# 5th Grade Science Unit: Out of this World

## Unit Snapshot

### Topic: Cycles and Patterns in the Solar System

<table>
<thead>
<tr>
<th>Grade Level: 5</th>
<th>Duration: 18 days</th>
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</table>

**Summary**

Students will explore the difference in size, composition, movement and distance from the Sun for the eight planets. The unit allows students to gain a deeper understanding of comets, meteors, and asteroids.

### CLEAR LEARNING TARGETS

**“I can”...statements**

- ___ evaluate the characteristics of a planet as it relates to distance from the Sun, size, composition, and movement.
- ___ design and construct a relative scaled-model that can demonstrate the planet size in relationship to the Sun and the Earth.
- ___ compare and contrast the physical characteristics of meteoroids, meteors, asteroids, and comets.
- ___ describe the effects of meteoroids on the Earth’s surface.

### Activity Highlights and Suggested Timeframe

<table>
<thead>
<tr>
<th>Days 1-2</th>
<th><strong>Engagement:</strong> Watch <a href="http://www.discoveryed.com">www.discoveryed.com</a> video, <em>The Magic School Bus: Gets Lost in Space</em>. Students will create and construct a relative scaled model that can demonstrate each planet’s size and distance in relationship from the Sun and Earth.</th>
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</thead>
<tbody>
<tr>
<td>Days 3-4 (teachers may extend the lesson by doing more research)</td>
<td><strong>Exploration:</strong> Small groups of students will be assigned a planet to research facts for the solar system model they created in the Engage. Conduct the investigation called Crater Collision that models the impact of meteoroids or meteorites on celestial bodies. (A crater on the moon is caused by meteoroids. A crater on the Earth is caused by meteorites.)</td>
</tr>
<tr>
<td>Days 5-9</td>
<td><strong>Explanation:</strong> Students will engage in reading informational texts, watching video clips, discussions and taking notes related to characteristics of planets, asteroids, meteors and comets. Complete Anticipation Guide, comparison worksheet and the reading comprehension worksheet.</td>
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<tr>
<td>Days 10-16</td>
<td><strong>Elaboration:</strong> Smart Exchange SmartBoard activity called Solar System by Melissa Love. Complete choice board activities.</td>
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<tr>
<td>Day 17 and ongoing</td>
<td><strong>Evaluation:</strong> A teacher-created short cycle assessment will be administered at the end of the unit to assess all clear learning targets.</td>
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<tr>
<td>Day 18</td>
<td><strong>Extension/Intervention:</strong> Based on the results of the short-cycle assessments, facilitate extension and/or intervention activities.</td>
</tr>
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</table>
LESSON PLANS

NEW LEARNING STANDARDS:
5.ESS.1 The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.

- The distance from the sun, size, composition and movement of each planet are unique.
- Planets revolve around the sun in elliptical orbits.
- Some of the planets have moons and/or debris that orbit them.
- Comets, asteroids and meteoroids orbit the sun.

Note 1: The shape of Earth's orbit is nearly circular (also true for other planets). Many graphics that illustrate the orbit overemphasize the elliptical shape, leading to the misconception regarding seasonal change being related to how close Earth is to the sun. The discussion of planet characteristics should be at an introductory level for this grade.

SCIENTIFIC INQUIRY and APPLICATION PRACTICES:
During the years of grades K-12, all students must use the following scientific inquiry and application practices with appropriate laboratory safety techniques to construct their knowledge and understanding in all science content areas:

- Identify questions that can be answered through scientific investigations
- Use appropriate mathematics, tools and techniques to gather data and information
- Analyze and interpret data; Develop descriptions, models, explanations and predictions
- Think critically and logically to connect evidence and explanations
- Recognize and analyze alternative explanations and predictions

COMMON CORE STATE STANDARDS for LITERACY in SCIENCE:

- See attached 5th grade ELA Standards at the end of this unit for; Reading Standards for Informational Text, Writing Standards and Speaking and Listening Standards

*For more information: http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf

STUDENT KNOWLEDGE:

Prior Concepts Related to Surface of Earth
PreK-2: The moon, sun and stars can be observed at different times of the day or night. The observable shape of the moon changes throughout the month, the sun's position in the sky changes in a single day and from day to day and the sun is the principal source of energy. Earth’s atmosphere is discussed.
Grades 3-4: All objects are made of matter and light is a form of energy. Earth’s surface is discussed and gravitational forces are introduced.

Future Application of Concepts
Grades 6-8: The interior and exterior composition of Earth, Earth’s unique atmosphere, light waves, electromagnetic waves, interactions between the Earth, moon and sun, and gravitational forces are explored in more depth.
High School: Galaxies, stars and the universe are studied in the physical sciences.
MATERIALS:

Engage
- computer for video
- for the model: butcher paper, white paper, scissors, crayons, tape, rulers, the teacher sheet for sizes and distances

Explore
- planet research: planet resource pages (in curriculum guide) or the website www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm, library books, computers for internet, planet facts worksheet, crayons, tape
- meteorite experiment: flour, pie tin, 3 marbles, meter sticks, rulers, lab worksheets

Explain
- each student needs an Anticipation Guide, Comets, Asteroids and Meteors Comparison worksheet and Reading Comprehension worksheet
- chart paper and sticky notes for students’ questions
- planet resource pages or computer www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm, computer for UnitedStreaming video, Space School: Pluto
- Meteor, Comet and Asteroid resource pages, computer for UnitedStreaming videos: -What are Asteroids, Meteors and Comets, -Other Heavenly Bodies: Asteroids, Meteors and Comets
- Craters
- Cosmic Collisions on the Moon
- computer for The Life of a Meteorite video www.kidsastronomy.com/meteorites.htm

Elaborate
- computer for SmartBoard Exchange lesson, Solar System by Melissa Love
- choice board and templates
- may need computers, variety of paper, crayons/colored pencils/markers, index cards, other supplies the students may ask for to create their game

VOCABULARY:

Primary
- 8 Planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)
- Asteroid
- Comet
- Gravity
- Gravity/gravitational attraction
- Meteor
- Meteorite
- Meteoroid
- Orbit
- Physical characteristics
- Pluto – Dwarf Planet
- Solar System

Secondary
- Atmosphere
- Celestial bodies
- Craters
- Impact
### SAFETY

- Handle all science equipment and materials appropriately according to teacher directions.
- Be respectful of other student’s experiments/projects.

### ADVANCED PREPARATION

- Watch the videos from [www.Discovery.com](http://www.Discovery.com)
- Provide library books available for all planets so students can conduct research. (Students need the books for Exploration and Elaboration.)
- Gather all materials for Crater Collision experiment.
- Copy all reading material.
- Bookmark all websites the students may use during the unit.
- Log in or sign up for Smart Exchange to view and use SmartBoard lessons.

### ENGAGE (2 days)

*What will draw students into the learning? How will you determine what your students already know about the topic? What can be done at this point to identify and address misconceptions? Where can connections be made to the real world?*

**Objective:** To spark student’s interest in the Solar System by watching a video and creating a model.

**What is the teacher doing?**

**Video (Day 1)**


**Solar System Model (Day 2)**

- Create a relative scaled solar system. Teacher will provide a butcher paper “solar system” about 62” long taped on the wall of the hallway. The teacher can have the Sun already posted on the paper. Assign groups of students to cut out each planet and place on the paper according to the provided directions.
- Consider using the following mnemonic device to help students learn the planetary order: **My Very Excellent Mother Just Served Us Nachos** (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune)

**What are the students doing?**

1. Students will begin learning about the Solar System while watching the video.

### EXPLORE (2 days)

*How will the concept be developed? How is this relevant to students’ lives? What can be done at this point to identify and address misconceptions?*

**Objective:** Groups of students will complete a planet fact sheet to accompany the relative scaled model solar system poster. Students will conduct investigations that model the impact of meteoroids or meteorites on celestial bodies. (A crater on the moon is caused by meteoroids. A crater on the Earth is caused by meteorites.)

