The Solar System

To the Planets and Beyond

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http://www.magnet.fsu.edu/education/teachers/resources/stars.html

The Solar System

To the Planets, Comets and Beyond

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The Solar System

To the Planets, Comets and Beyond

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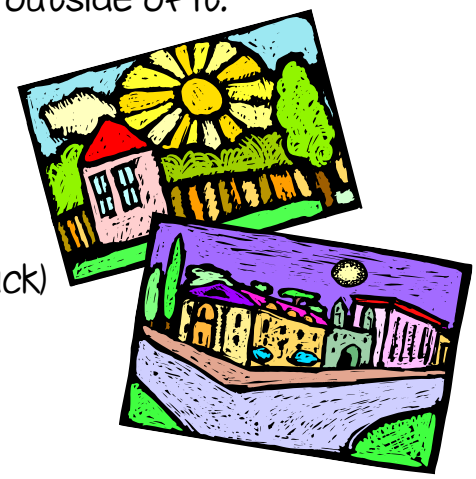
Vocabulary Connection

Section 1

What Makes Day and Night?

Activity 1: Day Sky, Night Sky

Goal: Students become familiar with objects they observe "in the sky." Note: Some objects are in our atmosphere, while others (stars, planets, comets) are outside of it. You may choose to discuss this also.



Materials:
- Magazines
- Scissors
- Glue Sticks
- Poster Board (2) (one blue, one black)
- "In The Sky" mini-book
- "What is in the sky?" worksheet

Description:

1. Ask the students to think about the kinds of things they observe in the sky during the day and at night.

2. Have them work in small groups to cut out pictures of things seen during the day and at night.

3. Come together as a whole group. Have students share their findings and glue them onto the large poster boards labeled "Daytime sky" (blue) and "Nighttime sky" (black).

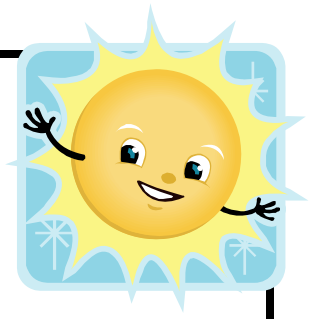
4. Have students illustrate their findings on the "What is in the sky?" worksheet.

5. Have students put together the "In the Sky" mini-book and then read with a partner.

What is in the sky?

Draw a picture of objects you see in the daytime sky and in the nighttime sky.

The Daytime Sky



The Nighttime Sky

In The Sky

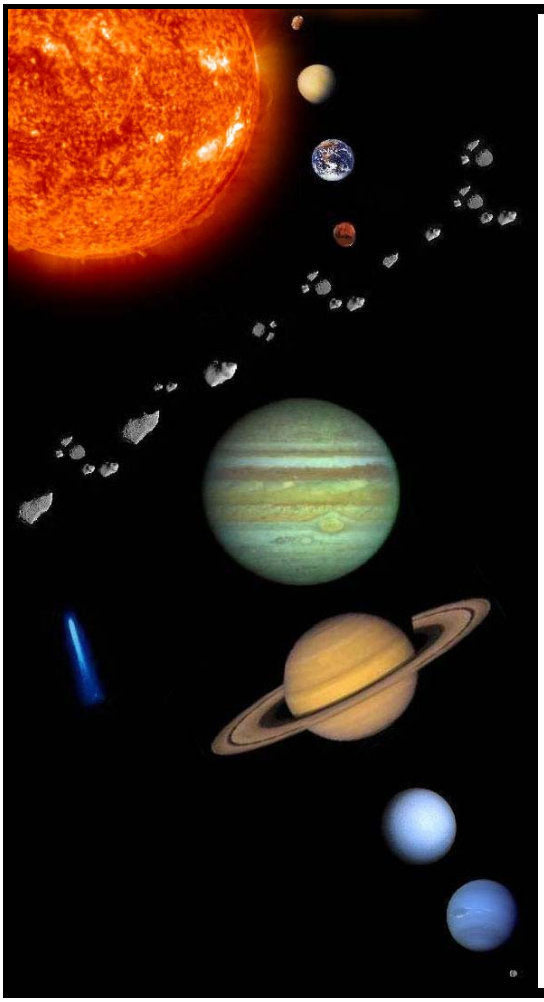
Name

What do we see in the sky? We see the sun and clouds in the daytime. But did you know there are many more objects up in the sky that we can see better at night?

- Comets
- Planets
- Stars
- Moon

At night we see the moon and the stars. Sometimes we even see other planets.

The stars and the moon are always in our sky. Our sun makes so much light that we cannot see the stars during the day, so they are only visible when the sun goes down.

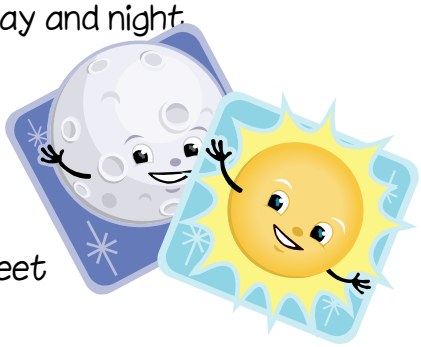


The other planets are always in the sky too!
It is very hard to see the other planets without a telescope because they are very far away. They are not as far away as the stars, but are much smaller and don't make their own light.

Why do we have day and night?

Activity 2: Why do we have day and night?

Goal: Students learn that the rotation of Earth causes the sun to **appear** to rise in the morning and set in the evening. Students should understand that it is actually the motion of Earth, not the sun, that causes day and night.



Materials: Flashlight
Globe
Drawing paper
Crayons
"Why do we have the day and the night?" worksheet

Description:

1. Ask students to remember and share some things they observe in the sky during the day and at night.

2. Ask if they can think of one object they ONLY see during the day? Help them come to realize that the **sun** can only be seen during the day. Let them discuss why this might be.

3. Put students in small groups and allow them to draw their ideas about why we only see the sun during daylight hours. You may choose to let them make a myth or story, or try to come up with a scientific explanation.

4. As a class, allow some students to share their ideas. Then introduce the concept that Earth rotates. Show students the globe, slowly rotating it counterclockwise.

5. Once students see this rotation, give one student the flashlight and mention that the globe will model Earth and the flashlight will model the sun. Turn on the flashlights and off the classroom lights.

6. Show that at any time, half of Earth receives light from the sun. That half experiences day. The other half does not receive light. That half experiences night. Ask students to tell which part of the globe is in day/night.

7. Rotate the globe counterclockwise. Ask them several more times which part of the globe is experiencing day/night? When they seem to understand, ask students to turn the globe so that Florida (or their state) is experiencing morning/ noon/ evening/ night. Have students complete "Why do we have day and night?" worksheet.

Extension Activity

Students can create their own globe by using a Styrofoam ball covered in tissue paper (blue and green) stick a dowel through the bottom and have students show how the Earth rotates and how the sun shines on the Earth.

Why do we Have Day and Night?

Draw the Earth in each box, and show the sun's effects.

The Earth rotates as it orbits the sun.

When your part of the Earth faces the sun it is daytime.

As your part of the Earth rotates away from the sun, it becomes nighttime.

ART CONNECTION

Daytime/ Nighttime Mural

Activity 3: Daytime/ Nighttime Mural

Goal:

This is a fun introduction to "Why can't we see the stars during the day?"

Materials:

Butcher paper
Construction paper
Crayons
Glue
Scissors
Glow- in -the- dark paint or stickers

Description:

1. Place butcher paper on the wall or on the floor where students can draw.

2. Have students draw a daytime scene that might include trees, buildings, and clouds. They can also add daytime images by drawing them on construction paper and then cutting them out and attaching them to the mural. Make sure they leave room for nighttime images.

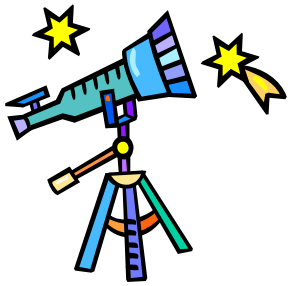
3. Have students add nighttime images, such as comets, stars and planets, using glow-in-the-dark stickers, paint, or markers.

4. When the mural is done have the students observe the objects during the day (with lights on). Turn the lights off and observe the objects seen in the night sky. Be sure to point out that these objects are around during the day but the sun's light is too bright for them to be seen.

Why Can't we see the stars during the day?

Activity 4: Why can't we see the stars during the day?

Goal: Students should understand that stars shine all the time. They can't be seen during the day because the light from the sun is much brighter (not because the sun is a bigger star, but because it is a closer star).



Materials: Flashlights (a few)
*This activity requires that you make the classroom dark and (if possible) that you take students outside.

Description:

1. Ask students to think about the objects they painted on their mural. What objects did they paint as nighttime objects? Are there any "nighttime" objects that they see during the day?
   *Note: Many may not have noticed that the moon is often visible during the day. This is a good time to point it out.

2. Ask students if they see any stars during the day. Students may mention that some stars become visible before it is completely dark.. Lead them to realize that our sun is a star.

3. Ask students if any other stars are visible while the sun is visible. Have them discuss why not.

4. Place the students in groups and give each group a flashlight. Explain to students that they will use the flashlights to model stars. They will observe the light from their "stars" under different conditions.

5. Ask the students how they could model nighttime conditions, without sunlight. Take suggestions, then make the classroom as dark as possible. Have students turn on their flashlights and make three observations about the light (e.g. brightness, length of beam, width of beam). You may choose to have them record these observations.

6. Ask students how they would model daytime conditions. If possible take students outside. If not, turn on all lights in the classroom. Have students turn on flashlights and make observations. Bring students back inside and collect flashlights.

7. Have students report their findings. Ask again why stars (other than the sun) are not visible during the day. Lead them to understand that although the stars are always there, the light from the sun is much brighter (because the sun is closer, not because it is a brighter star). We simply can't see the light from other stars during the day.

Section 2

Our Amazing star, the sun

Activity 5: What is a star?

Goal: Raise interest and increase content knowledge about the properties of stars.

Materials: Chart Paper divided in half
Markers
Resource books on stars
**Some we like are: How far is a star? By Sidney Rosen
Do stars have points? By Melvin and Gilda Berger
Seeing Stars by James Muridan
Black construction paper
White paint in a spray bottle

Description:

1. Hang chart papers and have markers at hand.

2. Recite "Twinkle, Twinkle Little Star" with the students.

Twinkle, twinkle, little star, How I wonder what you are!
Up above the world so high, Like a diamond in the sky.
Twinkle, twinkle, little star, How I wonder what you are!
*Actually titled "The Star," written by Jane Taylor.

3. Ask students what they think the author was thinking about when she wrote the poem. Ask students for their observations about stars. Ask students what they think stars are. Record any questions that arise about stars on the left side of the chart paper.

4. Read one of the books to the students and have them listen for any answers to the questions that were recorded on the chart. Record answers on the right hand side of the chart paper.

Writing Extension:

Have students make their own book about stars. Use black construction paper to make a cover. Spray watered-down white paint onto the construction paper to create a starry background for the cover of the book.

Sensing Stars

Activity 6: Sensing Stars

Goal:

Students should learn that stars produce heat and light (energy) by burning. They should realize that the sun is not a large star but that we feel its effects strongly because we are closer to it than we are to other stars.

Materials:

1 large candle (large wick)
2 or 3 tea lights
Matches

*You will light the candles and students will only be allowed near the candle while you are there.

Description:

1. Place large candle and one or two tea lights in areas around the classroom where the students will not have access (or you can pull the students into a large group away from candles). Save one tea light to use with the students.

2. Ask students to name things they learned about stars. Any answers are acceptable. Some students may remember the following:
   Stars are made of gas.
   Stars burn gas to produce heat and light (energy).

3. Tell the students they will be modeling stars using candles. Remind students of safety.

4. Turn off the lights. Have the students describe what they see. Light the candle. Now have them describe what they see. Have them describe the light source.

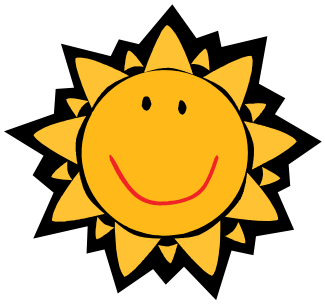
5. Let the students take turns placing their hand close to the candle flame and ask them what they feel (heat). Ask students to explain where the heat is coming from. (The candle is burning and it is hot.)

6. Have students explain how a candle is similar to a star. (Stars are burning and they make light and heat.)

7. Now light the other candles. When you finish, go back to the tea light. Ask one student to place her hand so that she can feel heat from the tea light. Ask her if she can also feel heat from the candles across the classroom (while she is still standing by the tea light). Ask your students why she cannot feel heat from the other candles. Is it because of the size of the candle? Her distance from it? You might have to explain that we can only feel the sun's heat because it is close. The other stars are too far away for us to feel their heat.

8. If you did "Why can't we see stars during the day?" this would be a good time to review that activity. Remind students that the light from the sun is much brighter to us than light from other stars because we are closer to it than to other stars. Ask the students to think about why we need the sun.

Our Sun



Activity 7: Our Sun

*You may need two days for this activity.

Goal: Students gain content knowledge about the sun.

Materials:

CD: Power Point Presentation: The Sun
Computer
Chart Paper
Markers
Pencils
Crayons
Yellow construction paper Sun for each student (or group)
"Why do we need the sun" worksheet
Optional : Resource Books on the sun (2-3 for each group)

Description:

1. Ask students what they already know/ want to know about the sun. Record their ideas in a KWL chart.

2. Show the CD: "The Sun" to the students.

3. Discuss with students what they learned and add this to the KWL chart.

4. Have students work individually or in a group to choose 4 facts they learned about the sun. You may have them use resource books. They should write these facts on their yellow sun.

