plan

Activity Name: Solar System Unit: Lesson 2 – Revolution vs. Rotation

Grade Level: 4th Grade

Major Concepts:
SD State Standards: 4.E.2.1. Students are able to describe the motions of Earth, Sun, and Moon.

Materials and Resources:
• Books
• Gym
• Rotation and Revolution Worksheet for misbehavior/book
• Earth Rotation and Revolution Quiz
• Rotation vs. Revolution Game

Rationale: Four out of the twenty-seven students were able to accurately state the difference between revolution and rotation; since less than 15% of the class is able to do this we are going to cover this content. Students have many different learning styles indicated by Howard Gardner theory, and one learning style many students thrive in is kinesthetic learning. Students’ needs to be actively moving and engaged in the material they are trying to learn and understand. In the lesson, we will be doing an activity where the students will be moving around and physically demonstrating the movement of the earth around the sun.

Objectives:
By the end of the lesson, the students will be able to explain the difference between revolution and rotation.

By the end of the lesson, the students will be able to explain how and why the seasons change.

Assessment:
At the end of the lesson, students will complete a quiz covering the content we covered in the lesson.

Procedure:

1. Anticipatory Set – Read pg D65-D67 - Motions of Earth and Earth Seasons
   • We will quickly review how many days are in a year (revolution), hours in a day, why do we have night and day (rotation), and how we tilt on our axis. 5 minutes
2. Explain that we have to understand that the earth spins on an axis, but that the earth tilts to one side. This tilts causes the seasons, because at certain times of the year parts of the earth are pointed toward or away from the sun. 5 minutes

3. Talk about expectations for the next activity and how there are no warnings. If I feel they are disrupting others learning they will be asked to finished a worksheet during the activity.

4. Model – We will be doing this activity in the gym. We will be imagining that we are the Earth and Toronto is located on our hearts. We will imagine an axis coming out of the top of our heads and we will point this all to the same point in the gym. We will talk about who is leaning towards the sun and away from the sun, and who is experience winter and summer. Then talk about which way we spin or rotate, and the way they revolve around the sun. Then we will talk about where spring and fall would be in our model. 20 minutes

5. Back in the classroom, we will talk if the Northern Hemisphere is having winter, what is happening in the Southern Hemisphere. 5 minutes

6. If we have extra time students may play Rotation vs. Revolution. The students will separate cards that describe each vocabulary word. Once they have separated all the cards, they will write down the card number on the graph and hand in the worksheet.

7. Closure - Students will be asked to complete Revolution or Rotation quiz. I will review the quiz to assess if the students understood the content. 5 minutes

Reflection:
How well did the whole class demonstration of revolution and rotation go?

At the beginning of the demonstration, I found it difficult for me to explain how I wanted the students to position themselves. I felt this way, because we were in a circle so I had my back to half of the students. I wish there was a better way, but I just kept spinning myself around and cold calling on students to make sure they were always paying attention. Most of the students were able to grasp the concept of revolution and rotation, but some of the students struggled putting the vocabulary together such as direct sunlight. If I were to do this lesson again I would have a quicker pace. I felt I lost some of the students who really understand the content. Also I wish I would have had the students who understood explain the content more.
Science Lesson Plan

Activity Name: Solar System Unit: Lesson 3 – Inner Planets

Grade Level: 4th Grade

Major Concepts:
SD State Standard: 4.E.2.1. Students are able to describe the motions of Earth, Sun, and Moon.

CC.4.SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Materials and Resources:
- Interactive solar system website
- Art Activities with Planet Descriptions
- Pictures of planets for Elmo
- Crayons or Markers
- Black construction paper

Rationale: Since four out of the twenty-seven students were able to list all the planets in order I believed it was very important for the students to learn again. Most of the students in the classroom love to draw and doodle during group discussion or read-alouds. Best practices indicate to incorporate the interests of the students to keep them motivated. In this lesson, students will be drawing and visually creating representations of the solar system which support students’ needs to draw and creatively express their understandings. This activity encourages students to use their linguistic ability by asking them to listen to information and draw according to the information.

Objectives:
By the end of the lesson, the students will be able to list the inner planets and describe similar characteristics between them.

During the lesson, students will restate the information provided to them from a read-aloud.

Assessment:
Throughout the lesson students will draw and color according to the information provided through the reading, and at the end of the lesson we will have a group discussion about the similarities among the inner planets.

