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Our World in Space [6th grade]

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Unit: Our World in Space
Grade: 6

Stage 1: Desired Results

Understandings

Students will understand that…

- All the components of our solar system and universe function as a system.
- Gravity is the force that holds our solar system and our universe together
- Our sun and our solar system is one of hundreds of billions in our galaxy and our galaxy is one of hundreds of billions in our universe.
- As Technology (including telescopes, satellites, and space travel) expands so does our knowledge of our universe, but our knowledge and technology is limited.

Essential Questions	Knowledge & Skill
• How is our universe a "system"? • Is our solar system unique? • How do we know what's out there?	TEKS 6.5a Student Identifies and describes a system that results from the combination of two or more systems such as in the solar system. TEKS 6.5b Student describes how the properties of a system are different from the properties of its parts. TEKS 6.13 The student knows the components of our solar system. TEKS 6.13a Students identify characteristics of objects in our solar system including the Sun, planets, meteorites, comets, asteroids, and moons. TEKS 6.13b Student describes types of equipment and transportation needed for space travel.

Stage 2: Assessment

A travel guide of the galaxy.

Students will conduct a web search to enrich their understanding of the components of the universe. Students will then create a travel brochure describing

- Description of the 3 destinations including how long it would take to get there
- Description of what travelers should expect to see during their journey
- Description of the type of space craft that would be necessary

Other evidence:

Test: Unit Exam
Quizzes: Our Universe
Academic Prompts:

- How is our universe a system made up of many systems?
- What would a day on another planet be like?
- End of Section Questions

Homework: Complete unfinished class work

(See attachments)

Stage 3: Learning Activities

(Steps taken to get students to answer Stage 1 questions and complete performance task)

How is Our Universe a System?

Day 1: An Introduction to the Universe

- Students will come in to find the room decorated with various images of space. They will get to work on the warm up: *What is out there in space?*
- After the warm up the teacher will ask students to share their warm up responses and will probe students to think about things they already know about the universe.
- The teacher will introduce the advance organizer that will be used throughout the Unit.
- The teacher will show the *Our Universe* slide show with a discussion of gravity as the glue that holds the universe together

Day 2: Systems within the Universe

- Students will complete the warm up: "What is a system?"
- Discussion of systems
- Think Pair Share: Based on what you already know and what you have already seen of the Universe, what kinds of systems do you think make up the universe?
- As a class we will read the beginning of section one. There will be a brief introduction of what a solar system is and how big it is.
- The class will go to the foot ball field and recreate a model of the solar system to scale. We will discuss distances in terms of how far it is from San Antonio to Austin and other places that students have visited.

Day 3: Things to Know (Substitute)

- Students will complete the warm up: "What is the speed of light?"
- Before diving into our study, there are several terms that students need to know. Students will define the vocabulary words using their book. They will create a flip book with the word, the definition, and create an illustration of 10 of the words.
- If students complete the assignment they can begin working on their Exploratory Activity.

Day 4: Our Star: The Sun (Substitute)

- Students will complete the warm up: "What are the 6 layers of the Sun?"
- Students will view the video, "Savage Sun" and write down 3 facts and one question that will be addressed upon our return.

Day 5: Our Star: The Sun

- Students will complete the warm up: Would you weigh more on earth or on the sun? (page 545)
- The class will briefly review the relationship between mass and weight and why students would weigh more on the sun.
- Students will review their video notes and share out some of the things they learned and will have an opportunity to ask questions about the things they saw in the video.
- As a class, students will read chapter 20 section 1, "The Sun: Head of the Family" and "Solar Activity"
- In pairs, students will complete student notes on the sun. (From Provided Unit Resources)
- To assess understanding of basic facts of stars- namely, the sun, and the universe as a system students will take an open notes quiz.

What makes our Solar System Unique?

Day 6: Our Planets

- Students will complete the warm up: "What are the 4 inner planets?"
- Students will read the section 2 in pairs using the say something model and will create a solar system completing notes on each planet:
    - On the planet shaped sheets students will fill in Data tables on the front and will take notes on the back. They will color the planets appropriately and string them together to create a model of our solar system.

Day 7and 8: Our Planets Continued

- Students will complete the warm up "What are the four outer planets?" and "What is Saturn known for.
- Teacher Student Check in- Check in to see where students are, and what interesting they have learned about the planets
- And will continue working on their solar systems.
- Debrief- See where students are, and ask questions based on where they are.

Day 9: A Day on Another Planet

- Students will complete the warm up, "How can you remember the order of the planets from the sun?"
- Students will put their planets with their notes together to create their own solar system. Then we will discuss how the distance from the sun and their rotation affects the conditions on the planets
- Pairs of students will be assigned a planet and will describe a day on that planet using their book and provided recourses. Students will then present their discoveries to another pair of students.