5. Have students share their findings as a class.

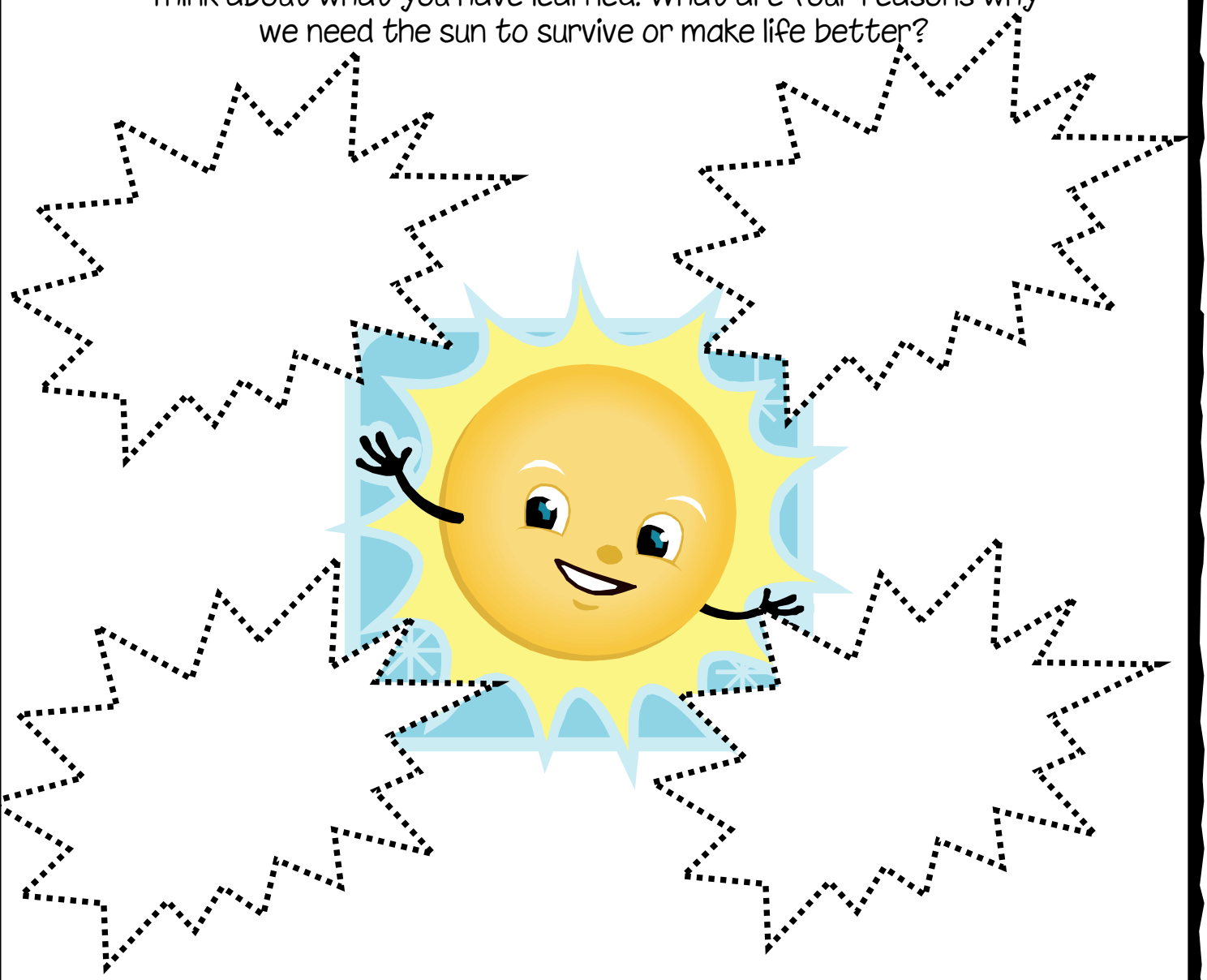
6. Students may complete the "Why do we need the sun?" worksheet.

Extension Activity

Work with students to record facts from their groups into a student created power point presentation on the sun.

Why do we need the sun?

Think about what you have learned. What are four reasons why we need the sun to survive or make life better?



What would happen if we didn't have the sun?

Suns Heat makes a Treat

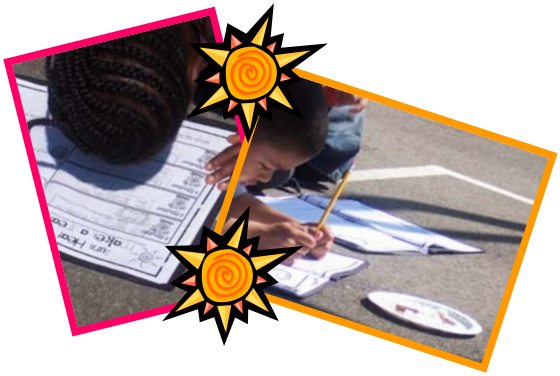
Activity 8: Sun's Heat Makes a Treat

*This activity is done outside, works best during warm months, and should be done in the middle of the day.

Goal: Students will make and record scientific observations about the effects of the sun's heat. They may also graph their observations.

Materials:

Graham crackers (one square per student)
Chocolate bars (one square per student)
Mini-marshmallows (4 per student)
Muffin cups (one per student)
Metal trays (to hold all muffin cups)
Paper
Pencil
Watch
Chart paper



Description:

1. Ask the students to describe how it feels when they stand outside on a sunny day. What do they sense? They may mention heat. Tell the students they will observe the effects of the sun's energy and record their observations.

2. Pass out the crackers, chocolate, marshmallows, and muffin cups. Each student should write his/her name on the side of one cup. Have students place a graham cracker, a small square of chocolate and 4 mini marshmallows into their muffin cups. Set the cups on trays and set the trays aside.

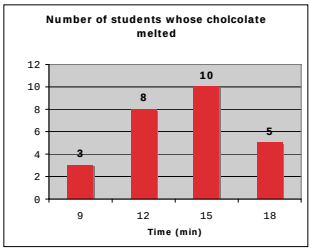
3. Explain to the students that the trays will be placed in the sun and the students will observe how their ingredients change. Ask students to predict changes they expect to see. You may want to record these predictions on the board. Students may say the chocolate will melt. Ask them how long they expect to wait before they can see changes in their ingredients. Have them discuss how they would know that the ingredients had changed and how they would record this. Help them come up with a system for recording their observations. Below is an example. Have students prepare their observation sheets.

My Observations	chocolate is warm	chocolate dents when touched	some chocolate looks melted
Time (min)			

4. Take students outside and place trays in the sun. Announce the time and have students begin observations. While students are observing ask the students to discuss what they feel. Light and heat should be two answers. Discuss how we are using the sun's heat to make a treat. The length of the experiment will depend on the temperature outside. You may want to let the students play and check back every 3 (or 5) minutes or so.

5. At the end of the experiment, ask students to report their times on a classroom chart. (Use the format they made, just add a row for each student's times). Did all of them observe changes at the same times? Why or why not? Ask students how their snack changed (melted due to the sun's heat). Compare this with their predictions. Ask students to brainstorm other ways we can use the sun's heat.

*** OPTIONAL : You can help the students create a graph with their data, for example a bar graph showing the number of students whose chocolate melted at each time (see right).



Suns Heat makes a Treat

Observe your treat and draw what you see after each time period.

3 Minutes

6 Minutes

9 Minutes

12 Minutes

What did the sun do to the treat?

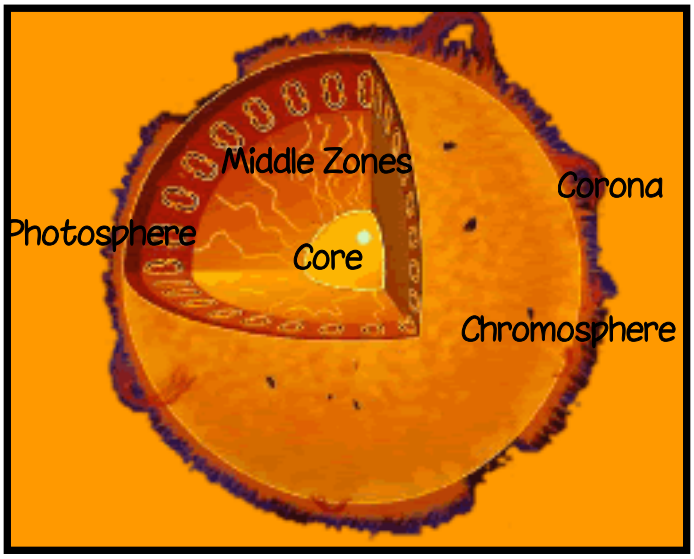
Layers of the Sun

Activity 9: Layers of the Sun

Goal: Students will make a model of the sun that will show the different layers.

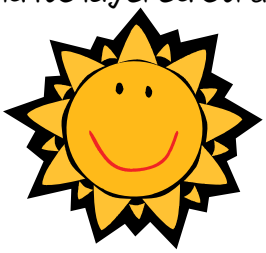
Materials:

Modeling Clay or Play Dough
(white , yellow, orange , red, pink)
Large, clear heavy duty straws
Science Journal: "Sampling the Sun"
Science Journal: "Parts of the Sun"



Extension Activity

This activity could be modified by using different flavors and colors of Jello to offer an edible way to learn about the sun and its layered structure.



Description:

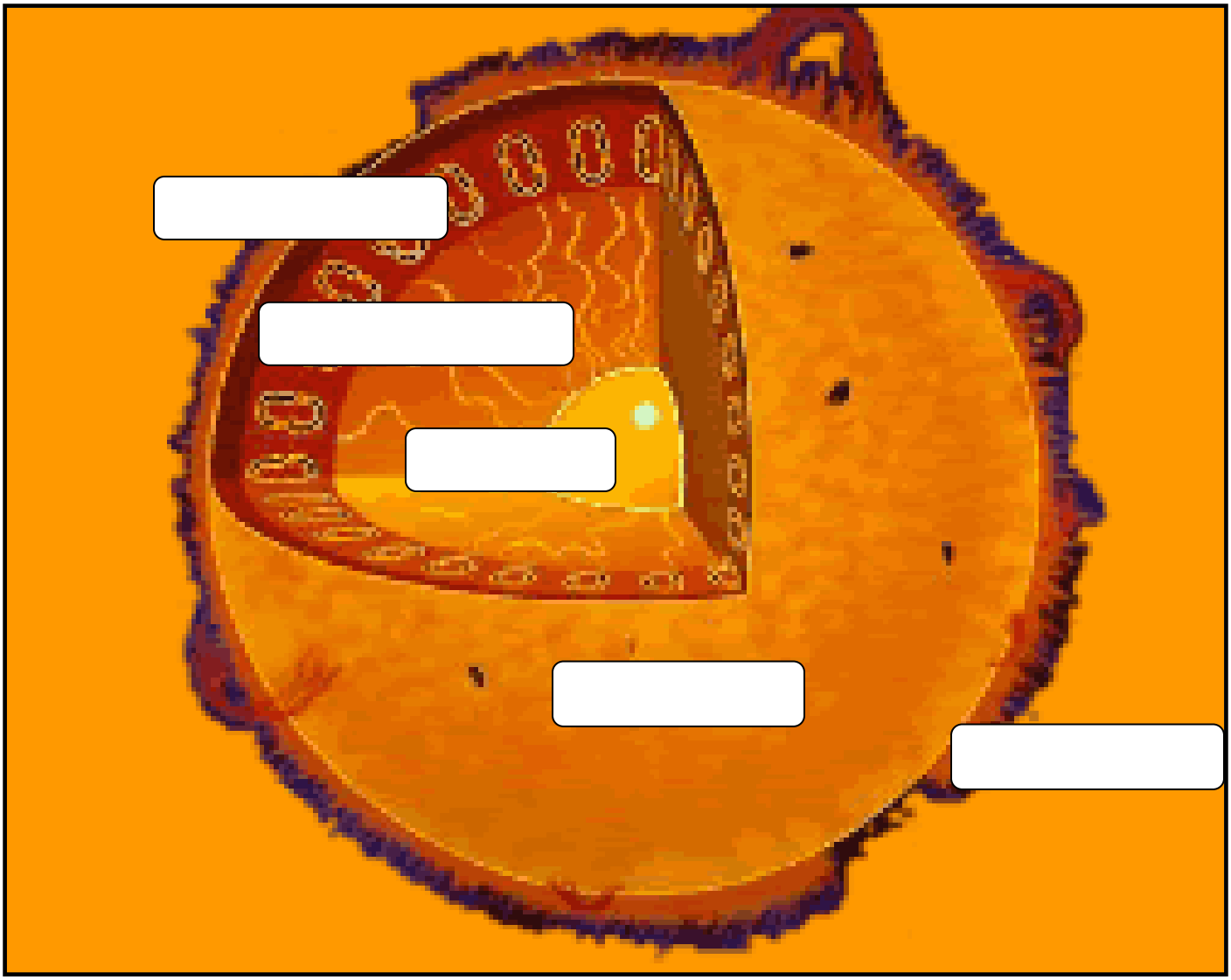
1. Ask students to name one thing they remember about the sun. Does it have layers? Can anyone remember the names of the layers?
2. Assign teams and pass out newspaper and clay. You may choose to give students one color at a time.
3. Students should make a small clay ball, about the size of a marble, to represent the core. Next have them add a different color of modeling clay around the ball to form a larger ball about twice the size of the original. Continue this process adding one color after another until all five colors have been used. It is easiest if you assign the order of colors, so that all students have the same colored layers.
4. Pass out straws and explain to the students that they will take core samples of their sun. Students should poke the large straw into the center of their sun and pull it back out. There should be a core sample with all 5 colors of clay inside the straw. Students may need help with this depending on the sturdiness of the straw. The clay models can also be cut in half with a plastic straw to show the different layers.
5. Discuss the concept of layers and review the layers of the sun. Introduce the sun vocabulary (core, middle zone, photosphere, chromosphere, corona) relate the layers in their model with the layers found in the sun.
6. Have the students draw a picture of the layers they see on the worksheet "Sampling the Sun". Encourage them to use the vocabulary to label the different layers of the sun. You may then have them label the correct layers of the sun in "Parts of the Sun".

