

SPACE SCIENCE

ADVENTURE IS WAITING

In-Class Activities and Take-Home Pages

Activity #1:
Comets, Meteors,
and Meteoroids
Activity #2:
Web Quest: Gravity,
Black Holes, and Robots

GREAT SWEEPSTAKES!

GREAT PRIZES!
Family Trip to
**Kennedy Space Center
Visitor Complex
in Florida!**

See take-home page.

ANSWERS TO REPRODUCIBLES:

Activity #1: shooting stars (meteors); composed of minerals and ice (comets); orbits sun (comets, meteoroids); has a tail (comets); speedy streak of light (meteors); usually weighs less than a grain of sand (meteoroids); hits the atmosphere faster than 100,000 miles per hour (meteoroids); falling stars (meteors); surface melts into gas and dust when gets close to sun (comets); lasts a second or two (meteors); travels slowly across the night sky (comets); may come in showers or storms (meteors); remains in the sky for many days or weeks (comets).

Activity #2: 1. The red ball is being driven by its forward motion. 2. The design of the leaf, nautilus, and flowers may be the result of the laws (or forces) of nature at work. 3. Black holes are unseen because they are a region of space where gravity is infinitely strong. 4. A black hole can form when (1) a massive star runs out of nuclear fuel and collapses and (2) the mass of the star's core is three or more solar masses. 5. Answers may include: Robots do things that humans are unable to accomplish; they go on long trips; they don't need air or water; they go on space walks; they take pictures. 6. Voyager 1, Cassini, Stardust

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Name _____ Date _____

FALLING STARS

“Catch a falling star and put it in your pocket...”

The sight of a falling star is always exciting. Before the word “look!” is out of your mouth, the streak of light is gone. You point to where it was and ask others if they saw it, too. Often, no one else sees the speedy flight of light flash by, and you are left trying to describe what you saw and felt. You stare at the dark space, hoping another will streak across the sky.

What is a falling star? A falling star is not a star at all. It is not even a piece of a star. Stars are huge balls of burning gas sending off great amounts of energy in the form of light and heat. Stars are much bigger than our planet. Stars do not fall; they stay in their own places in their own galaxies. Our sun is a star.

A falling star is a meteor. Meteors are streaks of light in the sky that we can see when a small speck of dust burns up high in the air above us. Where do these specks of dust come from? Comets!

Astronomers call these pieces of comet dust “meteoroids.” Meteoroids are usually smaller than a grain of sand. Some meteoroids are bigger, but most are tiny. Meteoroids hit the Earth’s atmosphere at super-high speed, sometimes faster than 90,000 miles per hour. The friction between the tiny meteoroid and the atmosphere creates the light that we recognize as a meteor (or “falling star”). The dust speck that burns up is called a meteoroid. The flash of light is called a meteor. Meteors usually last just a second or two.

Sometimes, there are meteor showers. The heavens are a black theater for an amazing display of silent fireworks. It is exciting to watch all these meteors shoot through the dark sky. There are so many that if you watch with a friend, you will probably see some of the same and some different ones. Scientists also watch these meteors and record the numbers, the brightness, and the paths of these beautiful fireworks of nature. In a meteor shower, lots of shooting stars seem to fall from one area of the sky.

Why do we have meteor showers? They happen when the Earth passes through the tail of a comet. Like the dust cloud surrounding Pigpen in the “Peanuts” comics, a meteoroid stream travels along with the comet on its orbit through the Solar System.

Some people are confused by comets and meteors. A comet is different from a meteor. A comet is usually larger and travels slowly across the night sky. A very bright comet only appears once or twice in a century but it remains in the sky for many days or months.

Comets appear to be bright balls with fat tails. They do not fall rapidly in the sky; you would have to watch one for hours or days to see its movement. The center of a comet is a ball of frozen gas, dust, and water. Like planets or moons, comets orbit around the Sun.

The comet that causes the Leonids is called Tempel-Tuttle. It is named after two scientists

who discovered it at the end of 1865. The scientists were not working together; one was in France and one was in America. They were each looking through telescopes. Both astronomers spotted the comet and reported their finding. The comet they found was not a big, bright comet. It is so small that it can only be seen with a telescope. The comet Tempel-Tuttle is about two-and-a-half miles in diameter.

When comets get close to the Sun, they begin to warm up and their icy material begins to melt. Tiny grains of dirt that have been riding on the comet for perhaps four and a half billion years fly off into space to join a long stream of orbiting meteoroids.

When the Earth hits this stream of comet junk from Tempel-Tuttle, meteors seem to shoot out of the constellation Leo. That’s why this meteor shower is called the Leonids.

The Leonids are famous. The reason that the Leonids are so famous is that sometimes they cause a meteor storm! In a meteor storm, over 1,000 meteors blaze across the sky every hour. In 1833, people all over America woke up to see hundreds of stars falling every minute! All night, the sky was brightened by meteors that rocketed through the night by the thousands! Since no telescopes or fancy equipment were needed to see the storm, ordinary people were able to see that wonderful and rare sight. Many artists tried to paint pictures of the “rain of stars” that fell so heavily that night. Newspapers ran many stories about the storm. What they saw was a Leonids meteor storm. This display was so beautiful and amazing that meteors suddenly captured the attention and imagination of people everywhere. Scientists were inspired to begin a serious study of meteors and their causes.

The best way to watch a meteor storm is with your eyes. Telescopes are not required. Dress warmly. Set up a comfortable lounge chair with blankets and snacks or spread out a blanket. Lie down and look up at the sky. Watch the beautiful flashes of light from tiny “sky candles” created in the long-ago dawn of our Solar System.



FALLING STARS: CONTINUED DO YOU KNOW YOUR COMETS FROM YOUR METEORS?

DIRECTIONS:

Some of the following words and phrases describe comets. Some words and phrases describe meteors. Some words and phrases describe meteoroids. Some describe more than one. Based on what you learned in the article "Falling Stars," write "comets," "meteors," and/or "meteoroids" by the appropriate words and phrases.

- 1 shooting stars _____
- 2 composed of minerals and ice _____
- 3 orbits Sun _____
- 4 has a tail _____
- 5 speedy streak of light _____
- 6 usually weighs less than a grain of sand _____
- 7 hits the atmosphere faster than 90,000 miles per hour _____

- 8 falling stars _____
- 9 surface melts into gas and dust when gets close to Sun _____

- 10 lasts a second or two _____
- 11 travels slowly across the night sky _____
- 12 may come in showers or storms _____
- 13 remains in the sky for many days or weeks _____





Name _____ Date _____



WEB QUEST

INTRODUCTION:

During this Web quest you'll learn about some amazing things related to the science of space: **gravity, black holes, and robots.**

Gravity

Explore the subject of gravity at <http://spaceplace.nasa.gov/en/kids/orbits2.shtml>, then answer the questions below based on what you find.

- 1 Look at the spinning red ball in the animation. Other than gravity, what force is driving its circular movement?

- 2 According to the article, what might the leaf, nautilus, and flowers that are pictured all have in common?

Black Holes

Visit www.nasa.gov/worldbook/blackhole_worldbook.html to learn more about black holes, then find the answers to these questions.

- 3 Why can't you see a black hole?

- 4 According to the article, what two things must happen for a black hole to form?

Robots

Robots have been helping humans on Earth and in outer space for a long time. Go to www.nasa.gov/audience/forchildren/home/F_NASA_Robot_Storybook.html and learn all about them. Then locate the answers to the last two questions.

- 5 Name four ways in which scientists use robots:

- 6 Find the names of three robots that are spacecraft and list them here:
