



September 2009 – Comets

The sun gives off lots of light and heat. When the light and heat are used to power things, it is called solar energy.

Comets & Space Science Projects

Make a Crater

Do this project to see how craters are made. You may want to do this project outside, or inside with newspapers spread over your work area.

What You Will Need:

- An aluminum pie pan or other shallow dish
- Dry sand
- Water
- A cup
- A spoon

What To Do:

1. Fill the dish with sand.
2. Add water until the sand begins to stick together, like what you would use to build a sandcastle.
3. Scoop some of the sand mixture into a cup, then smooth the sand in the pan out, to make a flat surface.
4. Sprinkle a little more dry sand into the pan, in an even layer. (Make sure it covers all of the wet sand.)
5. Using your fingers or a spoon, fling a bit of the wet sand mixture from the cup into the pan.
6. What happens when you throw a bigger spoonful? Does the crater get bigger?



What's Happening?

Sometimes asteroids, meteors, or comets bump into planets or the moon as they move through space. When they do, they leave an indentation or dip in the planet or moon's surface. In this project, the wet sand from the cup was like an asteroid, meteor, or comet, and the pie pan with sand was like a planet or moon. To make the best crater, it

doesn't really matter how much sand you take from the cup, but how hard you fling it. Even just a little wet sand thrown at the pan can make a big crater!

Catch a Comet

Make a colorful "comet" that you can play catch with! If you like, you can make it glow-in-the-dark for nighttime fun.

What You Will Need:

- Plastic grocery bag
- Scissors
- Tennis ball (or any other soft ball)
- String or ribbon
- Glow-in-the-dark paint
- Paintbrush

What To Do:

1. Use the scissors to cut the handles off of the plastic bag. Carefully cut down each side of the bag, to make a flat piece of plastic.
2. Put the ball in the middle of the plastic, and pull the corners together.
3. Tie the string around the plastic, close to the ball, so the plastic won't slip off.
4. Carefully cut slits in the plastic, making 1 or 2-inch strips.
5. Decorate the comet using the glow-in-the-dark paint. You could also use stickers or add ribbon.
6. When the paint is dry, you're ready to play!

Your homemade comet can streak through the air with its tail behind it, just like the real thing! The tennis ball is like the ice and rock chunk of a comet, and the plastic bag makes the coma and tail.

A Penny As Big as the Moon?

A comet circles around the sun in a long orbit. How much bigger than a comet is the moon, or the earth, or the sun? Find objects in your house to show how big the earth would be if the moon was the size of a penny, or if a comet was smaller than the head of a pin.

1. If the moon was as big around as a penny, how big do you think the earth would be? The earth is almost four times as big across as the moon is. If you put four pennies next to each other, that's how big the earth is across its middle. Can you think of something that is that size? We used a baseball as our sun.
2. If the moon is a penny, what object can show how big the sun is? The sun is huge - 109 times as big across as the earth is. Is there a room in your house that could fit 100 baseballs across it, if they were side by side? If the moon was as big as a penny, the sun would be a whole room!

In our solar system, the moon is much, much bigger than a penny! The moon is more than 2,000 miles across! It is hard to imagine how big that is. Just like in this project though, the earth is bigger, and the sun is much, much bigger!

1. How big do you think the moon would be if a comet was as big as this dot: . ? What about the earth and sun? Try to think of an object for each.
2. If a comet was as tiny as that dot, the moon would be about the size of a beach ball (18 inches).
3. The earth would be four times as big across as the beach ball. Can you think of something that size? Your dad standing with his arms stretched out might be as big around as the earth.
4. Even if a comet was only as tiny as that dot, the sun would still be bigger than your whole house! The sun would be about the size of a shopping mall. If you walk for two blocks, that's how big the sun would be across.

Now that you know how big the sun, earth, and moon are compared to each other, you might have an idea of how big our solar system really is! A comet is not really as small as a dot, or even a beach ball. Comets are between one mile and fifty miles across, not including the tail! Comets are huge! But when compared to other things in our solar system, they seem pretty small.