**What is the teacher doing?**

**Planet Facts (Day 3)**

- Have students get into the same planet groups from the Engage activity. Distribute the resource page for their planet and the Planet Facts worksheet. They will complete the Planet Facts worksheet and tape it to the “solar system” model under their planet.

**What are the students doing?**

1. Students will read the resource page, library books or internet sites to complete the Planet Facts worksheet and color the planet. Tape facts under the planet on the model.
Suggestions: Teacher may want to laminate Planet Facts worksheets. During the Explain section of this unit the students will need to read all of the planet resource pages, so the teacher may want to copy all pages for Explore and reuse them during the Explain section of this unit.

### Crater Collision (Day 4)
- Gather materials for Crater Collision experiment: 3 marbles, flour, pie tin, goggles, lab worksheets, meter sticks and rulers. The experiment can either be teacher demonstrated or student performed. Prior to the experiment, explain expectations and rules for completing this activity. In order to measure the crater, the teacher will need to explain diameter.

### Crater Collision (Day 4)
2. Complete the Crater Collision experiment. Be sure to use centimeters when measuring height of drop and when measuring diameter. It is very important to drop the marble with the same force for each trial.

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### EXPLAIN  
(5 days)

(What products could the students develop and share? How will students share what they have learned? What can be done at this point to identify and address misconceptions?)

### Objective: Students will read informational texts and watch video clips to gather information about planets, asteroids, meteors and comets. Students will complete an Anticipation Guide, comparison worksheet and reading comprehension worksheet.

### What is the teacher doing?

#### Comets, Asteroids, and Meteoroids (Days 5-9)
- Before reading, distribute the Anticipation Guide for Comets, Asteroids and Meteors. Students need to complete the BEFORE section. Collect Anticipation Guides to be used at the end of the Explain part of the unit.
- Copy and distribute the provided resource pages in this guide. The teacher may have students take turns reading the material or read in table groups. The planet resource pages can be read online at [www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm](http://www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm)
- To explain Pluto’s dwarf status watch UnitedStreaming video, *Space School: Pluto* (4:26 min.)
- Have students fill in the Comets, Asteroids and Meteors Comparison worksheet and the Reading Comprehension worksheet as they read the resource pages.

### What are the students doing?

#### Comets, Asteroids, and Meteoroids (Days 5-9)
1. Complete the BEFORE section of the Anticipation Guide.

2. The students should take turns reading aloud and asking inquiring questions about the material. Underline important information or take notes on the material. Students may want to use sticky notes to write down questions they have while reading. Place the questions on a class chart. The teacher can address the questions throughout the reading.

3. Students will complete the worksheets as they read the related material.
- Watch the video, *The Life of a Meteorite* (1:19 min.)
  [http://www.kidsastronomy.com/meteorites.htm](http://www.kidsastronomy.com/meteorites.htm)

Suggestions: Teacher may want to have students take notes as they read or underline important information. Hang a chart paper on the wall for students to write questions as they read. The teacher can address the questions as they go through the readings and videos.

- Distribute the Anticipation Guides and have students complete the AFTER section. Collect for a formative assessment grade.

### Objective:
Students will show their knowledge through the SmartBoard lesson and choice board activities.

#### SMARTBoard Activity (Day 10)
- Facilitate the Smart Exchange SMARTBoard activity, Solar System by Melissa Love. Teachers will need to be a member of Smart Exchange or join for free. [www.exchange.smarttech.com](http://www.exchange.smarttech.com)

#### What is the teacher doing?
1. Students will be participating in the SMARTBoard lesson.

#### Choice Board (Day 11-16)
- Choice Board Activities
  The choice board contains 10 activities. They are worth 1 point, 3 points and 5 points. The goal is to have the students complete 10 points worth of activities. However, the teacher may choose to use the choice board in a different way. The teacher can have students complete as many projects as time will allow. Students may complete some projects as individuals, teams of 2 or table groups.

#### What are the students doing?
2. Work on choice board activities.

### ELABORATE
(7 days)
(How will the new knowledge be reinforced, transferred to new and unique situations, or integrated with related concepts?)

4. Complete the AFTER section of the Anticipation Guide.
**Objective:** Students can show their knowledge through formative assessments throughout the lesson and show their cumulative knowledge with summative assessments.

<table>
<thead>
<tr>
<th>Format</th>
<th>Formative</th>
<th>Summative</th>
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</thead>
<tbody>
<tr>
<td><strong>How will you measure learning as it occurs?</strong></td>
<td>1. Explore - the group’s planet research for the model solar system.</td>
<td>1. Elaborate - choice board activities</td>
</tr>
<tr>
<td></td>
<td>2. Explore - the investigation lab to measure impact of meteorites.</td>
<td>2. Use the Study Guide questions provided at the end of the unit to create an assessment.</td>
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<tr>
<td></td>
<td>3. Explain - note taking and discussions throughout the reading.</td>
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**EXTENSION (1 day or as needed)**

1. Research 2 planets and complete a Venn Diagram.
2. The choice board activities can be used for intervention or extension.
3. Students create a matching game to extend their knowledge of Earth and Space science.

**INTERVENTION**

1. Crossword puzzle using vocabulary from the unit.
2. The choice board activities can be used for intervention or extension.
3. Planet cards, a matching game.

**COMMON MISCONCEPTIONS**

Common misconceptions about cycles and patterns in the Solar System at this grade level include:

- Meteors (shooting stars) are real stars. (Meteors are meteoroids burning up as they enter Earth’s atmosphere.)
- Meteoroids will have the same impact on the moon that meteorites have On Earth. (Meteoroids will have a greater impact on the moon due to the lack of atmosphere on the moon.)
- Meteorites and meteoroids are all meteors. (Meteoroids, meteorites and meteors are all smaller forms of asteroids. A Meteoroid is a small body moving in the Solar System before it enters Earth’s atmosphere. As that small body enters Earth’s atmosphere, it is a meteor. A meteorite is what remains from the meteor and has landed on the Earth.)
- Living in outer space is an idea of the future. (Astronauts are living and surviving on the International Space Station.)
- We could do everything on the other planets that we do here on Earth. (Based on resources and differences in gravity, life would be very different.)
- Pluto is a planet. (Pluto is now considered a dwarf planet due to it’s characteristics.)
- The Planets are evenly spaced. (The terrestrial planets are closer together, whereas the gas giants are farther apart.)
### Differentiation

**Lower-level:**
- Consider differentiating grouping to meet the needs of individual students when completing the planet facts sheet for the relative scaled model or choice board activities.
- Consider providing trade books or other appropriate reading-level materials for students to use for the research activities.

**Higher-Level:**
- Have students complete a Venn Diagram comparing more than 1 planet.
- Students can extend the choice board activities by completing more than required.
- The following website is a link to practice online tests.  

Strategies for meeting the needs of all learners including gifted students, English Language Learners (ELL) and students with disabilities can be found at the following sites:

- **ELL Learners:**  

- **Gifted Learners:**  

- **Students with Disabilities:**  

### Additional Resources

**Websites:**

- [www.nasa.gov/education](http://www.nasa.gov/education) - Information and related materials
- [http://amazing-space.stsci.edu/resources/explorations/](http://amazing-space.stsci.edu/resources/explorations/) - on-line explorations
- [http://www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm](http://www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm) Information about each planet in student friendly language
- [http://www.bobthealien.co.uk/solar.htm](http://www.bobthealien.co.uk/solar.htm) Bob the Alien’s tour of the Solar System has information about the Solar System written in student friendly language.