Day 10: Other Bodies in Space: Comets, Asteroids, and Meteorites

- Warm up: "Look at figure 34 on page 560. What is the region between mars and Jupiter where many solar bodies can be found?"
- Students will be coming back from spring break and will need a review, so the class will review for about 5-10 minutes. Students can use their solar systems to answer teacher questions?
    - What would a day be like on mars? What would you expect to find there?
    - What would it be like to visit Venus?

    - If you visited one of the outer planets would you be able to land on it like you would land on mars or mercury?
- The teacher will explain that between the inner planets and outer planets we find the asteroid belt. Asteroids are small rocky bodies of course small is relative. There are some asteroids like Ceres that are so big that some astronomers classify them as dwarf planets (like Pluto). Today we will be discussing some of the smaller solar bodies such as Asteroids, meteorites, and comets.
- As a class students will read pages 559-561 and the teacher will provide extra information about these bodies
- Students will work in pairs to identify whether each description in the Small Space Bodies notes applies to Asteroids, Meteorites, Comets, all, or some of these space bodies.
- Next the class and each student will create a Venn diagram using new knowledge of these solar bodies.
- Students will complete questions independently about asteroids, meteorites and comets:
    - Why is the study of comets, asteroids, and meteorites important in understanding the formation of our solar system?
    - Why do comets 2 tails often point in different directions?

Day 11: Other Bodies in Space: Moons

- Students will complete the warm up "Which planets have moons?" (page 555)
- Students will read and discuss The first part of Chapter 20 Section 3 "Moons and Other Bodies" as a class will watch the video "Moon Dance" this video describes the formation of the moon and how the moon affects Earth.
- In pairs students will read about the other planets moons and complete the student notes "Moons"
- Students will complete the questions:
    - Why does the moon have more impact craters than Earth?
    - How does the moon affect Earth?
    - What makes the relationship between Pluto and Charon unique?
    - What are 2 properties of Neptune's moon Triton that make it unusual?
    - How does knowing the age of a lunar rock help astronomers estimate the age of a planet?

Days 12-13: Web Search

How do we know what's out there?

Day 14: History of Space Travel and Technology

- Warm Up: What does NASA stand for and why was it founded?
- The teacher will ask students what they know about NASA and space travel.
    - Have we ever traveled to the edge of our galaxy?
    - Have we ever been to Jupiter?
    - Have we ever walked on mars?
- The teacher will present the Space Travel Slide Show including the Video "Space Exploration: Rockets: as Students complete student notes
- The teacher will show a short video and discuss limitations to space travel.

Day 15: Space Travel Jigsaw

- Warm Up: What is a space probe?

- Students will complete a Jigsaw Cooperative Learning Activity to learn about different missions involving space travel. Students will be in groups of 4 and will become specialists in
    - Missions to the Moon
    - Missions to Mars
    - Missions to Venus
    - Missions to the Outer Planets
    - Comet s and future Missions
- Students will then answer questions about these missions and about space travel and technology.

Day 16: Buffer Day
Day 17-18: Travel Brochure
Day 19: Review For Exam
Day 20: Exam

Monday	Tuesday	Wednesday	Thursday	Friday
26 School Holiday	27 Day 1 An Introduction to the Universe	28 Day 2 Systems Within the Universe	1 Day 3 Getting to know Vocabulary TMSA-Substitute	2 Day 4 Our Star: The Sun
	How is our universe a system?			
5 Day 5 Buffer Day Quiz	6 Day 6 Introduction to our Solar System	7 Day 7 Our Planets	8 Day 8 Our Planets A day on Another Planet	9 Immigration day
How is our solar system unique?				
12	13	14	15	16
Spring Break				
19 Day 9 Our Planets A day on Another Planet	20 Day 10 Other Bodies in Space Cont.	21 Day 11 Other Bodies in Space Cont.	22 Day 12 Computer Lab	23 Day 13 Computer Lab
	Half Days- Conferences		Web Search	
26 Day 14 History of Space Exploration	27 Day 15 Exploration Jigsaw	28 Day 16 Buffer Day	29 Day 17 Performance Assessment	30 Day 18
How do we know what's out there?				
2 Day 19 Review	3 Day 20 Unit Exam	4 Buffer Day	5 Buffer Day	6 Buffer Day

Unit Exam

Planning a Trip that is OUT OF THIS WORLD!

Pretend that you are a travel agent that provides your clients with a special kind of vacation. Suppose you have the ability to set up trips into outer space! These kinds of trips would require special technology, may require a different kind of time frame, and would provide vacationers with an out of this world experience!

You are going to use your knowledge of space to create a travel brochure that describes the trip plan that you are providing to your clients.