Fun Facts

- Comets are given the last name of the first person that finds them.
- The original Latin that our word "comet" comes from means "hairy star"!
- The biggest asteroid found so far is Ceres, which is almost 600 miles across.

Silly Science

- What kind of star is the most dangerous?
 - A shooting star
- What do planets like to read?
 - Comet books
- What do you get when you cross a meteor with a guppy?
 - A starfish

Way Cool Websites

- Check out [these incredible photos](#) of comets and meteors from National Geographic.
- Help the penguin astronaut get back to his spaceship in [this fun game](#)! You'll see for yourself how planets pull on smaller objects in space. (Requires shockwave.)
- Put together a [space puzzle](#) - choose from four different pictures.

Teacher Tidbits

What is a Comet?

A comet is made of lots of parts mixed together, sort of like cookie dough. The "ingredients" in a comet are ice, gases (that get so cold they freeze, just like your breath on a cold day), dust, and chunks of rock. A comet looks sort of like a dirty snowball.

Since it is made of ice, a comet must come from some place very cold. A comet starts its journey through space far away from the sun, at the edge of our Solar System. This place is so far away that we can't see it, even with the best telescopes. Scientists call it the **Oort Cloud**, and they think that it is full of comets. Some comets start from a different place called the Kuiper Belt--it is just past the planet Neptune, the eighth planet from the sun.

The Beginning of a Comet

Nothing in space can move around by itself. Small objects like comets are pulled by larger objects in our solar system. A comet begins when something pushes it away from its starting point and into the wideness of space. Usually a comet gets pulled into space by a star traveling past, or a planet that is nearby.

Gravity is what moves things in space. Gravity pulls in one direction - when you drop a ball it falls to the ground because of gravity. Each planet has gravity, and pulls things towards itself. The earth's gravity is what pulls a ball down when you drop it, and it also pulls on you, so you can walk, run, skip, and jump on the ground. The sun also has gravity. Instead of traveling on and on in a straight line, a comet travels around and around because it is being tugged at by the sun, and can't move away.

A comet's journey through space is in a long oval path (shaped like a hot dog) called an **orbit**. Comets that are in orbit travel from one edge of the Solar System until they reach the sun, then their path loops around the sun, and back towards outer space. Some comets have such long paths that it takes hundreds or even thousands of years to go around once. The comets that start from the Kuiper Belt have a shorter path, and may make it around their orbit every 75 years, like Halley's Comet. Ask an adult if they remember seeing Halley's Comet the last time it passed by earth, in 1986.

A Comet's Tail

When a comet comes close to the sun, it starts melting a little, and makes a layer of gas, dust, and tiny pieces of ice. This layer covers the comet, and is called the **coma**. The sun's heat blows on the comet, and makes a tail of dust and ice. This tail can be up to six million (6,000,000) miles long, and always points away from the sun. Gas that has melted from the comet also streams off as an even longer tail, but it is harder to see.

The comet's tail and coma catch light, making it look bright like a star. How does this work? Dust is so tiny that it can rest in the air. Our eyes can only see the dust in the air when there is strong light. If you like, you can try going into a dark room with a flashlight. When you turn the flashlight on, can you see dust floating through the air in the beam of light? In a similar way, the sun lights up the dust in a comet's tail, making the comet look very, very bright. When the

comet moves away from the sun again, the tail grows smaller, and the brightness fades, until the comet is just a hunk of ice and rock again. Every time the comet goes around the sun, a little more of it melts making it smaller. Eventually, there will be nothing but a chunk of rock left, and the comet will come to an end.

Shooting Stars

Rocks that break off or are left over from a comet sometimes get close enough that the earth's gravity pulls them away from their path around the sun. These rocks are called **meteors**, and move quickly through space. When a meteor gets close to the earth, we see a bright light falling through the sky - a shooting star! Meteors are often called shooting stars, or falling stars, but they are not really stars at all. They look brighter than anything in the night sky besides the moon, and can be seen for only a few seconds as they whiz past.