Parts of the Sun

Color and label the parts of the sun

Corona Chromosphere Middle Zones

Photosphere Core



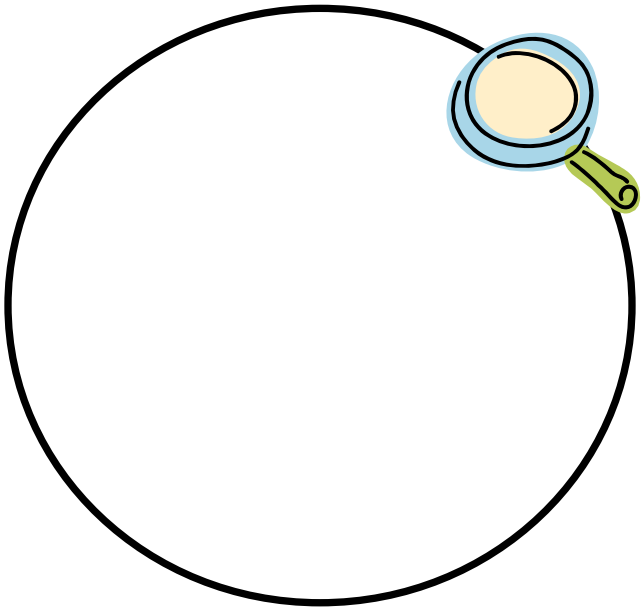
What are other objects that have layers? Name three.

1._____ 2._____

3._____

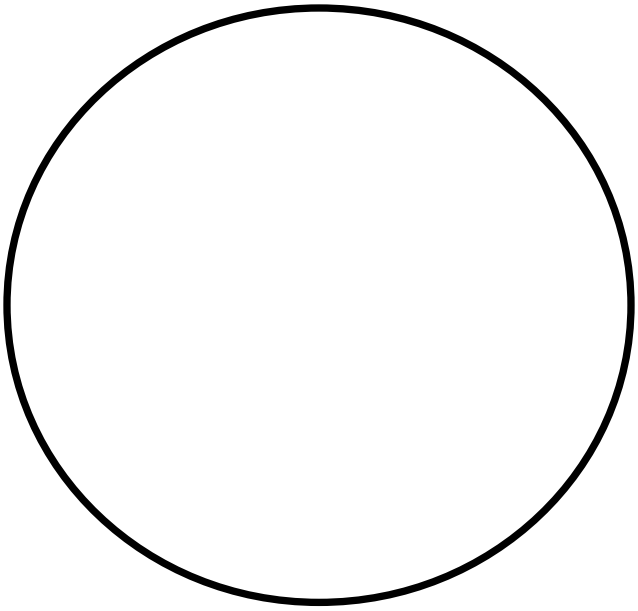
Sampling the Sun

Use your straw to take a core sample of your sun.
What do you see?



What do you see in your core sample?

Draw and label each layer you see.



What is the color of each layer?

Layer 1 _____
Layer 2 _____
Layer 3 _____
Layer 4 _____
Layer 5 _____

ART CONNECTION

Papier Mache

Activity 10: Papier Mache Sun with stars

Goal: This is a fun way to end the sun and stars unit.

Materials:
Large punching balloon
Newspaper
Glue
Water
Red, yellow, and orange tissue paper
Aluminum foil muffin cups (various sizes)
Fishing line

Description:

1. Blow up the large punching balloon. Have students use strips of newspaper and a mixture of glue and water to create a papier mache' sun. Let dry overnight.

2. When the sun is dry use the same procedure to add red, orange and yellow tissue paper to it. Solar flares can be added by gluing tissue paper to the edges of the sun to represent the 3- dimensional flares.

3. Hang the sun in the center of the classroom with the fishing line. During later activities students will make planets.

4. Use fishing line to hang aluminum foil muffin cups around the edge of the classroom to represent stars.

***Throughout the unit you can add to your hanging solar system

Section 3
Our Planets

Activity 11: The Planets

Goal: Generate excitement about planets unit and increase content knowledge about solar system bodies

Materials:

Chart paper
8 large circles cut from construction paper
Markers
Crayons
Resource books

Description:

1. Ask students what they already know/ want to know about the planets in our Solar System. Record their ideas in a KWL chart.

2. Place the students into 8 groups and assign them each a planet. Give each group resource books with information about their planet. Have them decide what their planet looks like and how they would color it. Also have them pick out four identifying features of their planet.

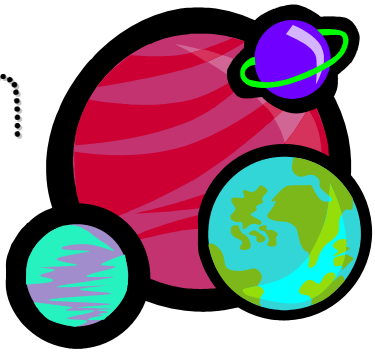
3. Hand out the construction paper planet for each group, and make sure each group has an accurate idea of how to color their planet. Ask students to color planets and write their four pieces of information on the back.

4. Let the students present their planets. Collect the planets and staple them together to make a class book of the Solar System.

Extension Activity

Have students write their four identifying features down on index cards and try to guess which planet belongs to each index card.

Our solar system



Activity 12: Our Solar System

Goal:
Students gain content knowledge about the solar system.

Materials: Computer
CD: Power Point Presentation: Our Solar System
My Pocket Planetary Guide

Description:

1. Ask students to remember and share a favorite piece of information about one of the planets.

2. Tell students they will be making their own planetary guide and pass out My Pocket Planetary Guide worksheets.

3. Show "Our Solar System" CD, pausing to allow students to fill in information on their sheets.

4. Have student use resource books on planets to record any information they missed.

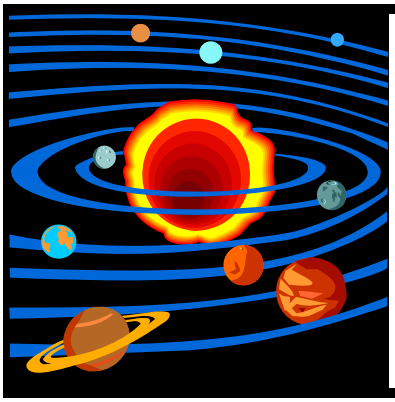
5. Let students cut out planet strips and staple guide together.

Teacher Background Information

A solar system consists of the sun, the planets, their moons, and smaller objects like comets and asteroids.
Planets are large objects that orbit around the sun. In our solar system we have eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. Each of our eight planets has very different characteristics that make each one unique.

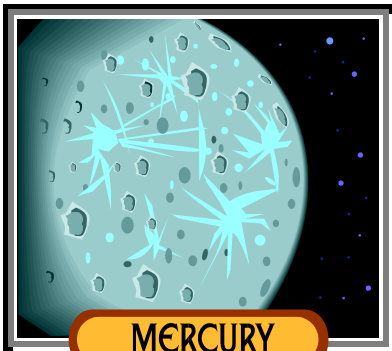
My Pocket Planetary Guide

Have students use resource books to look up facts on each planet. After each planet is studied have the students fill in the facts for that planet. After all of the planet facts are filled in have the students cut out each strip and staple together to make a book. This pocket sized fact flipper is ideal for a quick reference to facts about the planets.



Our Solar System

Name: _____



Rocky Midget or Gas Giant? _____
Distance from the sun _____
Number of moons _____
Interesting Fact:
_____
_____
_____
_____

Rocky Midget or Gas Giant? _____
Distance from the sun _____
Number of moons _____
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Number of moons _____
Interesting Fact:
_____
_____
_____
_____

Rocky Midget or Gas Giant? _____
Distance from the sun _____
Number of moons _____
Interesting Fact:
_____
_____
_____
_____

JUPITER

Rocky Midget or Gas Giant? _____

Distance from the sun _____

Number of moons _____

Interesting Fact:

_____

_____

_____

_____

SATURN

Rocky Midget or Gas Giant? _____

Distance from the sun _____

Number of moons _____

Interesting Fact:

_____

_____

_____

_____

URANUS

Rocky Midget or Gas Giant? _____

Distance from the sun _____

Number of moons _____

Interesting Fact:

_____

_____

_____

_____

NEPTUNE

Rocky Midget or Gas Giant? _____

Distance from the sun _____

Number of moons _____

Interesting Fact:

_____

_____

_____

_____

The Great Pluto Debate

Activity 13: The Great Pluto Debate

Goal:

Students learn how concepts in science change as new data are acquired. They participate in scientific debate and interpretation of data. They gain content knowledge about what constitutes a planet, and about the properties of Pluto, no longer classified as a planet.

Materials:

"The Great Pluto Debate" reading
Pluto and the Kuiper Belt Fact Files
"The Great Pluto Debate" worksheet
Pencils

Description:

1. Ask students what they have heard about Pluto. Do they think it is a planet? Why or why not?

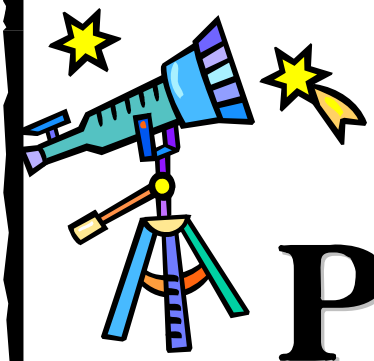
2. Have students work together to read "The Great Pluto Debate" and/or Pluto and the Kuiper Belt Fact Files.

3. Ask students to choose a position about whether or not Pluto is a planet. (Alternately, you may assign them a position.) They should work with their group to pick four or five pieces of information to support their position.

4. Allow students to share their pieces of information. You may choose to set up a debate during which students question and support this information.

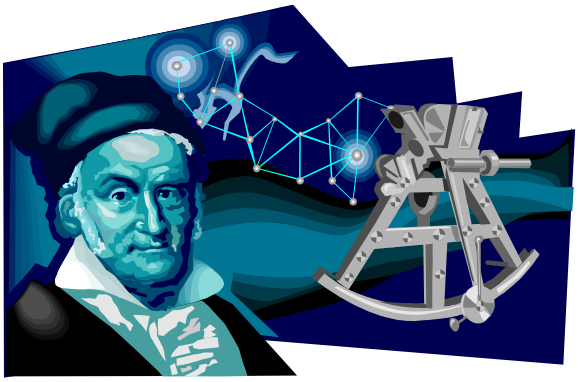
5. After students finish, share with them the recent decision of a panel of scientists (the International Astronomical Union) to declassify Pluto as a planet. A solar system planet is now defined as a round body orbiting the sun that has cleared out any other bodies in its orbit. Pluto is one of many bodies in its orbit, so scientists decided it should not be called a planet. You can support this activity with current websites or articles to illustrate how scientific discovery is constantly changing.

http://solarsystem.nasa.gov/planets/profile.cfm?Object=KBOs
http://www.enchantedlearning.com/subjects/astronomy/planets/pluto/
http://www.enchantedlearning.com/subjects/astronomy/



The Great Pluto Debate

It has long been debated whether Pluto is a planet or rather one of the many objects in the Kuiper belt. What do you think? Work with your team to gather facts to support your scientific opinion.

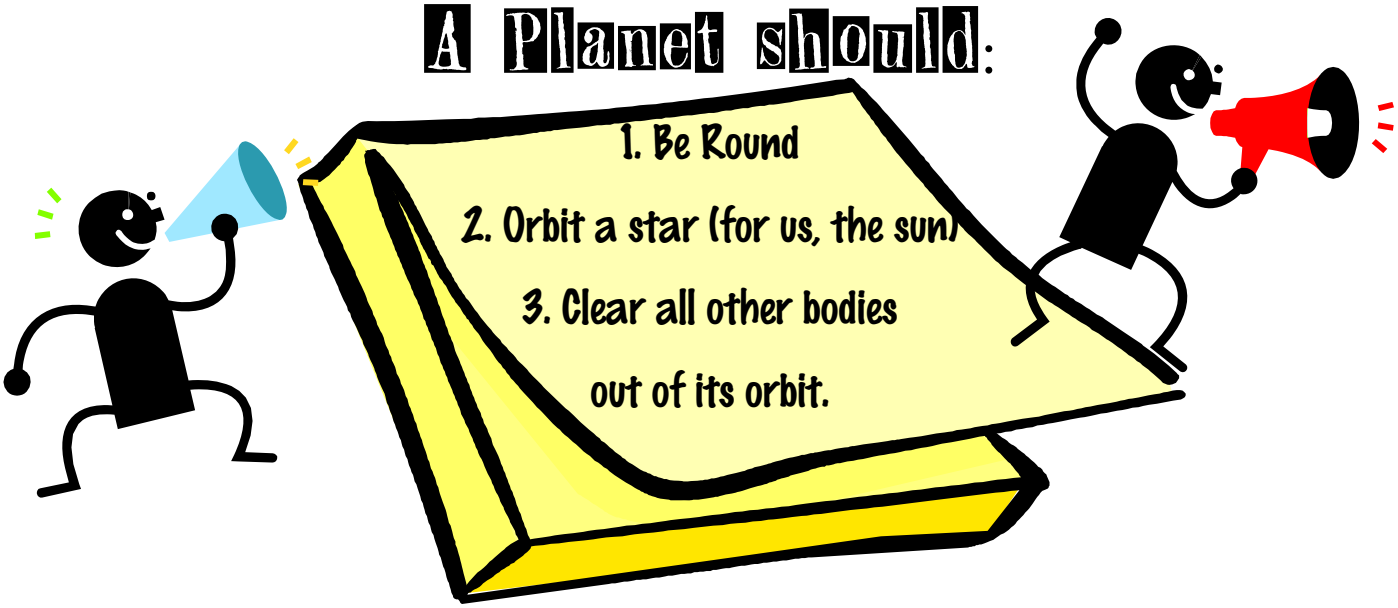


The Great Pluto Debate

A number of astronomers dispute whether Pluto, discovered in 1930, should really be classified as a planet. It is very different from the other eight planets in our solar system. It is 1/5 the mass of our moon, its orbit around the sun is tilted, and it has other bodies in its orbital path.

Many astronomers believe Pluto should be classified only as a Kuiper (koy-pur) belt object, part of an array of icy debris left from the formation of our solar system some 4.5 billion years ago. In 2006 the International Astronomical Union made a formal definition of a planet.

A Planet should:



Pluto has other bodies in its orbit, so astronomers said it should not be considered a planet.

It is now called a "dwarf -planet" just like Ceres, an object in our Asteroid belt. Not all astronomers agree. Some think Pluto should still be called a planet. So the debate continues…is Pluto a planet or simply an object in the Kuiper belt?

Fact File

Kuiper Belt Objects

The Kuiper (koy-pur)belt is a region beyond the planet Neptune in which at least 70,000 small, icy, slow-moving objects orbit. It is located about 30 to 50 Astronomical Units (AU) away from the Sun. In this region the planet-building process was stopped before any large objects (planets) were formed. There are only primitive remnants from our early solar system, formed 4.5 billion years ago.

Pluto and Charon (Pluto's moon) may be extremely large members of the Kuiper belt. If this is true, Pluto cannot be considered a planet at all.

** The Earth is 1 AU away from the Sun.

Fact File

Pluto

Pluto was considered to be the ninth planet, and was usually the farthest planet from the sun in our solar system. It was the smallest planet in our solar system and the last to be discovered. It is even smaller than many of the other planets' moons, including our moon.

Pluto is the only planet in our solar system that has not been visited by spacecraft yet. NASA currently has a mission headed for Pluto, which will arrive in the year 2015.

Its uncommon orbit, the presence of other bodies in its orbit, and its small size led scientist to believe that it might be part of the Kuiper belt objects. In 2006, astronomers changed Pluto's classification from planet to dwarf-planet, so our solar system has only eight planets now.

Information adapted from
www.enchantedlearning.com

Wear the Asteroid Belt!

Activity 14: Wear the Asteroid Belt! (Modified from www.nasa.org)

Goal: Students increase interest and gain content knowledge about the asteroid belt in this fun activity.

Materials:

Aluminum foil
Fish tank gravel
Small pebbles
Sand or glitter in a shallow tray
Elmer's glue
Paint brush
Index cards
Hole Punch
Markers
Paper clips
Newspapers to cover desks
Posterboard cut into belt sized strips 1 for each student
"Asteroid Fact sheet" worksheet
Asteroid Belt writing sheet

Description:

1. Set up stations with supplies: Aluminum foil, gravel, sand, pebbles.

2. Ask students to share what they remember about the asteroid belt. Tell them that they will each make an asteroid belt that they can wear. On this belt they will replicate the objects found in our asteroid belt.

3. Have students paint their posterboard belt with Elmer's glue. Dip the glue-painted belt into the tray of sand until the belt is covered. Let dry 1 hour.

4. Have students pick out a few pebbles, gravel and aluminum foil pieces students can roll these into small misshapen balls. They can do this while you glue their rocks onto their belt.

5. Using the asteroid fact sheet they can write down interesting facts on index cards. These index cards can be added to the holes of their belt using paper clips.

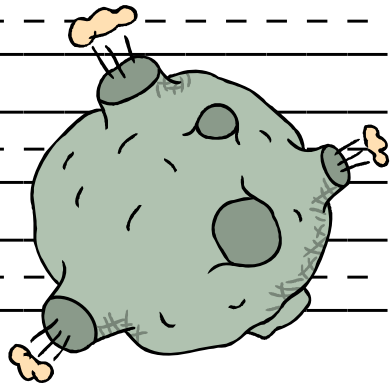
6. Once all the pieces are glued onto their belt and their fact cards are attached they can wear their fashionable work of art.

Writing Extension

Students can write a persuasive paragraph about how they believe the asteroid belt formed. Is it remnants of a planet that never formed or is it just space debris that is trapped by Jupiter's gravity?

Asteroid Belt

What do you think?
Missing planet or space debris?



Asteroids

An asteroid is a large rock in outer space. Some asteroids can be very large (1000km), while others are as small as a grain of sand. Astronomers group asteroids into different categories based on the way they reflect sunlight.

The main asteroid belt is located between Mars and Jupiter. It is divided into an inner belt (closer to Mars) and an outer belt (closer to Jupiter). Asteroids in the inner belt are made mostly of stony material and metal, like our Rocky Midget planets. The outer belt is farther from the sun and wasn't heated as much. Asteroids in the outer belt may have more carbon and ice.

Asteroids are materials left over from the formation of the Solar System. These materials never became a planet because they were so close to Jupiter's strong gravity. Sometimes asteroids, or parts of asteroids, get kicked out of orbit and reach Earth. We call these meteorites.

For further information please visit:
http://www.kidsastronomy.com/asteroid.htm

ART CONNECTION

Activity 15: Papier Maché Planets

Goal: This is a fun way to end the planets unit.

Materials:
8 balloons
Newspaper
Glue
Water
Red, blue, orange, yellow, green, tan, gray tissue paper
Fishing line
Craft wire
Planet Name labels

Description:

1. Blow up the balloons. Have students use strips of newspaper and a mixture of glue and water to create 8 papier mache' planets. Let dry overnight.

2. When the planets are dry use the same procedure to add appropriately colored tissue paper to them. Rings can be added by gluing tissue paper to craft wire.

3. Hang planets around the classroom with fishing line. If students already made the sun, place the planets in the appropriate order from the sun. You won't be able to make distance from sun (or size of planet) to scale in a classroom.

4. To represent the asteroid belt, use aluminum foil and brown paper bags or tissue paper to make large misshapen forms. Hang between Mars and Jupiter.

Cut the words out and use them to label your Papier Mache Solar System

sun

Mercury


Venus


earth

Asteroid Belt


jupiter


saturn

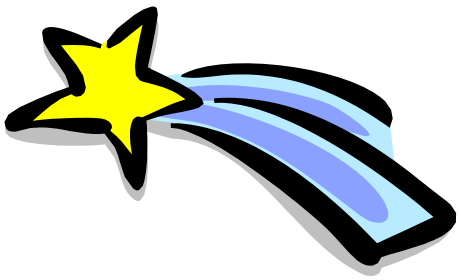

uranus


neptune

comets

Section 4

Comets



Activity 16: Crazy Comets

Goal: Students learn the three main parts of a comet. They also discuss models and how they are used in science.

Materials:

Styrofoam ball (1 per student)
Cotton balls (2 - 3 per student)
Tissue paper
Elmer's glue
Overhead of comet with nucleus, coma, and tail
Optional: "Comets" worksheets (3)

Description:

1. Ask students to share what they think they know about comets. Have any seen a comet? What did it look like? Show the overhead of a comet.

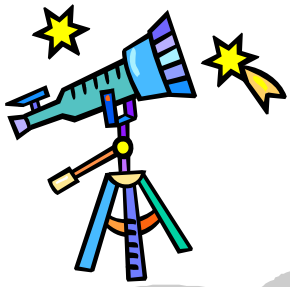
2. Tell students they will each make a model of a comet. A model of a comet will show some properties of comets, but not all. Ask students how they would model a comet. What properties would they want to show?

3. Explain that they will use a Styrofoam ball, tissue paper, and a cotton ball. Each of these things models a different part of a comet. Ask students to look at the overhead and guess which part each material will model. They don't need to know the names at this point.

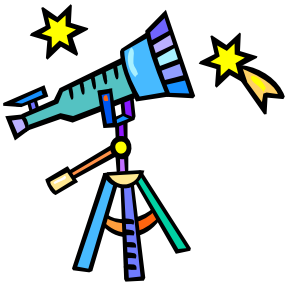
4. Distribute tissue paper, a Styrofoam ball, and a cotton ball to each student. Have students wrap the tissue paper (tail) around the Styrofoam ball (nucleus) and twist to tighten. Pull the cotton balls (coma) apart and then glue onto the tissue paper. As the students add each part, write the name on the board.

5. After the comets are finished, review the parts with the students. The comets can be hung from the ceiling, just beyond Neptune in the outer edges of the classroom solar system.

6. Optional: Allow students to begin the "Comets" worksheet by drawing their comet. You may choose to save the interesting facts section for later in the unit.



Comets



Comets can consist of three main parts:
a **nucleus**, a **coma** and a **tail**.
The frozen nucleus is the central permanent part of a comet. It is made of ice and dust.
The coma is a dusty cloud that forms around the frozen nucleus as the comet orbits closer to the sun and begins to heat up.
The comet's tail is formed when the **solar wind** forces the gas and dust of the coma away from the sun. The comet's gases may be blown behind the comet into tails that can be as long as 90 million miles.
Comets have two tails that flow behind the comet as it orbits around the sun, one made of gas and another made of dust.

1. What are the three main parts of a comet?

_____ _____ _____
_____, _____ and _____.

2. What is the nucleus of the comet made of?

_____
_____
_____

3. How is the comet tail formed?

_____
_____
_____

4. Can a comet have two tails?

_____
_____
_____

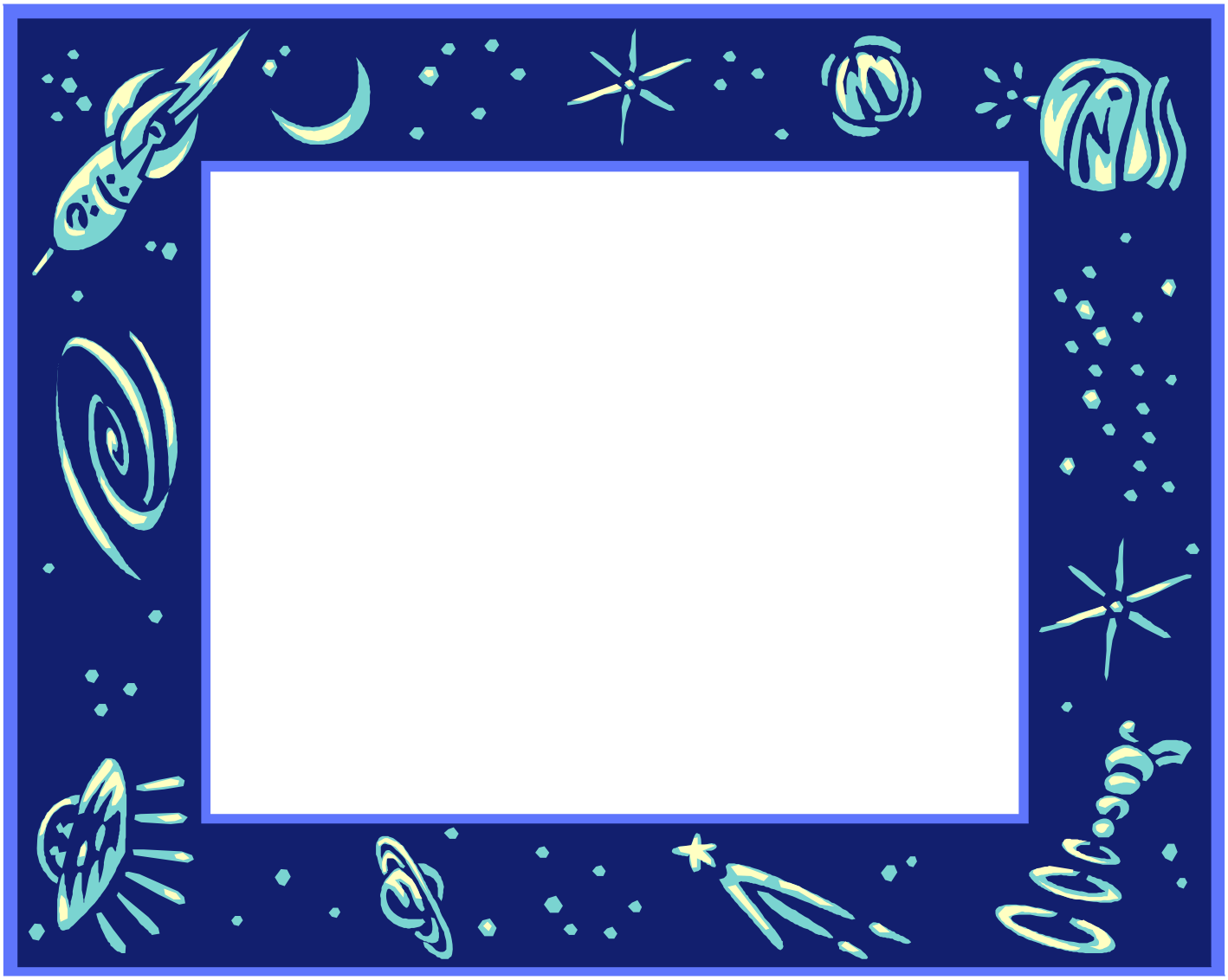
5. What are the two tails made of?

_____
_____
_____

Comets

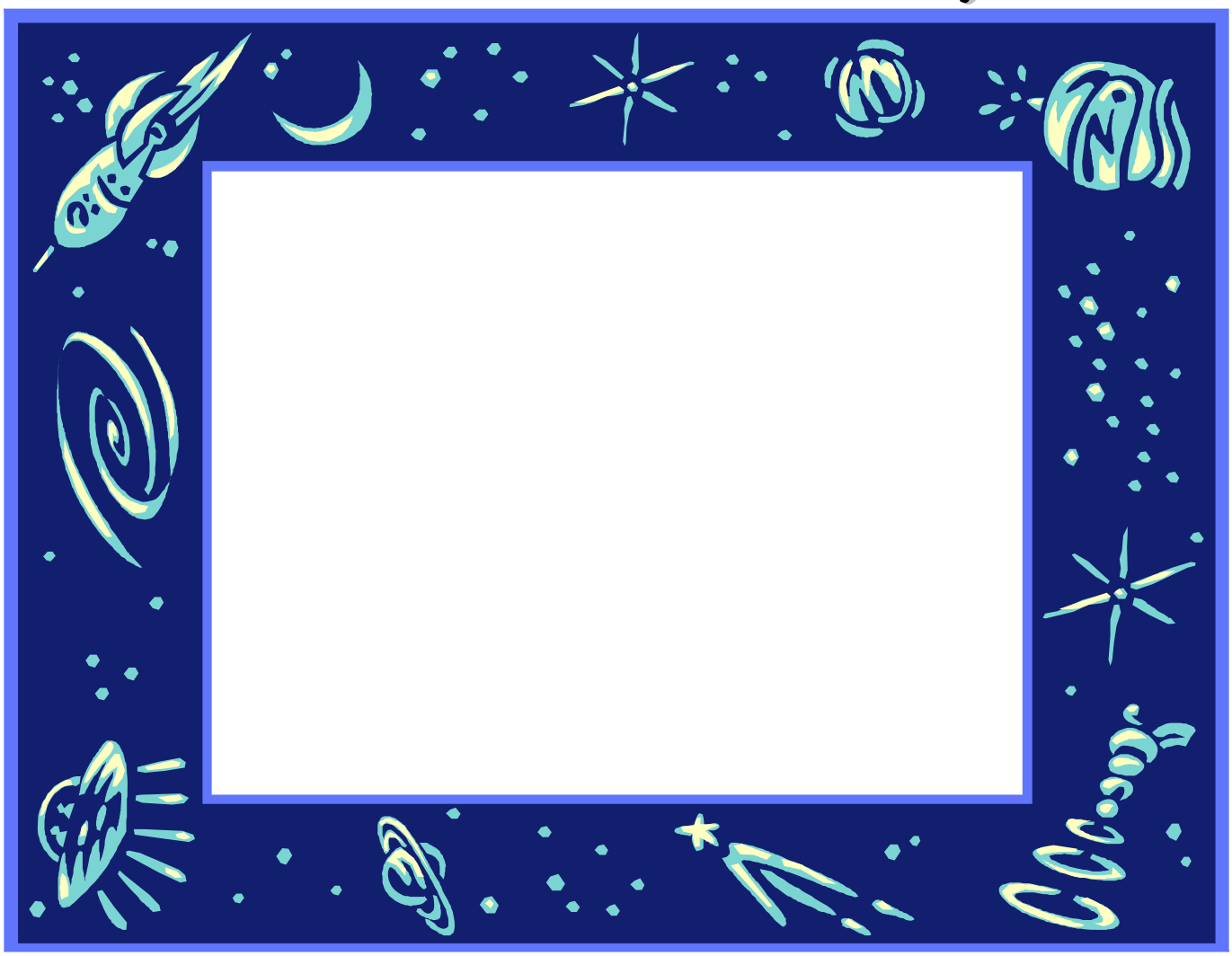
Draw a picture of a comet.
Label the three main parts.

Tail	Nucleus
Coma	



Comets

Draw a picture of a comet.
Label the three main parts.



What are three interesting facts you learned about comets?

Why are Comets Bright?

Activity 17: Why are comets bright?

Goal: Students learn that, unlike stars, comets do not produce their own light, but reflect light from the sun.

Materials:

**For each group of students (or you can do just one as a demonstration):
Flashlight
Shoebox
Hole punch or pencil (to punch holes in box)
Foil (enough to ball)
Yarn
Scotch tape

Description:

1. Ask students to describe how comets look in the sky. Are they dark or do they seem to glow? What makes them glow? Tell students they will make a model to show how comets appear to glow.

2. Pass out the shoeboxes. You may want to punch holes ahead of time, or allow students to punch them. They should both be on one end of the shoebox.

3. Pass out foil and have students create a ball about the size of a golf ball.

4. Students should tie some yarn around the aluminum foil ball and tape it in place. Then, tape the yarn to the top of the box so that the foil ball hangs in the shoebox about ½" from the bottom.

5. Cover one of the viewing holes with an index card. Have the students view the aluminum foil ball (comet) through the open hole of the shoebox. (Remind students to use their hands to cover around their eye so they don't get any classroom light in the viewing box.) Ask the students if they can see the comet.

6. Have the students take the index card off of the other opening and shine a flashlight in it. The students can take turns viewing the aluminum foil comet through the viewing hole. Have the students describe what they see. The comet should be illuminated by the light from the sun (flashlight).

7. Explain to the students that this activity models how comets seem to glow. They become visible in the night sky because they reflect the light of the sun. (Remember, though our part of the earth is turned away from the sun at night, the sun is still there and other objects receive its' light.)

Cooking up a Comet

Activity 18: Cooking up a Comet

* Adapted from NASA curriculum

Goal: Students gain content knowledge about the composition and physical properties of comets. They learn about the NASA STARDUST Mission and how scientists revise theories as they gain new information.

Materials:

Large, wide mixing bowl
Large wooden spoon for stirring
Blender
Heavy rubber gloves
Protective goggles
Cloth or paper towels
Overhead projector
Plexi-glass or cling wrap to cover overhead projector
Overhead of Comet Wild 2
Hair dryer (optional)
"Cooking up a Comet" worksheets (2) (optional)
"Comet Predictions" worksheet

Comet ingredients:
- 5lbs. **Dry ice pellets** (frozen carbon dioxide)
- 3 cups of water (comets contain lots of frozen water)
- A few squirts of windex (represents ammonia, which is frozen in comets)
- A handful of sand (represents rocky material, including grains collected by STARDUST)
- Soil (represents organic material, the building blocks for life)
- 1 can of soda (represents phosphorous; necessary for life as know it)

CAUTION

Dry ice is -79 degrees Celsius. Anything more than a brief exposure to the skin will cause burns. Anyone handling dry ice should wear protective heavy rubber gloves. Students shouldn't handle the dry ice. This is meant to be an observational lesson only! You should practice this lesson ahead of time to ensure a safe and accurate demonstration for the students.

Description:

1. Ask students if they have ever heard of the NASA STARDUST Mission. If so, what have they heard? Let them know the goal of the mission was to learn more about comets by flying by Comet Wild 2 (pronounced "Vilt 2"). Ask students what they would want to do to learn about a comet, if they were able to travel to one.

2. While you set up supplies, have students observe overhead of composite image of comet Wild 2 taken by the NASA STARDUST spacecraft. One of the things NASA scientists did was take pictures of the comet. Ask students to imagine they are the first scientists to see this image. How would they describe it?

Share with them some observations of NASA scientists:

- Hamburger shaped body about 4.5 km across
- Surface features unlike those seen on any other solar system body
- Tall pinnacles
- Flat topped mesas
- Sink-hole-like depressions with flat floors and vertical cliffs
- Crater like depressions surrounded by mysterious halos with over-hanging cliffs

3. Tell the students that they will make a comet model to compare with Wild 2, using ingredients really found in comets. Remind them that they already made a model of a comet. Ask them to observe how this model is different.

4. Once you are set up, begin to add ingredients. Discuss with students the significance of each ingredient. Add ingredients as follows:

Pour 2 ½ cups of water into the mixing bowl. Sprinkle in some sand, soil, and two squirts of ammonia (windex). Add the cola, mixing as you pour.

Put on the heavy rubber gloves and protective eye goggles. Use the blender to finely chop up the dry ice. Be careful not to freeze the blender by putting in too much at once. The dry ice should be the consistency of snow.

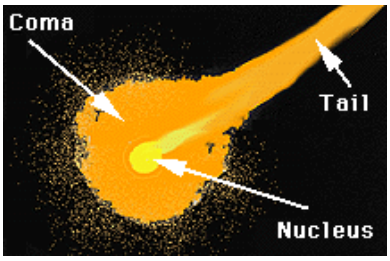
** Do not leave any dry ice in the blender as it will cause the blender to freeze up. If the blender freezes, use the hair dryer to thaw it.

Add 2 ½ cups of ground dry ice to the mixture. Stir carefully. Carbon dioxide gas will form as you stir (because the frozen carbon dioxide is warming up to room temperature). The mixture will get slushy. Keep stirring for a few seconds while it thickens.

Use the mixing spoon to push the slush off of the sides of the bowl and into the bottom. Reach in (with your gloved hands) and start packing the slush into a snowball. Keep packing and forming until you have a big lump. Add water to help it stick together.

5. Observe the behavior of your comet's nucleus. For the entire class to watch as the comet sublimes (turns from solid to gas without being a liquid) place some plexi-glass on top of an overhead projector. Place the comet onto the plexi-glass.

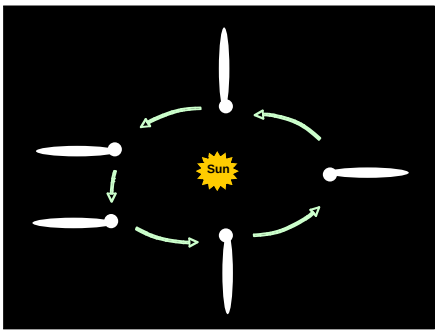
6. Have students observe the gases that sublime from the frozen nucleus to form a coma. Have students take turns blowing the coma to form a tail. Discuss the parts of a comet: nucleus, coma, and tail.



7. Remind students that the ingredients used to cook up this comet are representative of our current understanding of the components found in actual comets: frozen water, frozen carbon dioxide and other frozen gases, very small bits of rock, organic (carbon based) substances, and phosphorous. As the comet melts you can see little jets of gas coming off the comet. In space this is called "outgasing" and can actually affect the movement of the comet. Compare and contrast your model with the image of comet Wild 2.

8. If the comet is no longer subliming dramatically, blend up a little more dry ice and dump it on the plexi-glass around the nucleus.

9. Explain to students that their breath represents the solar wind, which streams from the sun in all direction at all times. When this wind hits the coma, it blows gas and dust away from the wind, like in the drawing below.



10. As you clean up, have students do one or more of the worksheets provided.

Cooking up a Comet

What did the comet look like?

What did you observe?

What happened to the comet as it warmed up?

How did the solar wind affect the comet?
What did you see because of it?

What have you learned about comets?

Cooking up a Comet

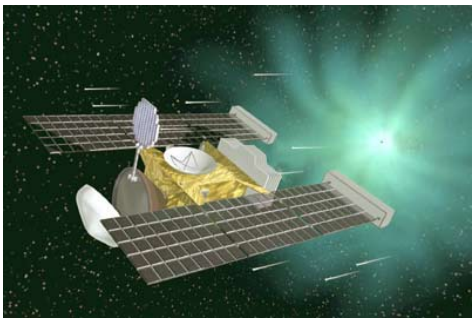
When we created our classroom comet we used items found at the store. What do these items represent in a real comet found in space?

Dish: _____ **Recipe** Serves: _____

1. Dry Ice	1. _____
2. Water	2. _____
3. Sand	3. _____
4. Cola	4. _____
5. Windex	5. _____
6. Soil	6. _____

What have you learned about comets and their ingredients?

Mission: STARDUST



Activity 19: Mission: STARDUST

Goal: Students use listening, reading and writing skills to learn more about the NASA STARDUST mission.

Materials:
Stardust Mission article
Comets (made in earlier the "Crazy Comets" activity)
Yarn
"STARDUST Mission" strips worksheet
Scissors
Scotch tape
Computer
Power Point Presentation: Our Solar System (slides 13-18)

Description:

1. Ask students to remember and share one piece of information about the NASA STARDUST Mission.

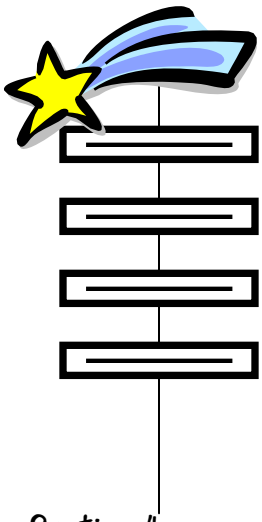
2. Tell students they will be making "Information Mobiles" with their "Crazy Comets" and "STARDUST Strips." Explain that they will cut out the 4 strips and record a piece of information on each of them. They will then attach these to a piece of yard and glue them to their "Crazy Comets."

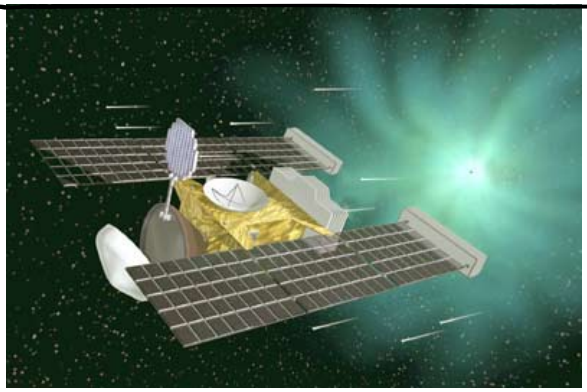
3. Pass out STARDUST Strips. Allow students to cut them out.

4. Play slides 13-18 of the DVD Power Point Presentation: Our Solar System. Ask students to listen for two pieces of information and record them on two strips.

5. Pass out the STARDUST article that fits the reading level of your students. Ask them or work together in groups of three to four to read the article. Have them choose two more pieces of information to record on their Stardust Mission strips.

6. Have them attach the strips to a piece of yarn with tape. They can then tape them to the Styrofoam comets made earlier in the unit. You may choose to hang these from the ceiling.





Stardust Mission

In 2004, the **NASA Stardust** spacecraft flew within 150 km of the nucleus of **Comet Wild 2**. It took pictures of the nucleus and captured dust samples to return to Earth for analysis. The primary goal of the mission was to learn more about comets.

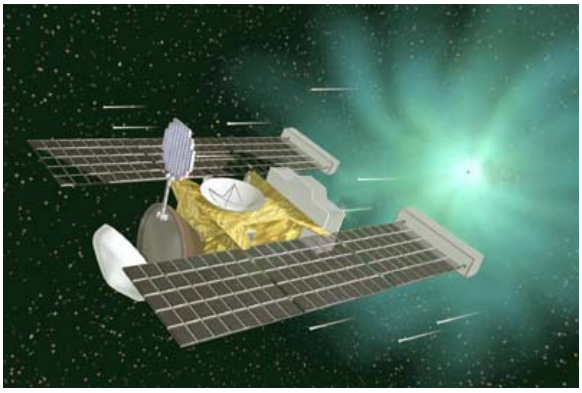
A comet is made of a frozen **nucleus** and sometimes a coma and a tail. When a comet comes close enough to the sun to be warmed, the frozen nucleus heats up and loses some of its material through the process of **sublimation.** This happens when a solid becomes a gas without first melting to a liquid. The escaping gases push the dust particles out of the solid nucleus. The dust and gas form a fuzzy cloud around the nucleus, called a **coma.**

The **solar wind** is made of charged particles streaming from the sun. When this "wind" reaches the coma of the comet, it pushes the gas and dust away from the nucleus to form **tails.** These tails sweep out into space, always pointing away from the sun. Some tails may be 100's of millions of kilometers long!

After about 1,000 trips past the sun, a comet loses most of these frozen materials and no longer forms a coma. Once this happens the comet no longer creates the long beautiful gas and dust tails that we can sometimes see in the night sky.

Unlike the planets, most comets have not changed very much since the formation of the solar system. Dust from comets may hold the key to our understanding of the early development of the solar system. Since Wild 2 has passed the sun only a few times, it still has most of its ancient dust and gases, making it an ideal choice for study. Scientists are just starting to learn about the dust grains returned by the Stardust spacecraft.

Information adapted from
Article Source: http://stardust.jpl.nasa.gov/science/wild2.html
http://www.windows.ucar.edu/tour/link=/space_missions/comets/stardust.html



Stardust Mission

A spacecraft named Stardust returned to Earth in January 2006 after a 7 year-long mission. Stardust flew past a comet and grabbed some pieces of dust from the comet. The spacecraft returned those dust particles to Earth. Scientists have started to study them. The scientists hope to learn about comets, and about the history of our solar system, from the comet dust.

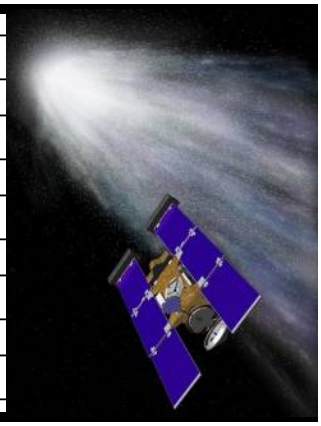
Stardust was launched in 1999 and flew by the comet in January 2004. It snapped the best pictures ever of the nucleus of a comet as it flew past Comet Wild 2. It also grabbed some dust from the coma of the comet using a high-tech material called aerogel.

On January 15, 2006 a capsule from the Stardust spacecraft brought the comet dust back to Earth. The capsule had a heat shield to protect it when it re-entered Earth's atmosphere. It also had parachutes that gently lowered it to the ground. The capsule landed in Utah at around 3 AM and crews in helicopters picked it up. They brought it to scientists who opened the capsule and got the dust particles out.

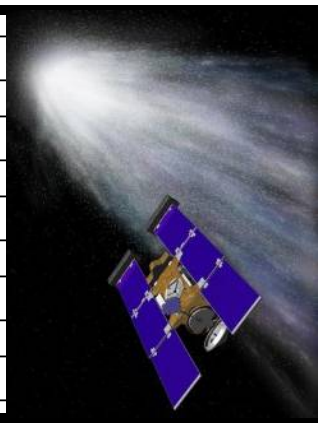
The scientists have started to study the dust to learn more about comets. They have already had a surprise. Comets are large balls of ice, but the samples Stardust brought back included some minerals that form at high temperatures! These minerals normally form near the Sun (or some other star). Scientists don't know how the minerals got out to the frozen edge of the solar system to become part of comets.

Information adapted from
Article Source: http://stardust.jpl.nasa.gov/science/wild2.html
http://www.windows.ucar.edu/tour/link=/space_missions/comets/stardust.html

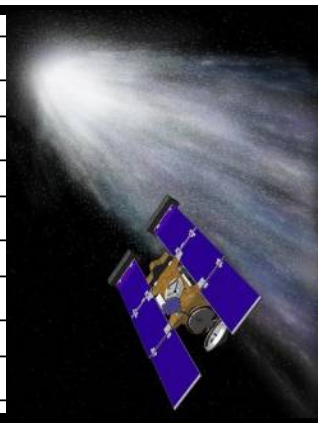
Stardust Mission



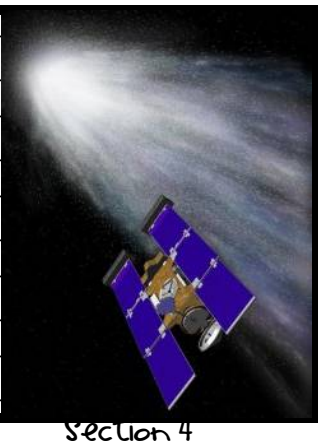
Stardust Mission



Stardust Mission



Stardust Mission



Searching for Stardust

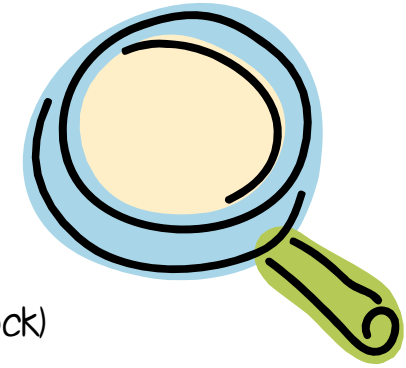
Activity 20: Searching for Stardust

Goal: Students will work as teams of scientists, extracting, observing, describing, and recording particles embedded in Jello. They will then compare their experiences to those of scientists working with NASA STARDUST material.

Materials:

For each group of students:

- 1 unrefrigerated Jello cup (with particles embedded)
- Pair of plastic tweezers
- Magnifying hand lens
- 2 pieces of yarn cut at 3"
- Tape
- Paper towel
- "STARDUST Team" packet (2-pages)
- Worksheet: Sampling a Comet



For whole class:

- Aluminum foil pieces (metal)
- Fish tank gravel of different colors (rock)
- Small beads of different colors (glass)
- Permanent marker
- Overhead with Aerogel pictures

Description:

1. Prepare the Jello cups ahead of time by removing the lid and placing an assortment of particles (aluminum foil, gravel, etc.) on each one. Push the particles into the Jello and replace the lid. Use a permanent marker to draw a line all the way around the middle of the cup, dividing the top from the bottom. Write an "A" on one side of the cup (so students can line up their cups to record items on their maps).

2. Explain to students that the Jello is a model for the Aerogel used in the NASA STARDUST mission. Let students know they will work as teams of scientists to explore particles in Jello. Place students in groups of four and assign roles: Extractor, Map Specialist, Recorder, and Reporter. The Extractor will use the tweezers to carefully extract one particle at a time. The Map Specialist will locate the position of the particle on the map and tape the particle in its appropriate place. The Recorder will write a description of the particle. The Reporter will participate in all parts of the process and present the information to the class.

3. Pass out the worksheets, tweezers, magnifying lenses, yard, tape, paper towels. Pass out Jello cups last. Show students how to tape yarn into an "X" on the top of Jello cup to divide it into quadrants. Help them position the cups so that they can easily find their place on their maps. Use an extra Jello cup to demonstrate the processes of extraction, mapping, and recording.

4. Let the students begin and circulate to help as needed.

5. After the students have recorded their findings allow Reporters to share results.

6. Show overhead pictures of Aerogel, used in the STARDUST mission to capture comet particles from Comet Wild 2. Aerogel is very lightweight, yet has excellent insulating capabilities and is able to support a large amount of weight. Particle tracks can be seen in Aerogel returned to Earth.

Teacher Resources

Video clips, Podcasts
and updated stardust mission
resources can be found at
http://stardust.jpl.nasa.gov/home/index.html

STARDUST Team

1. Write down the names of your team members.

Extractor _____

Map Specialist _____

Recorder _____

Reporter _____

2. Place your Aero-Jello so that the "A" on the cup is facing in the same direction as the "A" on the particle map.

3. Make sure you have taped your yarn on the top of the cup to make a grid.

4. Extractor: Take one particle from the top layer of your Aero-Jello.

   Map Specialist: Tape the particle in place on the map (use the "Top Layer" circle). Give it a number.

   Recorder: Write a description of the particle by its number.

   Reporter: Think about how you will report this particle.

5. Repeat step 4 until ALL particles are taken out of the top layer.

6. Do the same thing for all particles in the bottom layer. This time tape the particles in the "Bottom Layer" circle.

7. Prepare a report to share with the class.

Particle Map

A

Top Layer

A

Bottom Layer

Particle Descriptions:

Particle 1: _____

Particle 2: _____

Particle 3: _____

Particle 4: _____

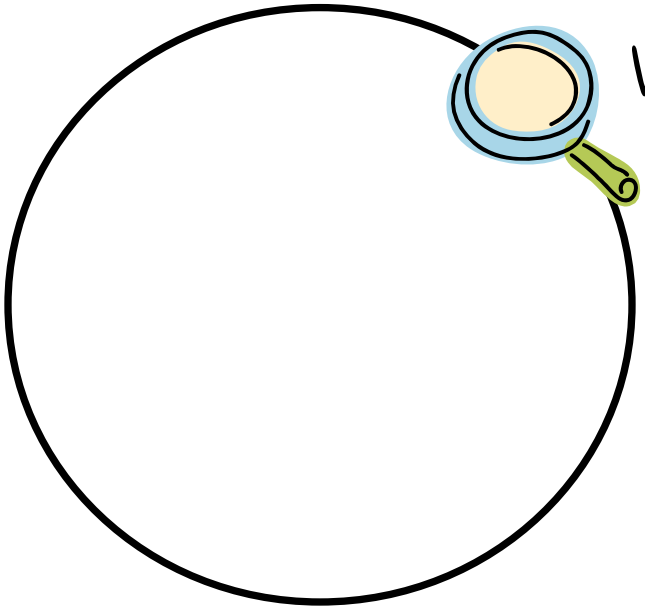
Particle 5: _____

Particle 6: _____

Particle 7: _____

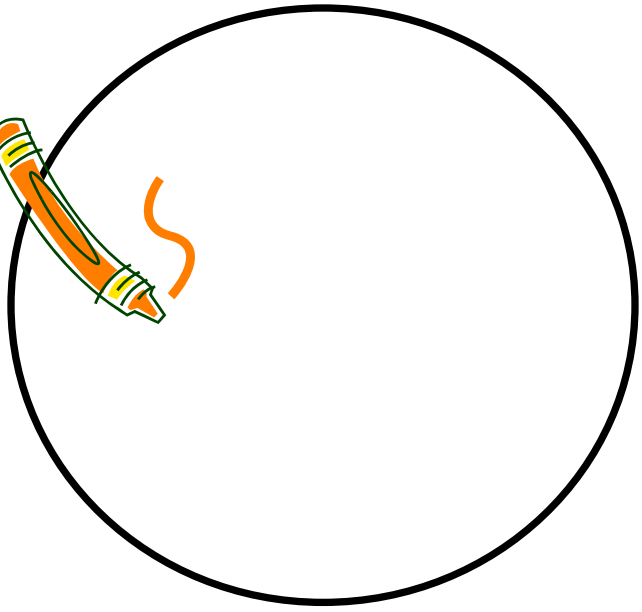
Particle 8: _____

Sampling a Comet



What do you see in your sample?

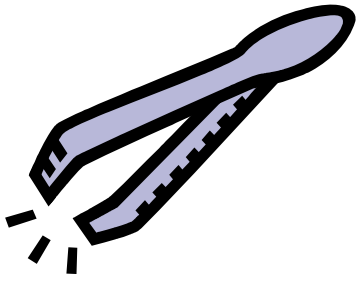
Draw and label each item you see.



Use your tweezers to extract the items from your comet sample.

What are the different particles you found in your sample?

Particle 1 _____
Particle 2 _____
Particle 3 _____
Particle 4 _____



Comet Craters

Activity 21: Comet Craters (2 days)

Materials:

For each student:
- "Comet Craters" worksheet (1 or 2)

For each group of students:
- 2-lb bag of flour
- Small bowl
- Water
- Large plastic container with lid (shallow containers work best)
- Enough modeling clay to make golf ball-sized "comet"
- Ruler with centimeters

For the whole class:
- 1 container of cocoa powder
- Food coloring (different colors)
- Small plastic animals, houses, Lego buildings, trees, cars, aliens
- Chart paper
- Computer
- Power Point Presentation: Our Solar System (slide 16 and 17)

Description:

Day 1

1. Ask students to imagine what it might be like on another planet. Will there be life? How will it compare to life on Earth?

2. Show students the materials they can use and tell them they will work in groups to design their own planet. Demonstrate what they will do. Using the flour as the base, fill the container 2-3 inches deep. Put a thin layer of cocoa over the flour to represent the top layer of soil. Show students how to add oceans or lakes by filling small plastic bowls with water and adding a drop of food coloring. Let them know they can add houses, trees, animals, people, or aliens.

3. Pass out materials (or have students go to already prepared stations) and let students begin. When their planet is complete put the lid on and save it for the next day.

Writing Extension

Have students write a letter to an alien or write a persuasive paragraph about whether or not there is life on other planets.

Day 2

1. Ask students why is it important to study comets. What do they think would happen if a comet hit a planet? Ask the students if they know how craters are formed.

2. Explain to them that they have created a model of a planet. Today they will be creating a model of what would happen if a comet struck that planet.

3. Give students rulers and various amounts of modeling clay (give some groups 2 - 3 sticks and other groups 5 - 7) to create a large ball (comet). Demonstrate how they will drop the clay onto their planet.

4. Allow them to see the crater that formed in your planet. Ask them what observations they might make about that crater. How might they measure it or describe its impacts? Hand out the "Comet Craters" worksheet and rulers. Explain to students how to measure the diameter of their clay comet and the diameter of the crater with a ruler (in cm). Demonstrate on the board how to measure the distance of rock scatter (how far out the flour shows up). Show them how to measure the distance of disturbance (how far they can see any effects of the impact- they may say it extends throughout the entire box).

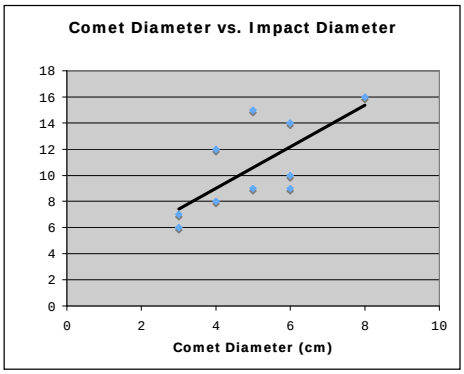
5. Once they have made their comet and measured its diameter allow them to get their planets from day 1.

6. Work with one group at a time to create their comet crater simulation. Choose one student to stand on a chair directly over their "planet". Have the other students stand around the planet ready to observe the comet's impact. Students should begin making measurements and observations on the "Comet Craters" worksheet immediately after impact.

7. When students finish, have them place the lid on their planets and collect them. (You may wish to have helpers separate and rinse out the parts later.)

8. Have the students record the diameter of their comet and of their impact on chart paper.

Group #	Diameter of comet (cm)	Diameter of impact (cm)



9. Help them make a scatter plot with this data. If possible, draw a trendline through the data points. If they recorded a relationship between comet size and impact size, discuss why a larger comet would make a bigger impact.

10. Discuss the impact the crater had on their planets. Talk about the environmental and physical effects of a comet impact. Some sample questions are: How might life be different for the animals? Will the air quality be different? How will life be different in the cities/ in the country? How will life be different for things that lived close to/ far away from the impact site?

11. Optional: Revisit the power point and focus on the comet impact section. (Slides 16 - 17).

sample Questions

How might life be different for the animals?
What about the air quality?
How will life be different in the cities or the towns?
How will life be different for people who lived close to/ far away from the impact site?

Science Connection

After completing the comet crater experiment have students relate what happened on their "planets" to what they think might have happened to the dinosaurs on planet Earth. Do they think a comet or an asteroid might have caused their extinction? Have a class debate. Support each side with facts from the comet craters experiment.
The Chicxulub crater is believed by scientists to be the missing evidence to support their findings that an impact led to the extinction of the dinosaurs.

For more information visit:
http://photojournal.jpl.nasa.gov/catalog/PIA03379

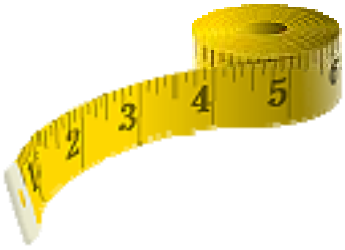
Comet Craters

1. Write the names of your group members.

_____
_____
_____
_____
_____

2. What is the diameter of your comet in cm?

_____cm



3. What is the diameter of your impact crater in cm?

_____cm

4. What is the distance of rock scatter (how far your flour went)?

_____cm

5. What is the farthest distance you can see any sign of damage?

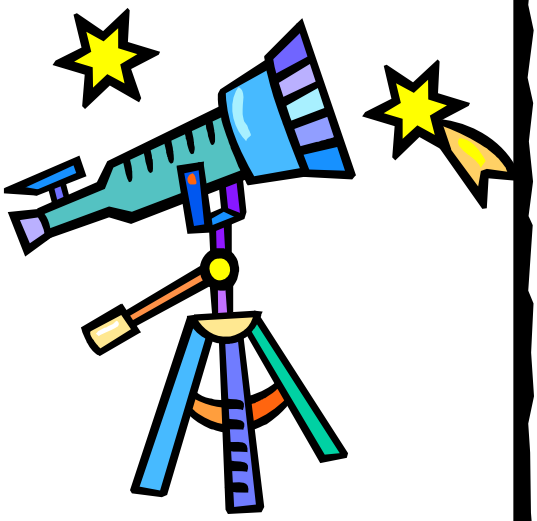
_____cm

Comet Craters

Draw a picture of your crater and the impact it had on your planet.

Describe what happened to your planet when the comet hit.

Comet Predictions



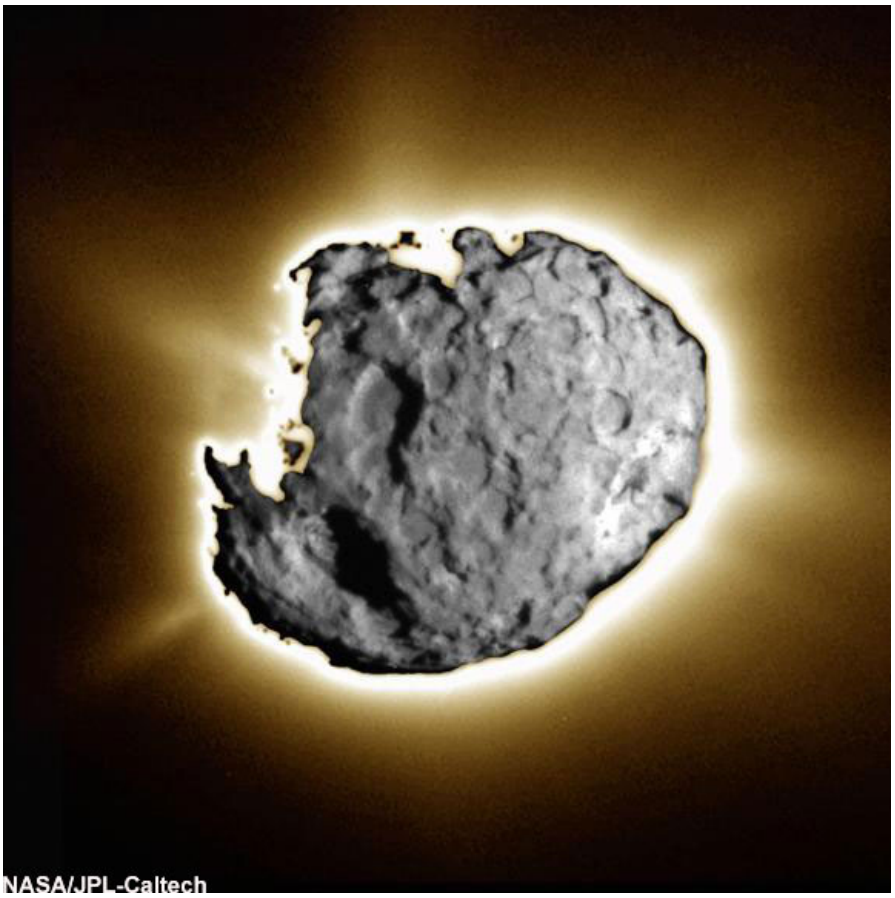
Activity 22: Comet Predictions

Goal: Students will apply the knowledge they have gained on comets, to observe and make predictions about them.

Materials: Images of Comet Wild 2
Worksheet "Comet Predictions"

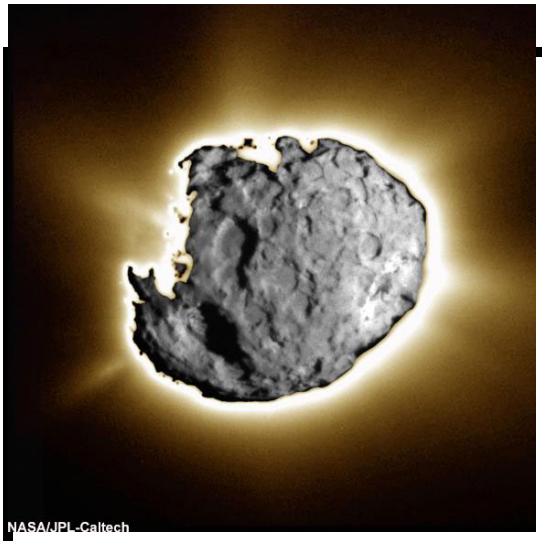
Description:

1. Ask the students to draw a picture of what they think Comet Wild 2 will look like the next time it passes the sun.
2. Did it get bigger? Smaller? Does it have a different shape? Ask students to explain their predictions.



Comet Predictions

The Wild 2 Comet orbits the sun once every 6.39 years. With each passing of the sun the comet loses a tiny bit of its mass. Draw a picture of what you think Comet Wild 2 will look like when it passes the sun again.

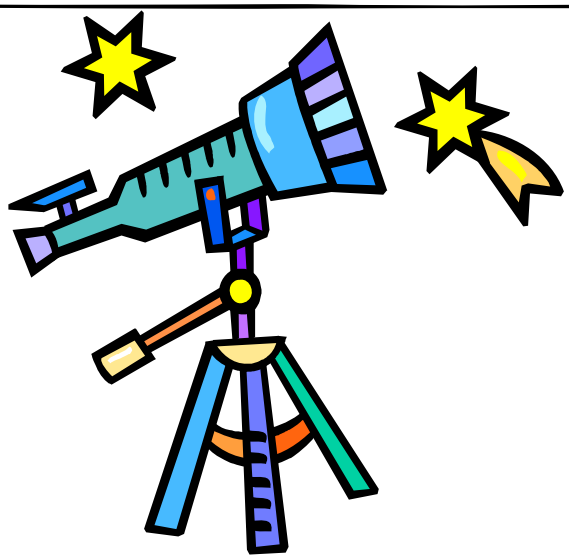


Describe what the comet will look like and why.

Unit Resources

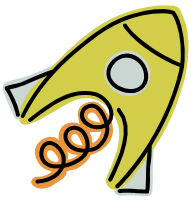
In this section you will find components that will enhance the unit, assessments, workshop ideas and other resources.

For more resources please check online at
http://www.magnet.fsu.edu/education/teachers/resources/stars.html



My Science Journal

The Solar System
To the Planets, Comets and Beyond



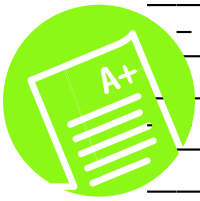
Name: _____

Activity: _____

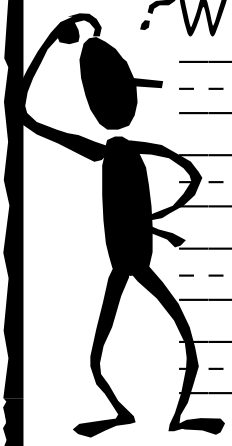
What we did:

What we saw:

What we learned:



?What questions we have:



Cut and laminate these strips and use them for whole group instruction when completing investigation activities.

What we did

What we saw

Cut and laminate these strips and use them for whole group instruction when completing investigation activities.

What we learned

What questions we have

Name: _____ Date: _____

Solar System Test

1. Name the planets in order.

M_____

V_____

E_____

M_____

J_____

S_____

U_____

N_____

Draw and label the three parts of a comet.

2. What is a comet made of? _____, _____ and _____.

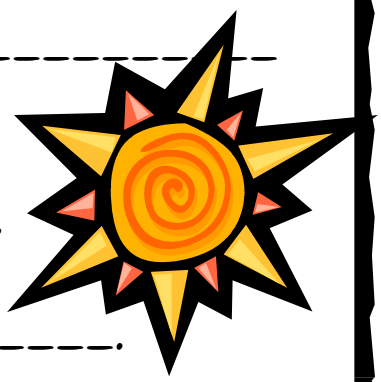
3. What causes a tail to form on a comet?

_____.

4. A comet may have two tails, one made of _____ and one made of _____.

5. What is the sun? _____.

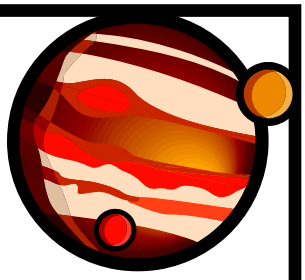
6. The planets orbit around the _____.



7. The _____ gives us energy, heat and light.

8. Without the sun what would happen to life on Earth?

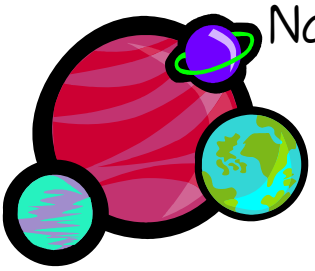
Draw one of the planets you learned about.



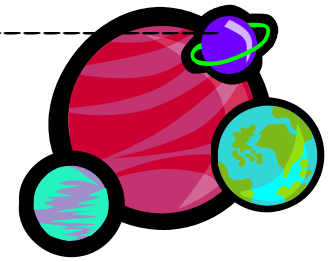
Write two facts you learned about that planet.

1.

2.



Name: _____ Date: _____



Solar System Test

1. Name the planets in order.

M_____

V_____

E_____

M_____

J_____

S_____

U_____

N_____

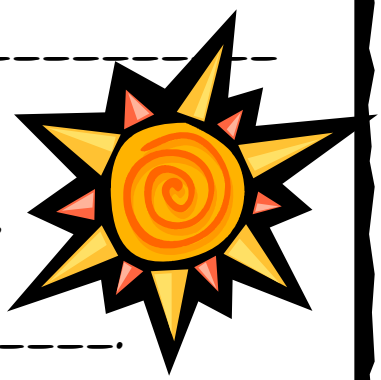
Draw a picture of the sun and label its layers.

corona chromosphere
photosphere middle zones core

2. What gases are in the sun?
_____ and _____.

3. Which way does the comet's tail face? _____.

4. A comet may have two tails, one made of _____
and one made of _____.



5. What is the sun? _____.

6. The planets orbit around the _____.

7. The _____ gives us energy, heat and light.

8. Without the sun what would happen to life on Earth?

Draw one of the planets you learned about.

Write two facts you learned about that planet.

1.

2.

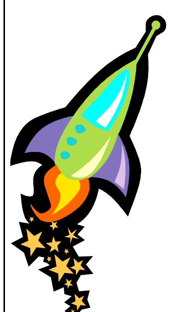
NASA
Student
Scientist

NASA
Student
Scientist

NASA
Student
Scientist

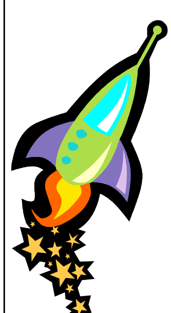
NASA
Student
Scientist

NASA
Student
Scientist



NASA
Student
Scientist

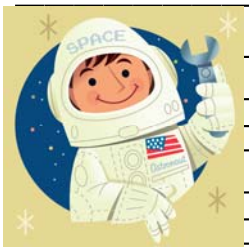
NASA
Student
Scientist

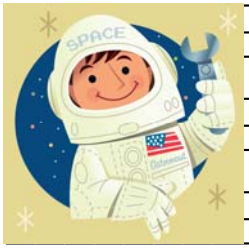


NASA
Student
Scientist

Planet Facts

_____





Planet Facts

My Planet: _____

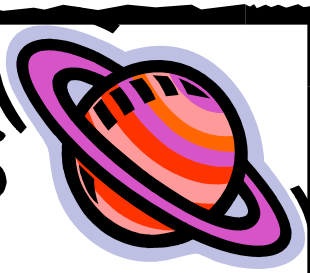
Characteristics:

Distance from the sun: _____

Interesting facts about my planet:

Here is a picture of _____.

The Planets



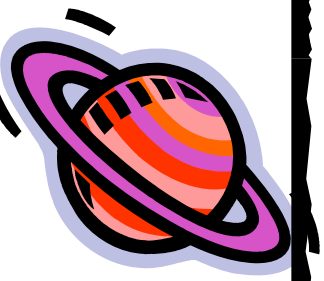
Mercury

Venus

Earth

Mars

The Planets



Jupiter

Saturn

Uranus

Neptune

Workshop Centers

Copy the following centers and use them during your Reading Workshop time. Each activity offers reading connections and skills while introducing and reinforcing the science concepts being taught.