**Discovery Ed: Unitedstreaming.com**

- The Magic School Bus: Gets Lost in Space (29:08 minutes)
- The Planets (5:36 minutes)
- All About Comets (2:13 minutes)
- Asteroids and Meteoroids (3:29 minutes)
- Real World Science: Our Solar System (18:39 minutes)
| **Science is Elementary: What’s in Space: Stars and Planets (18:19 minutes)** |
| **Space School: Pluto (4:26 minutes)** |
| **Science Lab: Our Solar System (game)** |
| **Our Solar System: The Inner Planets [29:16]** |
| **Our Solar System: The Outer Planets [30:07]** |

**Smart Exchange Lessons:**
- Solar System by Melissa Love
- Solar System submitted by LadyLiz2012
- Space Objects submitted by Billyernst

**Literature:**
Making a Model of the Solar System

(Taken from www.scholastic.com/teachers/lesson-plan/making-models-solar-system by Ruth Manna)

Objective: Create the relative-size model of the solar system for the hallway. Students will create the model of each planet during the Engage part of the unit. Students will research facts about the planets to add to the model during Explore.

Materials: butcher paper, white paper, scissors, crayons, tape, rulers, planet information sheets, textbook

Procedure:
1. To represent outer space, roll out 62 inches of butcher paper, any color will do.
2. Divide the students into 8 groups, 1 for each planet.
3. Each group needs white paper to cut out the planet according to the given dimensions. Leave the planets white until research has been completed during the Explore part of the unit.

<table>
<thead>
<tr>
<th>Planets</th>
<th>Diameter (distance across the sphere passing through the center)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>1 1/2&quot;</td>
</tr>
<tr>
<td>Venus</td>
<td>3 3/4&quot;</td>
</tr>
<tr>
<td>Earth</td>
<td>4&quot;</td>
</tr>
<tr>
<td>Mars</td>
<td>2&quot;</td>
</tr>
<tr>
<td>Jupiter</td>
<td>44 1/4&quot;</td>
</tr>
<tr>
<td>Saturn</td>
<td>37&quot;</td>
</tr>
<tr>
<td>Uranus</td>
<td>16&quot;</td>
</tr>
<tr>
<td>Neptune</td>
<td>15 1/4&quot;</td>
</tr>
</tbody>
</table>

4. The teacher will need to create a Sun to go on one end of the butcher paper.
5. After students have created the planets correctly they need to place them on the butcher paper. The distance is not to scale it is just to show how spread out the solar system really is. Each group needs to place/tape their planet a given distance from the sun.

<table>
<thead>
<tr>
<th>Planets</th>
<th>Distance from the Sun</th>
</tr>
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<tbody>
<tr>
<td>Mercury</td>
<td>1&quot;</td>
</tr>
<tr>
<td>Venus</td>
<td>1 1/2&quot;</td>
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<td>Earth</td>
<td>2&quot;</td>
</tr>
<tr>
<td>Mars</td>
<td>3&quot;</td>
</tr>
<tr>
<td>Jupiter</td>
<td>11 1/2&quot;</td>
</tr>
<tr>
<td>Saturn</td>
<td>19&quot;</td>
</tr>
<tr>
<td>Uranus</td>
<td>38&quot;</td>
</tr>
<tr>
<td>Neptune</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

picture below is from http://eisforexplor.blogspot.com/2012/04/candy-solar-systems.html

If you would like to read the information online, the information and pictures were taken from http://www.manatee.k12.fl.us/sites/elementary/samoset/psgk3ex.htm
Our Solar System is made up of eight planets, their moons, and our Sun. The planets and their moons revolve around, or orbit the Sun. The orbits are not round. They are elliptical (E-lip-tih-cul). Elliptical means egg-shaped.

Mercury is the planet closest to the Sun. It is not, however, very close, since it is 36 million miles, or 58 million kilometers away from the Sun!

Like all the other planets Mercury orbits around the Sun. A year on Mercury lasts for only 88 days. The Earth’s orbit lasts for 365 days, 1 year. Because Mercury goes around the Sun so quickly, the planet was named after the messenger of the Roman Gods. The messenger Mercury, or Hermes as the Greeks knew him, is usually shown as having wings on his helmet or on his sandals. When Mercury orbits the Sun, it travels 36 million miles in the 88 days of the orbit. It moves at a speed of 107,372 miles an hour! Unlike the Earth and most other planets Mercury turns very slowly on its axis, taking 59 days to complete the turn from day to night.

Mercury’s sunny side has a temperature rising to 400° Celsius or 750° Fahrenheit. Compare this to a warm summer’s day in London, when the temperature might be 80° Fahrenheit or 26° Celsius. Mercury’s dark side, however, is very cold indeed, with the temperature going down to -200° Celsius or -328° Fahrenheit. Mercury has no atmosphere around it to protect it from the Sun or to retain any heat when it rotates on its axis. Mercury’s distance from the Earth is 57 million miles.

Mercury has no moons.

Mercury is quite a small planet. Its diameter, the distance right round its middle, is only 3100 miles. The diameter of the Earth is 7926 miles.

The surface of Mercury is covered with craters and completely dry. There is no possibility of life on Mercury. Mercury is one of five planets that can be seen without using a telescope, Mercury, Venus, Mars, Jupiter and Saturn. When you look at the sky at night, the planets do not twinkle in the way that stars do. Mercury is not very easy to see, but it can be seen low in the west just after sunset or in the east just before dawn.

About once every ten or fifteen years Mercury can be seen crossing the Sun. At this point its orbit has come between the Sun and the Earth. This event is known as a transit. When watching any event near the Sun a proper filter must be used to protect the sight. With this filter Mercury can be seen as a tiny black dot slowly passing across the Sun.

http://www.planetsforkids.org/planet-mercury.html

Columbus City Schools
Curriculum Leadership and Development
Science Department June 2013
Venus is the second planet from the Sun. It is one of the four inner planets. These planets are Mercury, Venus, Earth and Mars. The inner planets are also called the rocky planets, because they are made of rocks.

Venus is sometimes called the "Evening Star" and the "Morning Star". It is very bright. You can see it at sunset and sunrise. It is so bright it looks like a star, but it does not twinkle.

Venus spins very slowly. One "day" on Venus is longer than one year on Venus!!! It takes Venus 243 days to spin around its axis one time. This means that one Venus day is 243 "Earth Days" long. Venus orbits, or goes around the sun, in only 225 days! This means one Venus year is 225 days long!!

Venus is different from all the other planets because it spins "backwards" on its axis.

Astronomers call Venus Earth's "sister planet" because it is about the same size as Earth. Its gravity is also about the same as Earth's gravity. This means you would weigh about the same amount on Venus and on Earth. Venus, however, is very different from Earth.

Earth has big oceans and a lot of water vapor in the air. Earth has clouds made of water vapor. Earth has an atmosphere made of gases called oxygen and nitrogen. Our atmosphere also has a little bit of carbon dioxide and other gases in it. Venus has no oceans. Its atmosphere is made mostly of carbon dioxide. There is almost no water vapor in its air. Venus is totally covered by clouds made of acid. (sulfuric acid)
The clouds cover the whole surface of Venus. They let sunlight in, but do not let heat out. This makes Venus very, very hot. It is even hotter than Mercury which is closer to the sun! The temperature on the surface of Venus is about 900 degrees Fahrenheit! That is nine times as hot as a 100 degree day on Earth!

Like Mercury, the surface of Venus is covered with craters made by meteoroids. There are also many volcanoes on Venus. The volcanoes are not active anymore, which means they do not erupt. This picture shows Maat Mons, one of Venus's volcanoes.
Earth is the third planet from the Sun. It is the largest of the four inner planets. These planets are Mercury, Venus, Earth and Mars. The inner planets are also called the rocky planets, because they are made of rocks.

Earth is often called the "Water Planet" because it is the only planet in our solar system which has liquid water on its surface. About 70% of the surface of Earth is covered by water! The other part of Earth is made up of continents and islands which have different landforms on them. Examples of landforms are mountains, and plains. Because Earth has so much water, plants and animals can live on Earth.

Earth spins very quickly compared to other planets. It only takes Earth 24 hours to spin around its axis one time. One Earth day is 24 hours long!!! Earth orbits the sun in 365 days! This makes one Earth year 365 days long!!!

Earth has big oceans and a lot of water vapor in the air. Earth has clouds made of water vapor. Earth has an atmosphere with a lot of oxygen in it for us to breathe. The rest of our "air" is made up of nitrogen, carbon dioxide and other gases.

Earth is the only planet in our solar system which has all the conditions that are needed for animals, plants, and humans to live on it. There is plenty of water for them to drink, and/or live in. Earth has air which plants and animals can breathe. The temperature on Earth is just right for plants, animals, and humans. Different parts of Earth have different temperatures, but plants, animals, and humans can live in almost all areas of Earth.

Like the other inner planets, Earth has volcanoes. Earth's volcanoes are different from those on other planets, because they still erupt. Scientists think that there may be volcanoes on other planets and moons in our solar system that may still be active. They are still studying this.

Earth has one moon which we call "The Moon". Its surface has many craters on it from where meteoroids have hit it. It has many volcanoes on it which do not erupt anymore. We can see the moon at night without using a telescope. It is the closest space object to our planet.
Mars is the fourth planet from the Sun. It is the last of the four inner planets. These planets are Mercury, Venus, Earth and Mars. Mars is often called the "Red Planet" because of the color. Here is a picture of "Twin Peaks" on the surface of Mars. You can see that the surface is rocky and sandy looking. The picture was taken on July 4th, 1997 by the Mars Pathfinder's camera. The 'peaks' are the hills in the back of the picture. They are about 100 feet tall.

Mars spins very quickly compared to other planets. It only takes Earth 24 hours to spin around its axis one time. Mars spins around on its axis in 24 hours and 36 minutes. This means that the Martian Day is about half an hour longer than ours! One Mars Day is about 24 and one half hours long. Mars has a very long year. It is about 687 Earth days long! That is almost twice as long as one year on Earth.

Mars has an atmosphere, but it is different than Earth's. Our atmosphere is made up of oxygen (which we breathe), nitrogen, carbon dioxide and other gases. Earth has a lot of water vapor in the air. Mars has "air" made up mostly of carbon dioxide. Other important gases in the air of Mars are nitrogen and oxygen. There is much less oxygen in the air of Mars than we have on Earth. We would not be able to breathe the air on Mars. Mars has water vapor in the air, but Earth has four times as much. Mars has weather, but it is different than Earth's. Scientists have pictures of clouds on Mars. The clouds are made of water vapor. Scientists do not know if it ever rains on Mars. They do know Mars has winds and very big dust storms.
Jupiter is the fifth planet from the sun. It is the largest planet in the solar system and it is the largest of the outer planets. The outer planets are: Jupiter, Saturn, Uranus and Neptune. Jupiter, Saturn, Uranus, and Neptune are called "gas giants" because they are mostly made of gases and are very large.

Jupiter is named after the Roman "King of the gods". Jupiter was the leader of the made-up gods that the Romans who lived long, long ago believed in. The planet is named Jupiter because it is so big!

Jupiter is mostly made of a gas called hydrogen. Its atmosphere has three layers of clouds in it. The first layer of clouds is made of ammonia. Ammonia is the stinky stuff that is used to clean floors and is found in spray-cleaners like window cleaners. The second layer of clouds is made of ammonia and sulfur. Sulfur is the material found on the head of a match that makes it light. The third layer of clouds is made of water vapor. Jupiter has a lot of storms in its atmosphere. The spot in this picture is a storm on Jupiter. Scientists call this Jupiter's red spot. It is a storm which has been going on for about 300 years!!! It is 2 times as big as our whole planet Earth. This storm is like a giant hurricane. It has winds that blow as fast as 270 miles per hour!! The Red Spot is the biggest storm in the Solar system.

An interesting fact about Jupiter is that it has rings. Here is a picture from NASA showing Jupiter's rings. Some of Jupiter's moons are found in its rings. Jupiter has at least 16 moons and maybe more!!
Saturn is the second of the outer planets. It is also the second largest planet in our solar system. Because it is so big people can see it without a telescope. The ancient Greeks and Romans saw it and named it Saturn. In 1610, Galileo discovered it had "lumps" on each side when he looked at it through his telescope. In 1655, another scientist named Christian Huygens, made a better telescope than Galileo had. He discovered Saturn had rings!

Saturn is made mostly of hydrogen and helium. On Earth these are usually gases. In fact, helium is the gas used to blow up balloons that float. On Saturn, hydrogen and helium are liquids! Saturn has weather and storms. Scientists think these are mostly wind storms. The storm is the bright yellow and blue patches in the middle of Saturn. Saturn is yellow, because there is a lot of sulfur in its atmosphere.

Saturn is so big, has rings and so many moons that it is called a "system". This picture shows Saturn and 6 of its 18 moons! The rings are made up of pieces of rocks and ice. These pieces can be as small as a pebble or as big as a building. The rings get their pretty colors because the sun shines on them from far away. Sometimes after it rains on Earth, we see a rainbow. This is because there are many tiny drops of water in the air. These drops are too small to fall as rain. The sun shines on the tiny drops and reflects off making a rainbow. Saturn's rings are made of dust and ice pieces. The sun reflects off these and makes rainbow colors.

Saturn spins very quickly on its axis. One day on Saturn is only 10 hours long. A year on Saturn is very long. It is 29 1/2 Earth years long. This means you would be 30 years old on Earth and 1 year old on Saturn.
Uranus is the seventh planet from the Sun. It is the third of the outer planets. Like Saturn and Jupiter, Uranus has a very short day. One day on Uranus is only 17 hours long. A year on Uranus is VERY long. One Uranus year is 84 Earth years! It takes Uranus 84 years to orbit the Sun one time! That means Uranus goes all the way around the sun ONCE in our lifetime!

Uranus has more moons than any other planet in our solar system. So far, 20 moons have been discovered! 18 of these are "for sures". The other 2 are still being studied to make sure they are moons. This picture shows Uranus and some of its moons. You can see that Uranus has rings like Saturn and Jupiter. They are not colorful or easy to see. Uranus' rings are very thin.

Uranus was first seen by a scientist named William Herschel in 1781, about 5 years after America declared its independence from Great Britain. Herschel wanted to name Uranus after King George III, who was the king of England at that time. Other scientists didn't like this, so they named it after another made-up Roman and Greek god like all the other planets.

Uranus is made of methane ice. Methane is usually a gas on Earth, but it is so cold on Uranus that it is frozen into ice. Uranus's atmosphere is mostly made of methane gas. There are so many clouds made of methane in the atmosphere, that they cover the whole planet. Uranus looks bluish-green because its atmosphere is made of methane. Weather on Uranus is mostly winds that move through the atmosphere. Winds on Uranus can blow up to about 320 miles an hour!!

An odd fact about Uranus is that it "lies on its side." The axis is perpendicular to the Sun so it rotates north and south. Some people say Uranus spins on its side. Here is a picture that shows this. Uranus sort of looks like a ball that got squished in the middle.
Neptune is the eighth planet from the Sun and the fourth of the outer planets. Like Uranus, Neptune is a blue color because its atmosphere is mainly made of methane gas. Neptune's day is about the same length as Uranus'. It is 17 hours long. One year on Neptune is 165 Earth years - about twice as long as Uranus' year! It takes Neptune 165 years to circle around the sun once because it is so far away.

Neptune has some interesting features. Jupiter has the "Great Red Spot" that looks like an eye. Neptune has a "Great Dark Spot". Jupiter's spot is really a storm. Scientists think that Neptune's spot is a hole in its atmosphere! Like Uranus, Neptune's atmosphere is mostly made of methane gas. Neptune also has bands of thin white clouds that look like stripes. The cloud patterns change as Neptune spins on its axis.

Neptune has 8 moons. The biggest one is Triton. Here is a picture from NASA showing Triton and Neptune. Neptune is much, much bigger than Triton. Triton looks bigger in this picture because the picture was taken closer to Triton than it was to Neptune.
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*Pictures from Starchild.gsfc.nasa.gov and Cosmic Elk*
ESSENTIAL QUESTION: **How do meteoroids and meteorites affect celestial bodies upon impact?**

Hypothesis: Write your hypothesis on a post-it note and display it on the board.