Procedure:

2. Read pg D76-D77 – The Planets: The Inner Planets
   • Talk about similar characteristics. 5 minutes

3. Art Activity – Planet descriptions and the students draw while I read the information. Display planet photos over Elmo for the students to see what the planets really look like. We will only do the inner planets, and save the art project for the next lesson. 10 minutes

4. Read pg D71 – Other objects in Our Solar System
   • Emphasis on vocabulary words. Planet, Asteroids, and Comets. 5 minutes

5. As a final project for this unit, students will be working in a group of three to give a presentation over one planet or the sun. Students will be given a rubric for them to follow on developing their presentation. At this time we will be dividing into the groups, and drawing for planets. 15 minutes

6. Students will be given time to determine who will be doing what in their group, and decide how they will be providing the information. 5 minutes

7. Closure - Students will be asked to fill out a Solar System brochure. The brochure will be the student’s exit ticket. They must hand it in to me before we move on to the next class. I will review the brochures to assess if the students understand the content. 5 minutes

Reflection:
How did the students listen to the information about the planets as they were coloring?
   After reading about each planet, I asked the students to share something they thought was interesting. The students were able to say accurate facts to the rest of the class, which told me that they were listening while they were coloring. Also during this time, the students who maybe did not hear the facts were given another chance to hear the information and obtain it. Overall I was very impressed with how well the students were about to listen while coloring, and I would do it again. At the end of the lesson, I asked the students to list some of the similar characteristics among the planets. Some of the students were able to do this, but it was a little difficult, but maybe if I would have also had examples of outer planets it would have given them something else to compare to.
Activity Name: Solar System Unit: Lesson 4 – Outer Planets

Grade Level: 4th Grade

Major Concepts:
SD State Standards: 4.E.2.1. Students are able to describe the motions of Earth, Sun, and Moon.

CC.4.SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

SD State Standards: 4.M.1.3. Students are able to use scales of length, temperature, capacity, and weight.

Materials and Resources:
• Art Activity with Outer Planets
• Pictures for Elmo
• Crayons, Markers, and Previous art project
• Piece of string about 4 m long
• Meter stick
• 9 different colored markers
• Science Books

Rationale: Ten out of the twenty-seven students were able to list one difference between in the inner and outer planets. I want the students to be able to synthesis the information they understand about the planets to describe some of the major differences such as size or distance from the sun. Most of the students in the classroom love to draw and doodle during group discussion or read-alouds. Best practices indicate to incorporate the interests of the students to keep them motivated. In this lesson, students will be drawing and visually creating representations of the solar system which support students needs to draw and creatively express their understandings. This activity encourages students to use their linguistic ability by asking them to listen to information and draw according to the information.

Objectives:
By the end of the lesson, the students will be able to list the outer planets and describe similar characteristics between them.

During the lesson, students will restate the information provided to them from a read-aloud.

At the beginning of the lesson, students use a simple scale to create an accurate classroom model of the distance between the planets.
Assessment:
Throughout the lesson students will draw and color according to the information provided through the reading, and at the end of the lesson we will have a group discussion about the similarities among the outer planets.

Procedure:

1. Anticipatory Set – Distances Between Planets page D74-75
   • This will help the students visualize of big our solar system really is. This is also incorporate math into the beginning of the lesson. 10 minutes

2. Read pg D78-D79 – The Planets: The Outer Planets
   • Talk about similar characteristics. 5 minutes

3. Art Activity – Planet descriptions and the students draw while I read the information. We will only do the inner planets, and save the art project for the next lesson. 10 minutes

4. Closure - Read pg 80 – Other objects in Our Solar System
   • Moons and Rings. We will watch SciFacts about Saturn’s Rings 10 minutes
   • http://www.youtube.com/watch?v=N1Fp7ZaopJc

Reflection:
How did incorporating math into the lesson go?

I believe fifteen out of the twenty-seven were partaking in the group discussion about using the scale to determine how far part our planets should be in our model. After explaining what a scale is and how to use one correctly, I wish I would have given each group one distance to figure out. This way in small groups the students would have had a better opportunity to show me that they understand the content. I think it was a great opportunity to incorporate some math skills into a science lesson. I want to find more opportunities to cross curriculum areas.
Science Lesson Plan

Activity Name: Solar System Unit: Lesson 5 – Inner & Outer Planets and Sun Presentations

Grade Level: 4th Grade

Major Concepts:
  4.E.2.1. Students are able to describe the motions of Earth, Sun, and Moon.
  4.W.4.1b. Provide reasons that are supported by facts and details.

Materials and Resources:
  • Information about Astronauts
  • Students Presentations
  • Planet Booklet

Rationale: Many theories suggest that students learn best when they are teaching others and have the opportunity to display their learning for others. In this lesson students will work cooperatively to present information orally and visually to other students, and have to critically think about how they want to present the important information based on the provided information. During this lesson, students are constructing their own understanding of the concept and developing presentations for others.

Objectives:
By the end of the lesson, the students will be able to list at least three basic characteristics about one planet in our solar system.

By the end of the lesson, the students read through provide facts and determine important information to share with others.

Assessment:
Throughout the lesson, students will be completing at least two facts about each planet and our sun in their planet booklets.

Procedure:

1. Anticipatory Set – We will read about the Astronauts and students will quickly write about where they would want to go and why. Students will have provide multiply reasons to support their reasoning’s. 10 minutes

2. Students will be given needed time to complete their planets presentation and decide who will be saying what. Time allotted depends on the needs of the students.
3. Planet Booklet – Student will need to create.  
   • As the other groups present the students will be expected to fill out the booklet. This booklet will help the students pay attention to others presentations while holding them accountable to remember the information. *5 minutes*

4. Students will present their presentations. *This may take the whole time or we may need to stop and finish the next day.*

5. Closure – We will review the planets we have covered so far, and if there is anyone interesting facts anyone would like to share. *5 minutes*

**Reflection:**  
Are the booklets effective at keeping the students attentive to each others’ presentations?  
After reviewing the booklets, I was able to see that the students were listening during the presentations. There were a couple of students who did not complete them and I asked them to use some of the recess time to couple the comments just like everyone else. The purpose behind using the booklets was to give the students something to productive to do while the other students were sharing about their planet. I knew the students were completing the booklets as the presentations were going on because I could use them, but also some of the students were asking to have facts repeated so they could accurately write them down. Giving the students something so small and simple was a great way for me to assess their listening skills.
Proof of Learning

The following results come from the science unit that I taught on our Solar System. There are 27 fourth graders who took the pre- and post-assessment. Within the classroom, there is a wide range of abilities within this group of students. The Solar System unit was five lessons lasting around two weeks. Some of the objectives covered in this unit were to have the students explain and demonstrate the motions of the Earth, Moon, and Sun, list the planets in order, and compare and contrast inner and outer planets.

The test consisted of nine questions. There were four short answer questions and five fill in the blank vocabulary questions. The following percentages are the results of the pre- and post-assessment.

<table>
<thead>
<tr>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
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<tbody>
<tr>
<td>33%</td>
<td>78%</td>
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**Pre-Assessment Results**
- Mean: 48%
- Median: 44%
- Mode: 44% and 56%

**Post-Assessment Results**
- Mean: 91%
- Median: 100%
- Mode: 100%
Analysis:

All the students scored higher on the post-assessment than on the pre-assessment. I was very surprised with the result of the pre-assessment, and how little the students knew about our Solar System. Based on this data, I know the unit was successful, especially since the mean of the pre-assessment was 48%, and the post-assessment's mean was 91%. At the end of the assessment, I was impressed how much of content the students did absorb during the unit.

The graph illustrates how many students answered the questions correctly on the pre-assessment and post-assessment. The pre-assessment showed there was need for us to cover the Solar System Unit, but I knew I would not need to cover some of the vocabulary. I made this decision based on the results of the pre-assessment, and how more than half of the students already knew the definitions. After implementing the unit, almost all the problems had more students answering it correctly than previously. On the pre-assessment there were 14% of students who correctly answered number one, and on the post-assessment 96% of students correctly answered the questions. Number nine was the only question that the same number of students answered it correctly on both assessments.

Reflection:

My unit over the Solar System went very well, and there are many factors to take in consideration for its success. First of all the students were overly enthusiastic about
getting into a new science unit, especially the Solar System. Along with this, I was able to keep their enthusiasm by incorporating multiply methods of teaching. Using all the different methods helped the students connect to the content in a way that worked best for them. During each lesson, we would do a variety of things with the content such as demonstrations, singing songs, reading poetry, or creating a pamphlet. I found out my students extremely enjoyed watching videos or toying around with virtual tours of the Solar System, and most of the videos helped me relate the material to different academic areas such as reading and math. There were many times the students did not even know that we were working on math during science which was very interesting.

Even with the success of my lesson, there were a few things I would like to tweak in the unit. Sometimes I felt like I had a weak closure with a lesson. Either the students were working on a project or I would run out of time, and there wasn’t a definitive stopping point to move on to a different lesson. I was planning on doing an “end ticket” after every lesson, but I felt like it would have been too much busy work for the students. Now looking back, I wish I would have had some type of “exit ticket” for the students to write down the information we covered and could review one more time at the end of the lesson.

I was surprised by the result of the post-assessment and very ecstatic when I was grading them. We did a little review a day before the post-assessment, and it must have just been the wrong time of day. The students were just struggling being engaged and not excited about the review, which made me extremely nervous about giving them the post-assessment. I just had this gut-feeling that it was not going to go well. As I was grading, I was getting more and more impressed, especially with one student. He was the individual who received a 0% on the pre-assessment, and he wasn’t able to tell me a single planet. By the end of the unit, he knew four planets in order, the difference between revolution and rotation, and three out of five vocabulary words. I was very impressed with his accomplishment, and it felt wonderful knowing I had helped even in the smallest of measures.