WRITING

Imagine you meet an alien. Draw a picture to show what he looks like. Write 7 adjectives that describe how he looks.

Computer

Investigate the 8 planets on the NASA website. Play a game.

http://www.nasa.gov/audience/forkids/kidsclub/flash/index.html

Math

Measure the spacecraft with a ruler. Record your measurements on your paper.

Science

Read the books and fact files about the different planets.
Choose one planet that interests you.

Write down the facts for that planet.

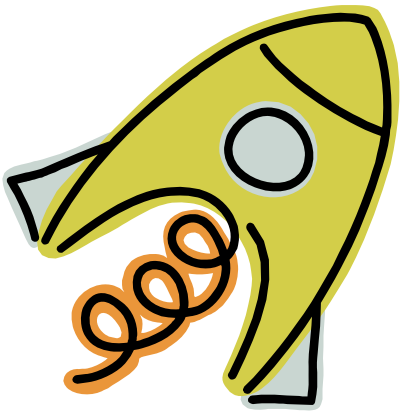
Color a picture of your planet.

Clean up your mess!

Workshop Centers Created By Marcy Grauer

Blast Off Math

Measure the spacecraft with your ruler



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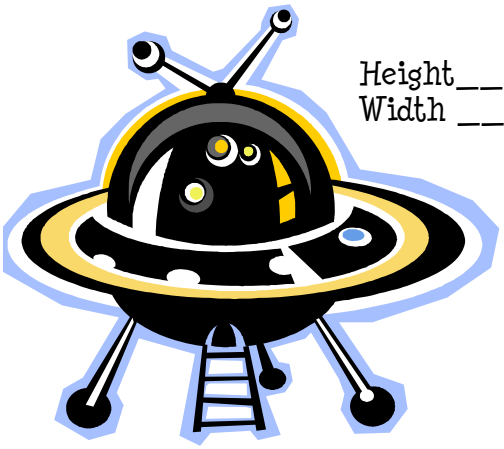
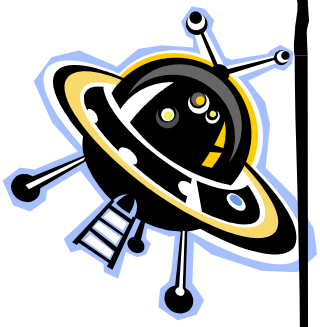


Height_____
Width _____

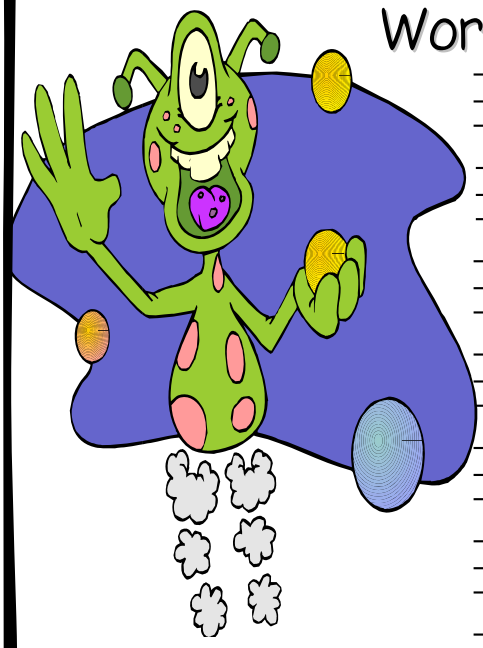
Height_____
Width _____

Height_____
Width _____

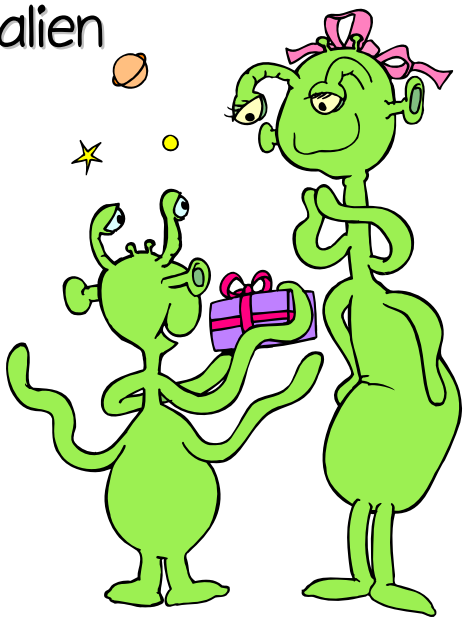
ALIENS



Here is a picture of my alien



Words that describe my alien



The Planets

Copy this page and cut into strips for each student. Have them create a drawing of the solar system and then label their planets.

Mercury

Venus

Earth

Mars

Jupiter

Saturn

Uranus

Neptune

Mercury

Venus

Earth

Mars

Jupiter

Saturn

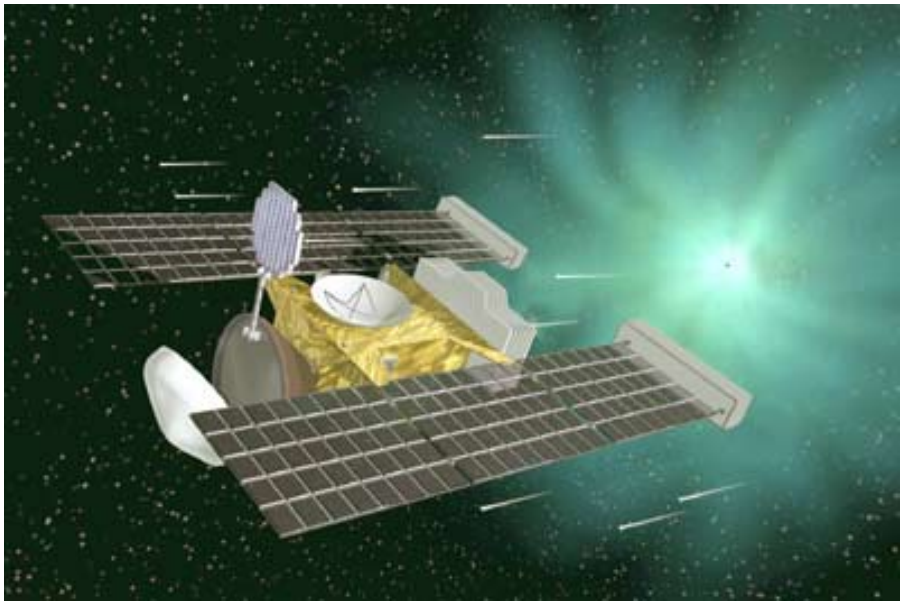
Uranus

Neptune

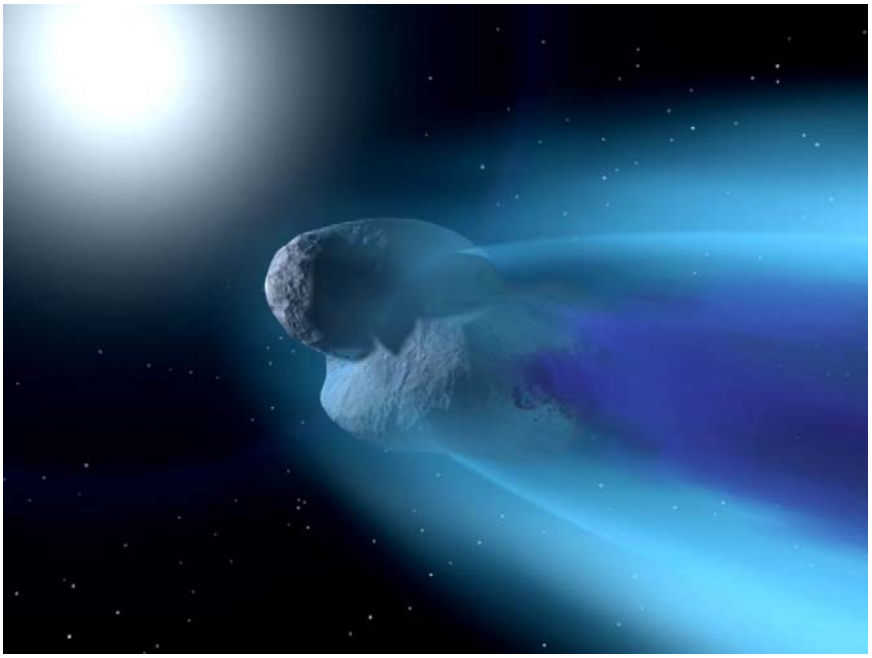
Vocabulary Connection

Cut out and laminate these vocabulary picture cards to help enhance meaning and understanding.

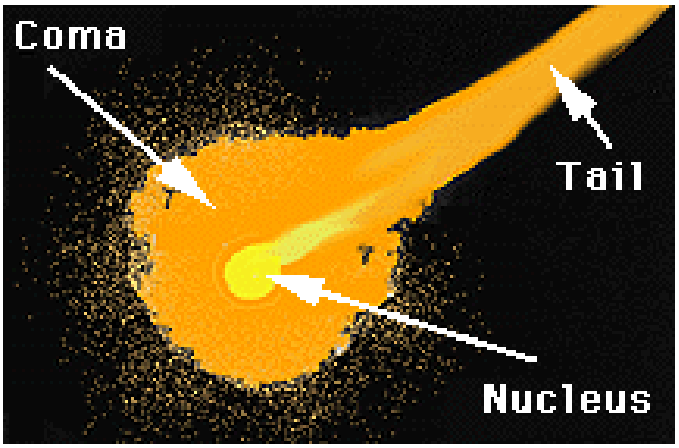
Stardust Spacecraft



Comet



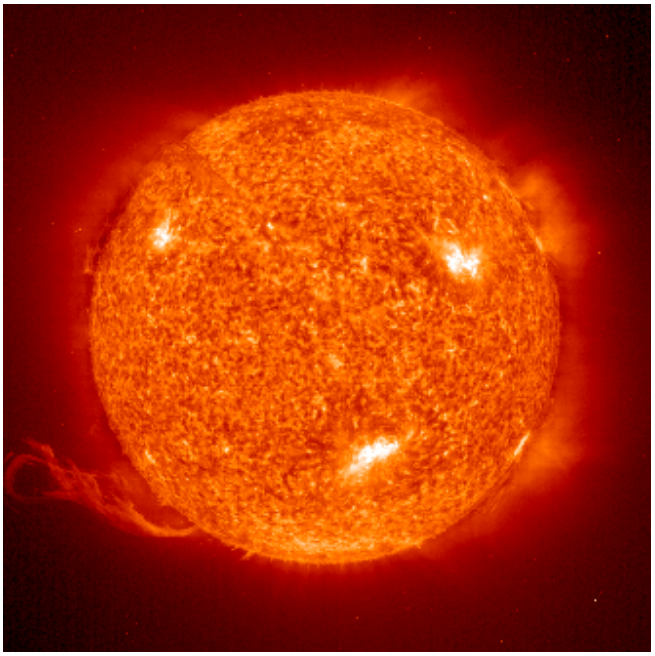
Nucleus, Coma, Tail



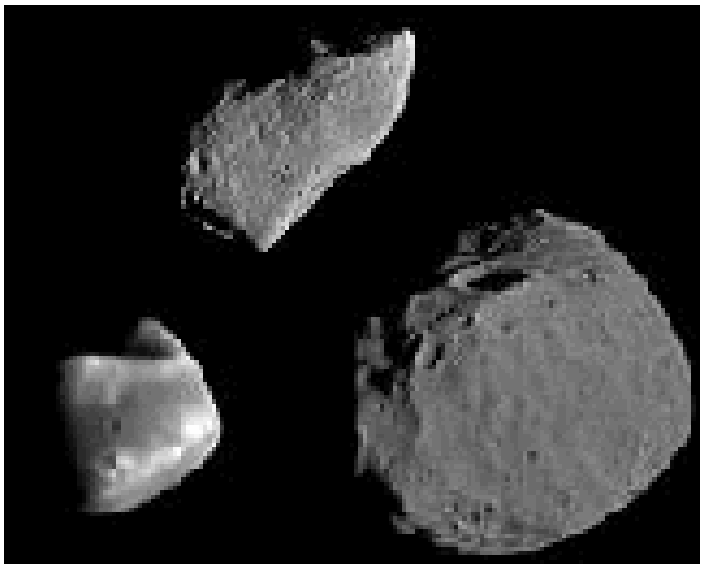
Solar System

Comet Sublimation

Sun



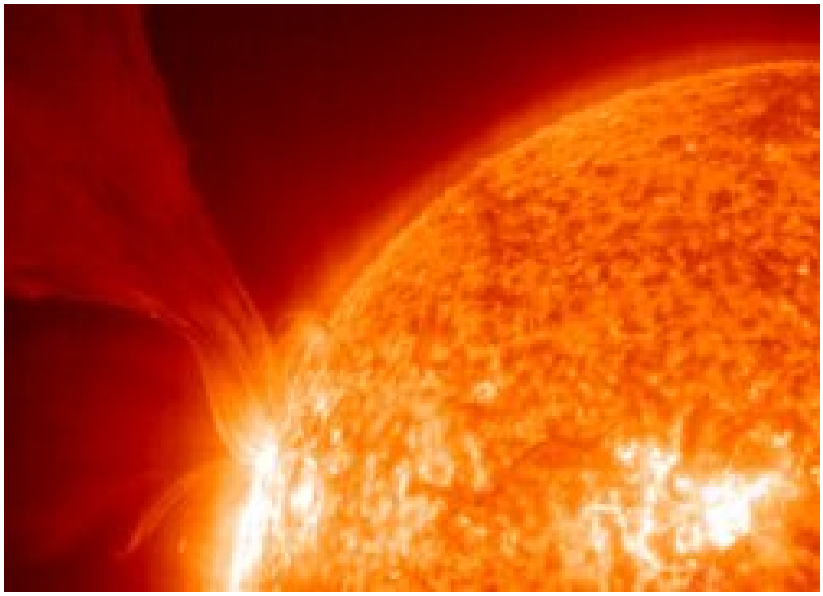
Asteroids



Crater

Meteorite

Solar Flare



Moon

Earth

Aerogel

Comet Wild 2