Experimental Procedure:
1. Put on safety goggles/glasses. Drop 3 marbles into the pie tin from the 30cm height.
2. Choose a crater. Measure in centimeters the diameter and the depth of the crater using your ruler. Record the information on the Data Collection Chart. Draw a picture of the crater.
3. Remove the marbles.
4. Smooth out the flour/soil.
5. Repeat steps 4-6 using the heights of 50 cm and 90 cm.

Optional:
Drop a marble into the pie tin using some force. Record the measurements. Throw a marble into the pie tin so that it strikes the surface at an angel. Record the resulting measurements.

Data Collection Chart

<table>
<thead>
<tr>
<th>Type of Meteoroid/Meteorite Strike</th>
<th>Depth of Crater</th>
<th>Diameter of Crater</th>
<th>Drawing of Crater</th>
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<td>30 cm</td>
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Optional: Graph your data.
Name_____________________________________________________________Date________________

Post-Lab:

1. Describe any crater differences when the marbles were dropped from different heights?
   _______________________________________________________________________
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2. What other factors may affect the size of a crater?
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3. How do meteorites affect the surface of the Earth?
   _______________________________________________________________________
   _______________________________________________________________________
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4. Describe what would happen if a meteoroid were to hit the moon?
   _______________________________________________________________________
   _______________________________________________________________________
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Crater Collisions -
Teacher Answer Key

ESSENTIAL QUESTION: How do meteoroids and meteorites affect celestial bodies upon impact?

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Answers will vary
Optional: Graph your data.
Name__________________________________________________________________________________

Post-Lab:

1. Describe any crater differences when the marbles were dropped from different heights?
   The craters became deeper and larger in diameter as the height at which the marble was dropped increased.

2. What other factors may affect the size of a crater?

   Other factors that affect the size of the crater might include:
   - speed at which the meteoroid is traveling
   - size if the meteoroid
   - type of surface that is hit (rock)
   - shape of the meteoroid
   - the mass of the meteoroid

3. How do meteorites affect the surface of the Earth?

   Meteorites cause circular craters to form on most surfaces in various sizes and shapes.

4. Describe what would happen if a meteoroid were to hit the moon?

   Since the moon does not contain a very large atmosphere, meteoroids would not slow down or burn up in the moon’s atmosphere before hitting the surface. Therefore, the impact would be greater on the moon than on Earth.
Anticipation Guide
Comets, Asteroids, Meteors

Before we begin learning about Comets, Asteroids, and Meteors, read the following statements and decide if you Agree or Disagree with each statement. After you read, go back and look at your responses. Decide if you are going to keep your original answer or change your decision. Circle the answer you feel is correct after reading.

<table>
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<tr>
<th>Before</th>
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<tbody>
<tr>
<td>Agree</td>
<td>Disagree 1. Comets are always visible.</td>
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<tr>
<td>Agree</td>
<td>Disagree 2. A comet’s orbit is a very long narrow ellipse.</td>
</tr>
<tr>
<td>Agree</td>
<td>Disagree 3. Comets sometimes have a tail of dust and gas.</td>
</tr>
<tr>
<td>Agree</td>
<td>Disagree 4. A comet is made of solid rock.</td>
</tr>
<tr>
<td>Agree</td>
<td>Disagree 5. Asteroids revolve around Earth in an area known as the asteroid belt.</td>
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<tr>
<td>Agree</td>
<td>Disagree 6. Asteroids are mostly solid rock.</td>
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<tr>
<td>Agree</td>
<td>Disagree 7. Meteoroids are mostly made up of ice.</td>
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<tr>
<td>Agree</td>
<td>Disagree 8. Meteoroids usually come from comets or asteroids.</td>
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<tr>
<td>Agree</td>
<td>Disagree 9. A “shooting star” occurs when a star burns out while traveling across the night sky.</td>
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<tr>
<td>Agree</td>
<td>Disagree 10. Meteorites fall all over Earth.</td>
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</table>
### TEACHER KEY - Anticipation Guide

**Comets, Asteroids, & Meteors**

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Asteroids

Between 1801 and 1807, astronomers discovered four small objects between Mars and Jupiter. Over the next 80 years, they found 300 more. These objects, called asteroids, are too small and too numerous to be considered full-fledged planets. Asteroids are left over material from the formation of the solar system. These materials were never incorporated into a planet because of their proximity to Jupiter's strong gravity. Asteroids are made of rock and metal and are similar to comets, but do not have a visible coma (fuzzy outline and tail). Most asteroids revolve around the sun between the orbits of Mars and Jupiter. This region of the solar system is known as the asteroid belt.

The asteroid belt is divided into an inner belt and an outer belt. The inner belt, which is made up of asteroids that are within 250 million miles (402 million km) of the Sun, contains asteroids that are made of metals. The outer belt, which includes asteroids 250 million miles (402 million km) beyond the Sun, consists of rocky asteroids. These asteroids appear darker than the asteroids of the inner belt, and are rich in carbon. While most asteroids can be found in the Asteroid Belt, others are in unique orbits far from the Asteroid Belt. It is currently thought that at least 5,000 asteroids cross the Earth's orbit, some coming very close.
An asteroid hit Earth 65 million years ago. It exploded, making a crater 200 kilometers in diameter in the Yucatan Peninsula of Mexico. The explosion probably started huge fires that destroyed much of Earth’s forests and grass. Scientists hypothesize that this caused the extinction of many types of animals, including dinosaurs. Don’t worry though, asteroids and comets only hit the Earth every 100 million years or so.
Comets

You can think of a comet as a dirty “snowball” about the size of an Earth mountain. Comets are chunks of ice and dust and small rocky particles whose orbits are usually very long, narrow ellipses. Comets come from two places: The Kuiper Belt and the Oort Cloud.

Imagine a place far, far away at the very edge of the Solar System. A place where millions of comets can be seen swishing around in every direction. These icy comets are orbiting the Sun in two different places, both of which are very distant. One place is called the Oort cloud, and the other is called the Kuiper Belt. A comet will spend billions of years in the Kuiper Belt or Oort Cloud. Sometimes two comets will come very close to each other, or even crash into one another. When this happens the comets change directions. Sometimes their new path will bring them into the Inner Solar System.

This is when a comet begins to shine. Up until now the comet has been among millions of others exactly the same, but as they approach the warmer Inner Solar System they begin to melt leaving behind magnificent tails. Unfortunately, comets don’t live very long once they enter the warmer part of the Solar System. Just like a snowman melts in the summer, comets melt in the Inner Solar System. After several thousand years they melt down to a little bit of ice and dust, not nearly enough to leave a tail. Some even melt away completely.
Many people think that a comet's tail is always following behind it, but actually the coma, or tail, can either be behind the comet or in front of it. Which way the tail is pointing depends on where the Sun is. That's right, the Sun's heat and radiation produce a wind called the Solar Wind, as a comet gets close to the Sun it begins to melt. The gas and dust that melt off are blown away from the Sun by the solar winds. So if a comet is traveling towards the Sun then the tail will follow behind, but if the comet is traveling away from the Sun the tail will be in front of the comet.

The English astronomer Edmond Hailey was very interested in a comet that he saw in 1682. He was told that a similar comet had appeared in 1531 and 1607. Using the laws of gravity, he realized he could predict when the comet would appear again. Halley suggested they were actually the same comet. He calculated that this comet appeared about every 76 years and predicted that it would reappear in 1758. When his prediction came true, the comet was named Hailey's Comet.
You have probably heard of a shooting or falling star, but have you ever seen one? If you have ever spent any amount of time looking up at the night sky, then you probably have - a flash of light streaking high above through the darkness for just a moment, disappearing just as quickly as it appeared. Do you know what a shooting star is? Their names are a little misleading and this causes some people to think that these fast moving trails of light really are stars that have fallen out of the sky. However, this is not true. Our Sun is a star, our closest star, and the other stars are many, many miles away (it would take more than your lifetime to travel to them!) and since they are much bigger than a shooting star, they are certainly not responsible. If you are still not sure of the answer, then you might be surprised to learn that shooting stars are just tiny bits of dust entering the Earth’s atmosphere from space. Tiny particles, like grains of sand or pebbles on a beach, crash into the atmosphere at amazingly fast speeds. The light that you see is the heat of the air around them as they fly into the atmosphere and burn up.

Occasionally, however, the piece of rock can be big enough so that it does not all burn up while entering the atmosphere and it will hit the ground. We call these meteorites. While they are flying through the atmosphere as shooting stars we call them meteors, and while they are in space we call them meteoroids. A whopping 38,000 meteorites have been found on Earth so far, from all over the world, but most are found in the hot desert or in freezing cold Antarctica.
There are three main types of meteorites: stony, iron and stony-iron. A lot of them have been smashed off from very large chunks of rock, called asteroids, in collisions before eventually finding their way to our planet. Iron meteorites, for example, are bits of metal iron cores of large asteroids that were once hot enough to have melted, causing all of their iron to sink to the center. Stony meteorites look most like the stones that you find on Earth and come from the outer layer of asteroids. Stony-iron meteorites are a mixture of the two.
What are asteroids?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Why didn’t asteroids form into one of the planets?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Asteroids are made out of _____________ and ______________ and are similar to _________________.

Where are asteroids located in our solar system?
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

Describe and explain how the asteroid belt is divided. Use each side of the table for each part of the belt.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
Describe the effect of the asteroid that hit Earth 65 million years ago.

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

What are comets?

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

What causes the comet to form a tail?

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

What causes a comet’s tail to follow the comet or be in front of the comet?

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

___________________________ are found in space. They become __________________________ while they are flying through the atmosphere. They become __________________________ when they hit the earth.

Meteorites are found all over the world, but most are found in the __________________________ and __________________________.

Describe the 3 types of meteorites. Use the table below to organize your information.
What are asteroids?

**Asteroids are left over material from the formation of the solar system. They are made of rock and metal.**

Why didn’t asteroids form into one of the planets?

*Asteroids did not form into one of the planets because they are too close to Jupiter’s strong gravity.*

Asteroids are made out of **rock** and **metal** and are similar to **comets**.

Where are asteroids located in our solar system?

**Most asteroids are found revolving around the sun between the orbit of Mars and Jupiter.**

Describe and explain how the asteroid belt is divided. Use each side of the table for each part of the belt.

<table>
<thead>
<tr>
<th>Inner Belt</th>
<th>Outer Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asteroids are within 250 million miles of the sun.</strong>&lt;br&gt;These include asteroids that are made of metals</td>
<td><strong>Asteroids that are 250 million beyond the sun.</strong>&lt;br&gt;These contain rocky asteroids&lt;br&gt;They are darker than the inner belt asteroids and are rich in carbon</td>
</tr>
</tbody>
</table>
Describe the effect of the asteroid that hit Earth 65 million years ago.

The asteroid exploded creating a crater 200 kilometers in diameter in the Yucatan Peninsula of Mexico. The explosion started huge fires destroying forest and grass. It also may have caused the extinction of many types of animals, including dinosaurs.

What are comets?
Comets are chunks of ice and dust and small rocky particles.

What causes the comet to form a tail?
The comet’s tail forms when they approach the warmer Inner Solar System and they begin to melt.

What causes a comet’s tail to follow the comet or be in front of the comet?
It depends on where the sun is. If a comet is traveling towards the Sun then the tail will follow behind, but if the comet is traveling away from the Sun the tail will be in front of the comet.

Meteoroids are found in space. They become Meteors while they are flying through the atmosphere. They become Meteorites when they hit the earth.

Meteorites are found all over the world, but most are found in the desert and Antarctica.

Describe the 3 types of meteorites. Use the table below to organize your information.

<table>
<thead>
<tr>
<th>stony</th>
<th>iron</th>
<th>stony-iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>these look like most stones that you find on Earth Come from the outer layer of asteroids.</td>
<td>bits of metal iron cores of large asteroids iron sinks to the center</td>
<td>these are a mixture of iron and stony asteroids</td>
</tr>
</tbody>
</table>
### Comets, Asteroids, and Meteors Comparison

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Comet</th>
<th>Asteroid</th>
<th>Meteor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appears as a streak in the sky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frozen ball of dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is visible in our sky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made up of rock and metals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orbits the Sun</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orbits the Sun between Jupiter and Mars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often called “Shooting Stars.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usually burns up in the Earth’s atmosphere</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Images of comet, asteroid, meteor]
<table>
<thead>
<tr>
<th></th>
<th>Comet</th>
<th>Asteroid</th>
<th>Meteor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appears as a streak in the sky</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Frozen ball of dust</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is visible in our sky</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Made up of rock and metals</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Orbits the Sun</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Orbits the Sun between Jupiter and Mars</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Often called “Shooting Stars.”</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Usually burns up in the Earth’s atmosphere</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

![Comet Image](image1)

![Asteroid Image](image2)

![Meteor Image](image3)

![Shot Image](image4)
### Choice Board

<table>
<thead>
<tr>
<th>1 point activities</th>
<th>3 point activities</th>
<th>5 point activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>#1</strong> Create a <strong>crossword puzzle</strong> using at least 10 words from the Earth and Space unit. You need to create an answer document to accompany your puzzle and clues. (This is NOT a word search.)</td>
<td><strong>#5</strong> Create <strong>trading cards</strong> for the sun, 8 planets, comet, asteroid and meteor. Use the template to make your cards.</td>
<td><strong>#8</strong> Create an Earth and Space <strong>game</strong> for other students to play. You can create a jeopardy game with answers and questions or a board game with directions and an answer key. Game must include factual questions and answers.</td>
</tr>
<tr>
<td><strong>#2</strong> <strong>Intergalactic Interview</strong> Interview beings from another planet. In your interview you must include at least 5 facts about that planet. You may write the interview in paragraphs or use the reporter template.</td>
<td><strong>#6</strong> Write about a <strong>current space discovery</strong>. The paper needs to be one page and in your own words. (do not copy) Internet sites you may use: <a href="http://www.news.discovery.com/space">www.news.discovery.com/space</a> <a href="http://www.nasa.gov">www.nasa.gov</a></td>
<td><strong>#9</strong> <strong>Planet research paper</strong> Conduct more thorough research for one of the planets. The paper needs to be 2 pages and in your own words. The paper must include new information learned about your planet.</td>
</tr>
<tr>
<td><strong>#3</strong> <strong>Acrostic poem</strong> Create an acrostic poem using one of the following words: universe, solar system, planets, outer space. Each letter must contain facts learned from the Earth and Space unit.</td>
<td><strong>#7</strong> The <strong>life of a meteoroid</strong> Pretend you are a meteoroid. Write a description of a meteoroid as it becomes a meteor and then turns into a meteorite. Write your description in 1st person.</td>
<td><strong>#10</strong> Create a <strong>PowerPoint</strong> about the Solar System. You must have at least 8 slides. You may include: planets, asteroids, meteor, comets, moon, asteroid belt, sun.</td>
</tr>
<tr>
<td><strong>#4</strong> Create a <strong>poem or rap</strong> to explain a part of the Solar System to a younger student. You must include at least 5 facts learned from the Earth and Space unit.</td>
<td>Name- I completed numbers:</td>
<td></td>
</tr>
</tbody>
</table>
Choice Board Explanation

The choice board can be used in different ways:
1. Have the students complete activities that add up to 10 points.
2. Have the students select 1 activity from each column.
3. Choose another point value for the students to complete.
4. Students may create their own activity. You may determine the point value.

Templates are included for:
#2 the intergalactic interview
#3 acrostic poems papers (space for decorating)
#5 trading cards
#6 note taking paper for current space discovery
#7 final draft paper for the life of meteoroid
#8 checklist for creating a game
#9 note taking paper for planet research paper
Name____________________________________

Intergalactic Interview

Directions: Pretend you are a reporter interviewing a being that lives on one of the planets. Create questions and answers that include at least 5 facts about the planet.

Reporter:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

Interviewee:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

Reporter:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

Interviewee:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

_________________________________________ 

_________________________________________ 

_________________________________________ 

_________________________________________ 

Reporter:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

Interviewee:

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________
Acrostic Poem

Name _____________________________________  

Universe

U ____________________________________________

N ____________________________________________

I ____________________________________________

V ____________________________________________

E ____________________________________________

R ____________________________________________

S ____________________________________________

E ____________________________________________
Name _____________________________________ Acrostic Poem

Planets

P ________________________________________________

L ________________________________________________

A ________________________________________________

N ________________________________________________

E ________________________________________________

T ________________________________________________

S ________________________________________________
Name ________________________________    Acrostic Poem

Outer Space

O __________________________

U __________________________

T __________________________

E __________________________

R __________________________

S __________________________

P __________________________

A __________________________

C __________________________

E __________________________
Trading Card Templates

Cut out the cards for each celestial body in space.
The front of the card should include the name and a picture. You may draw the picture or print a picture from the internet. (Shrink the picture to make sure it fits on the card.) The back of the trading card should include accurate information.

**SUN**
Size of the Sun: ____________________

___________________________________
The Sun is made of: ________________

___________________________________
The distance from the Sun to Earth:

___________________________________
Sun facts:___________________________

___________________________________

**MERCURY**
Size: ______________________________

Temperature:_______________________

Length of time it takes for 1 day:

_________________________________
Length of time it takes to orbit the Sun:

_________________________________
The planet is made of: ______________

_________________________________
# of Moons: _______________________

Planet facts: _______________________

_________________________________
### VENUS

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>______________________</td>
</tr>
<tr>
<td>Temperature</td>
<td>______________________</td>
</tr>
<tr>
<td>Length of time it takes for 1 day</td>
<td>______________________</td>
</tr>
<tr>
<td>Length of time it takes to orbit the Sun</td>
<td>______________________</td>
</tr>
<tr>
<td>The planet is made of:</td>
<td>______________________</td>
</tr>
<tr>
<td># of Moons</td>
<td>______________________</td>
</tr>
<tr>
<td>Planet facts</td>
<td>______________________</td>
</tr>
</tbody>
</table>

### EARTH

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>______________________</td>
</tr>
<tr>
<td>Temperature</td>
<td>______________________</td>
</tr>
<tr>
<td>Length of time it takes for 1 day</td>
<td>______________________</td>
</tr>
<tr>
<td>Length of time it takes to orbit the Sun</td>
<td>______________________</td>
</tr>
<tr>
<td>The planet is made of:</td>
<td>______________________</td>
</tr>
<tr>
<td># of Moons</td>
<td>______________________</td>
</tr>
<tr>
<td>Planet facts</td>
<td>______________________</td>
</tr>
<tr>
<td>PLANET</td>
<td>SIZE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Mars</td>
<td></td>
</tr>
<tr>
<td>Jupiter</td>
<td></td>
</tr>
</tbody>
</table>
SATURN

Size: ____________________________

Temperature:______________________

Length of time it takes for 1 day:

______________________________

Length of time it takes to orbit the Sun:

______________________________

The planet is made of: ________________

_________________________________

# of Moons: _______________________

Planet facts: _______________________

_________________________________

URANUS

Size: ____________________________

Temperature:______________________

Length of time it takes for 1 day:

______________________________

Length of time it takes to orbit the Sun:

______________________________

The planet is made of: ________________

_________________________________

# of Moons: _______________________  

Planet facts: _______________________

________________________________
NEPTUNE
Size: ____________________________

Temperature: ______________________

Length of time it takes for 1 day:
_________________________________

Length of time it takes to orbit the Sun:
_________________________________

The planet is made of: ________________
_________________________________

# of Moons: _______________________

Planet facts: _______________________
_________________________________

COMETS
Description: _______________________
_________________________________
_________________________________

Size: ____________________________

Famous Comets: ____________________
_________________________________
_________________________________

Why are we able to see comets on Earth?
_________________________________

Interesting information:
ASTEROIDS

Description: ____________________________________________________________

# of asteroids discovered: _________________________________________________

Where are they found in space and why?

________________________________________________________________________

Where have asteroids landed on Earth?

________________________________________________________________________

Interesting information:

METEORS

Definition of meteor: ________________________

__________________________

Definition of meteoroid: ________________

________________________________________________________________________

Definition of meteorite: ________________

________________________________________________________________________

# of meteorites found on Earth: ________

Where have meteorites been found?

________________________________________________________________________

Interesting information:
When taking notes put the information in your own words. Do not copy directly from the information you are reading. Notes should also be in note form not complete sentences.

Website used________________________________________

Date of discovery__________________________

What is the discovery?
__________________________________________________________________________________________
__________________________________________________________________________________________

What are facts or information pertaining to the discovery?
• ______________________________________________________________________________________
• ______________________________________________________________________________________
• ______________________________________________________________________________________
• ______________________________________________________________________________________
• ______________________________________________________________________________________
• ______________________________________________________________________________________

What is the significance of this discovery?
__________________________________________________________________________________________
__________________________________________________________________________________________

Now that you have your information, write a one page paper about your current space discovery. Staple this paper to your final draft.
Name ________________________________

Life of a Meteoroid

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________
Name ________________________________  Game Checklist

☐ I included directions for the game.

☐ My questions are accurate and I can prove where I learned the information (facts).

☐ I have an accurate answer key for the questions.

☐ I have at least 15 questions and answers.

☐ I created all pieces for the game. Example: jeopardy board, index card questions, game board, game pieces, game cards, etc.
Name____________________________________
Planet Research
Note Taking Paper

When taking notes put the information in your own words. Do not copy directly from the information you are reading. Notes should also be in note form, not complete sentences.

Sources used

•
•
•
•
•

Planet____________________________________

Basic information about the planet (information from your reading material)
__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

New information about the planet

•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________
•
__________________________________________________________________________________________

Now that you have your information, write a two page paper about the planet.

Columbus City Schools
Curriculum Leadership and Development
Science Department June 2013
Solar System

1. ___________

6. ___________

8. ___________

9. ___________

12. ___________

13. ___________

14. ___________

15. ___________

16. ___________

17. ___________
Across
3. any of the large bodies that revolve around the Sun in the solar system
5. once considered a planet, now considered a dwarf planet
9. the path of an object as it revolves around another object in space
11. a chunk of rock or dust in space
13. the largest of the 8 planets
15. once a meteoroid, now that it passes through the atmosphere and hits the Earth's surface it is called ____
16. a streak of light in the sky produced by the burning of a meteoroid in Earth's atmosphere
17. inner planet known as Earth's sister planet

Down
1. the planet farthest from the Sun in the solar system
2. the 7th planet from the Sun, its axis is perpendicular to the orbit around the Sun (rotates on its side)
4. rocky objects revolving around the Sun that are too small and numerous to be called planets
6. the planet closest to the Sun
7. a loose collection of ice, dust and small rocky particles, typically with a long, narrow orbit of the Sun
8. an outer planet known for the rings
10. a force that pulls objects toward each other
12. the 3rd planet from the Sun
14. known as the red planet, the 4th planet from the Sun
15. natural satellite(s) that revolves around a planet
Across
3. any of the large bodies that revolve around the Sun in the solar system  
   \( \text{planets} \)
5. once considered a planet, now considered a dwarf planet  
   \( \text{Pluto} \)
9. the path of an object as it revolves around another object in space  
   \( \text{obit} \)
11. a chunk of rock or dust in space  
   \( \text{meteoroid} \)
13. the largest of the 8 planets  
   \( \text{Jupiter} \)
15. once a meteoroid, now that it passes through the atmosphere and hits the Earth's surface it is called  
   \( \text{meteorite} \)
16. a streak of light in the sky produced by the burning of a meteoroid in Earth's atmosphere  
   \( \text{meteor} \)
17. inner planet known as Earth's sister planet  
   \( \text{Venus} \)

Down
1. the planet farthest from the Sun in the solar system  
   \( \text{Neptune} \)
2. the 7th planet from the Sun, its axis is perpendicular to the orbit around the Sun (rotates on its side)  
   \( \text{Uranus} \)
4. rocky objects revolving around the Sun that are too small and numerous to be called planets  
   \( \text{asteroids} \)
6. the planet closest to the Sun  
   \( \text{Mercury} \)
7. a loose collection of ice, dust and small rocky particles, typically with a long, narrow orbit of the Sun  
   \( \text{comet} \)
8. an outer planet known for the rings  
   \( \text{Saturn} \)
10. a force that pulls objects toward each other  
   \( \text{gravity} \)
12. the 3rd planet from the Sun  
   \( \text{Earth} \)
14. known as the red planet, the 4th planet from the Sun  
   \( \text{Mars} \)
15. natural satellite(s) that revolves around a planet  
   \( \text{moon} \)
**Planet Matching Cards**

Direction: Cut out the cards. Match the planet with the information card. Then, put the planets in their correct order from the sun.