Meteors get really hot when they are falling toward earth because they rub against the air that surrounds the planet. (Rub your hands together really fast--do they feel hotter? That's like the air rubbing a meteor as it falls.) The heat sets the meteors on fire, which is what makes them look so bright. Most meteors do not make it to the earth at all, but burn up completely. Meteors that do land on earth are called meteorites and are usually tiny - about the size of a pebble, or up to the size of a baseball. Sometimes even smaller pieces of rock (so tiny they look like dust) will fall to the earth.

Want to learn more about meteorites? See this [project](#) to learn how to collect them.

Asteroids

Meteors don't always come from comets. They can also be chunks of rock that have broken off other objects floating in space. **Asteroids** are large chunks of minerals and rocks that float in space. They have rough surfaces, with holes all over. Most asteroids are in a place called the Asteroid Belt that is about as far away from the sun as the planet Mars. In the Asteroid Belt, things are always bumping into each other, and small pieces get broken off. Those pieces might end up as meteors falling through earth's atmosphere.

Sometimes an asteroid will crash into a planet or moon. When this happens, it makes a **crater**. Our moon is full of craters, or dish-shaped holes in the ground. Large meteors can also make craters when they hit the earth, but that doesn't happen very often.

Meteor Showers

Some nights you can see the meteors that come from a comet. They seem to rain down to the earth, then burn up before they get here. The next big meteor shower is in the month of October. This shower happens every year, and is called the Orionids, because you will see the shower best if you look towards the constellation Orion. This meteor shower appears when earth passes by dust and rocks left by Halley's Comet. To see the Orionids, you will need to stay up late on the night of Oct. 20th (any time after 11pm is best), or get up early (just before the sun rises) on the morning of the 21st.

To watch a meteor shower, be prepared to spend a few hours sitting outside! Pack warm clothing and bring snacks. Meteor showers can be seen as soon as it gets dark, but it is easiest to see them from about 11pm until sunrise. You will need to go some place away from large cities, because city lights (or even lights that are on inside your house) make it impossible to see the night sky clearly. Give your eyes 20 minutes to adjust to the dark before gazing towards the part of the sky where the meteor shower will be.

Look up towards the sky, facing east, and find the three bright stars that are close together in a row. These three stars make the belt of the constellation Orion, which means hunter. The Orionids will appear from this part of the sky. You should be able to see a meteor every few minutes, if the sky is clear. You may also want to print out our [star chart](#) to help you find the stars and constellations visible during September and October. A constellation is a group of stars that would look like an object if you drew lines between the stars, like the Big Dipper in the picture. Depending on what day it is, and how late at night, you will be able to see different patterns of stars in the sky.



Science Words

Orbit - the oval path that planets and comets take as they travel around the sun.

Coma - the layer of gas, dust, and ice around a comet that shines with light from the sun.

Meteors - pieces of rock broken off or left over from a comet or asteroid. They shine brightly as they fall through the air above the earth.

Asteroids - large rocks that exist in space, especially near the planet Mars.

Crater - the round, disc-shaped hole that is made when an asteroid or meteor hits a planet or moon.

Printable Worksheet

Print out this star chart and help kids align it to the night sky to locate and identify stars and constellations. Using a star chart is a great opportunity to talk about stars and why some look bigger and brighter than others. To use the star chart inside instead, use a straight pin to poke holes through the white dots and hold the chart up to a flashlight in a dark room.

How to use this star chart:

1. Go outside after dark and stand facing south. Hold the chart up over your head so that the N points behind you towards the north.

2. Look for the Big Dipper. Once you find it, look down and to the left to find the bright star Polaris. How many of the stars and constellations can you find?

Note: These are just some of the constellations and stars you might be able to see in the sky. The constellations change positions throughout the night, so you'll be able to see some early in the night and others later.

You can also use the star chart in a dark room. Ask an adult to help you use a straight pin to poke holes through all of the white dots then have someone hold a flashlight in a dark room for you while you hold up the chart and look at the "stars."