<table>
<thead>
<tr>
<th>Venus</th>
<th>This planet is closest to the Sun.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jupiter</td>
<td>This planet is the hottest.</td>
</tr>
<tr>
<td>Mars</td>
<td>This is the 3rd planet from the Sun and the only known planet to support life.</td>
</tr>
<tr>
<td>Saturn</td>
<td>Scientists have explored this planet with Rovers.</td>
</tr>
<tr>
<td>Mercury</td>
<td>This planet is known for its famous rings of ice and dust.</td>
</tr>
<tr>
<td>Neptune</td>
<td>This planet has an axis that is pointing towards the Sun.</td>
</tr>
<tr>
<td>Uranus</td>
<td>This is the largest planet and known for the Giant Red Spot.</td>
</tr>
<tr>
<td>Earth</td>
<td>This planet is 8th from the Sun and appears blue in color.</td>
</tr>
</tbody>
</table>
Space Study Guide Questions

1. What objects make up the Solar System?
2. What object is at the center of the Solar System?
3. Which planets are the inner planets?
4. Describe the inner planets. (characteristics)
5. What separates the inner planets from the outer planets?
6. Which planets are the outer planets?
7. Describe the outer planets. (characteristics)
8. Which planet is the largest?
9. Which planet is the hottest?
10. Which planet is closest to the Sun?
11. Which planet is famous for its rings of dust and ice?
12. Which planet has an axis that is perpendicular to the Sun and spins North/South?
13. Which planet is known as the “Red Planet?”
14. There are _____ planets.
15. Which planet has a swirling storm known as the Red Spot?
16. Which planet is farthest from the Sun?
17. Which planets have more than 1 moon?
Space Study Guide Questions
The teacher can use these questions to create a test using multiple choice, short answer and extended response questions.

1. What objects make up the Solar System?
   Some objects in the Solar System: Sun, 8 planets, moons, asteroids, comets, meteoroids
2. What object is at the center of the Solar System?
   Sun
3. Which planets are the inner planets?
   Mercury, Venus, Earth, Mars
4. Describe the inner planets. (characteristics)
   They are smaller, rocky planets compared to the outer planets. They are all closer to the Sun and fairly similar in size.
5. What separates the inner planets from the outer planets?
   The asteroid belt
6. Which planets are the outer planets?
   Jupiter, Saturn, Uranus, Neptune
7. Describe the outer planets. (characteristics)
   Known as gas giants. They are huge in size compared to the inner planets. They do not have a solid surface. They are gaseous, mostly made of hydrogen and helium. All 4 outer planets have rings and moons.
8. Which planet is the largest?
   Jupiter
9. Which planet is the hottest?
   Venus
10. Which planet is closest to the Sun?
    Mercury
11. Which planet is famous for its rings of dust and ice?
    Saturn
12. Which planet has an axis that is perpendicular to the Sun and spins North/South?
    Uranus
13. Which planet is known as the “Red Planet?”
    Mars
14. There are _____ planets.
    8
15. Which planet has a swirling storm known as the Red Spot?
    Jupiter
16. Which planet is farthest from the Sun?
    Neptune
17. Which planets have more than 1 moon?
    See chart
<table>
<thead>
<tr>
<th>PLANET</th>
<th>MOONS</th>
<th>MOON NAMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Venus</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td>1</td>
<td>Moon</td>
</tr>
<tr>
<td>Mars</td>
<td>2</td>
<td>Phobos, Deimos</td>
</tr>
<tr>
<td>Saturn</td>
<td>33</td>
<td>Titan, Rhea, Iapetus, Dione, Tethys, Enceladus, Mimas, Hyperion, Prometheus, Pandora, Phoebe, Janus, Epimetheus, Helene, Telesto, Calypso, Atlas, Pan, Ymir, Paaliaq, Siannaq, Tarvos, Kiviuq, Ijiraq, Thrym, Skadi, Mundilfari, Erriapo, Albiorix, Suttung, plus others yet to receive names</td>
</tr>
<tr>
<td>Uranus</td>
<td>27</td>
<td>Cordelia, Ophelia, Bianca, Cressida, Desdemona, Juliet, Portia, Rosalind, Belinda, Puck, Miranda, Ariel, Umbriel, Titania, Oberon, Caliban, Sycorax, Prospero, Setebos, Stephano, Trinculo, plus others yet to receive names</td>
</tr>
<tr>
<td>Neptune</td>
<td>13</td>
<td>Triton, Nereid, Naiad, Thalassa, Despina, Galatea, Larissa, Proteus, plus others yet to receive names</td>
</tr>
</tbody>
</table>
Common Core ELA Reading Standards for Informational Text Grade 5

- RI 5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- RI 5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- RI 5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- RI 5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- RI 5.5 Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
- RI 5.6 Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.
- RI 5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- RI 5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).
- RI 5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
- RI 5.10 By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4–5 text complexity band independently and proficiently.

Common Core ELA Writing Standards Grade 5

- W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
  - W.5.1a Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.
  - W.5.1b Provide logically ordered reasons that are supported by facts and details.
  - W.5.1c Link opinion and reasons using words, phrases, and clauses (e.g., consequently, specifically).
  - W.5.1d Provide a concluding statement or section related to the opinion presented.
- W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
o W.5.2a Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

o W.5.2b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

o W.5.2c Link ideas within and across categories of information using words, phrases, and clauses.

o W.5.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.

o W.5.2e Provide a concluding statement or section related to the information or explanation presented.

• W.5.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

  o W.5.3a Orient the reader by establishing a situation and introducing a narrator and/or characters; organize an event sequence that unfolds naturally.

  o W.5.3b Use narrative techniques, such as dialogue, description, and pacing, to develop experiences and events or show the responses of characters to situations.

  o W.5.3c Use a variety of transitional words, phrases, and clauses to manage the sequence of events.

  o W.5.3d Use concrete words and phrases and sensory details to convey experiences and events precisely.

  o W.5.3e Provide a conclusion that follows from the narrated experiences or events.

• W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

• W.5.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 5 here.)

• W.5.6 With some guidance and support from adults, use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of two pages in a single sitting.

• W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

• W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

• W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and
research.

- **W.5.9a** Apply *grade 5 Reading standards* to literature (e.g., “Compare and contrast two or more characters, settings, or events in a story or a drama, drawing on specific details in the text [e.g., how characters interact]”).

- **W.5.9b** Apply *grade 5 Reading standards* to informational texts (e.g., “Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point[s]”).

- **W.5.10** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

### Common Core ELA Speaking and Listening Standards Grade 5

- **SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others’ ideas and expressing their own clearly.

  - **SL.5.1a** Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

  - **SL.5.1b** Follow agreed-upon rules for discussions and carry out assigned roles.

  - **SL.5.1c** Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

  - **SL.5.1d** gained from the discussions.

- **SL.5.2** Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

- **SL.5.3** Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

- **SL.5.4** Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

- **SL.5.5** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes.

- **SL.5.6** Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation. (See grade 5 Language standards 1 and 3 here for specific expectations.)