You will need to…

- Create and illustrate a cover for the brochure
- Select three destinations and describe what the traveler will find when they reach this destination and provide illustrations.
    - Possible Destinations may include other planets or dwarf planets, moons, comets, asteroids, or stars (including the sun).
- Describe and illustrate the type of technology that will be necessary
    - How fast will it have to travel?
    - How long will it take you to get to each destination?
- What can travelers expect to experience or see along the way?
    - Will they see comets, asteroids, meteorites, stars, black holes, other planets… etc.?
    - What will it be like in space?

You will be graded on:

Completion of Colored Illustrations (10 points)

Description of three solar bodies that will be your Destinations. (60 Points)

Description of necessary Technology and time span (15 points)

Description what travelers should expect to see or Experience along the way (15 points)

Planning a Trip that is OUT OF THIS WORLD!

	Destinations (60%)	Technology (15%)	Experiences (15%)	Illustrations (10%)
AWESOME!!!	50-60—I creatively and accurately described the three destinations that passengers will make during their space cruise. I clearly show my understanding of space is in these descriptions.	10-15—I have described the type of space craft that would be necessary including how fast the space craft would have to travel and how long it would take me to my destinations. The information is accurate	10-15—I have used my creativity and imagination to accurately describe what passengers will see and experience during their trip.	8-10-- I have neatly and creatively illustrated my brochure cover, and provided illustrations for each of my 3 destinations, and of the space craft or the technology described in my brochure.
Pretty Good	40-49—I have described the three destinations that passengers will be making accurately, but some of my explanations did not show my understanding of space.	7-9—I have described the type of space craft that would be necessary including how fast it would have to travel but the amount of time it would take to get to my destinations is not accurate.	7-9—I have described what passengers will see and experience during their trip but some of the information may be incomplete or inaccurate.	5-7— I have illustrated my brochure cover, and provided illustrations for each of my 3 destinations, and of the space craft or the technology described in my brochure, but some of these pictures may not be neat or colored
I Expect More!	20-39—I described my destinations, but some of my descriptions were inaccurate or incorrect.	4-6—I have described the type of space craft that would be necessary	4-6—I have described what passenger will see during their trip but most of my description is incorrect or inaccurate	3-4 I have illustrated my brochure cover, and provided illustrations for each of my 3 destinations, and of the space craft or the technology described in my brochure but have not colored or completed many of my illustrations
Not Cutting It	0-19—The descriptions I provided were inaccurate or incomplete	0-3—The description of my space craft and technology is incomplete	0-3—My description of what passengers should expect is incomplete and inaccurate.	0-2—I have not completed the illustrations for my travel brochure.

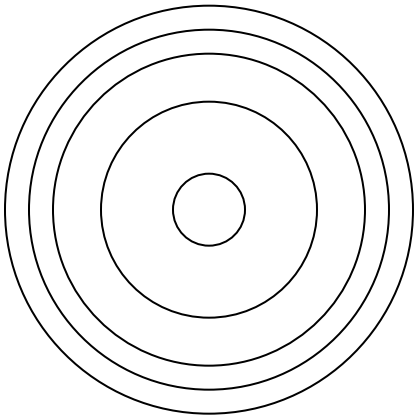
Name: _____ Date: _____ Period: _____

Our World in Space Quiz I

1. What is a system?

2. How is our universe a system made up of many systems?

3. Label the diagram of the sun:



4. Describe the process the sun uses to convert matter to energy ($E=mc^2$).

5. In which layer does this process occur?

Facts to include in Venn Diagram- Those in Italics are NOT listed in Student Sheet

COMETS

- Small body of ice, rock and cosmic dust loosely packed together
- Formed in cold outer solar system
- *The solid center is called the nucleus*
- *When they get close to the sun, the solar radiation causes the heat and dust to glow like a long tail*.
- They may have 2 tails-
    - Dust tail is from heat and dust and can stretch millions of Kilometers in space. It stretches our behind the nucleus.
    - Ion Tail is from electrically charged particles and always points away from the sun because of the solar wind.
- Has a large elliptical orbit around the sun

ASTROIDS

- Can range in size from a few meters to more than 900 km in diameter.
- *Many of the larger ones are spherical*
- Located in the Asteroid belt
- The ones located in the outer regions of the asteroid belt have dark reddish brown to black surfaces and may be rich in organic material
- The ones in the middle of the asteroid belt have dark gray surfaces and may be rich in iron
- The ones toward the inside of the asteroid belt (closest to the sun) have light gray surfaces and most likely have stoney or metallic composition.

METEOROIDS

- Are like asteroids, but much smaller.
- Are most likely pieces of asteroids
- When they fall to Earth's surface they are called meteorites
- When they hit the Earth's atmosphere they surface melts and lets off light *that looks like shooting stars.* We call these bright streaks meteors.
- There are three major types of composition- stony, metallic, and stony-iron

METEOROIDS AND COMETS

- Can cause what looks like bright streaks in the sky
- *Contribute to Meteor Showers (Dust and debris from comets and clusters of meteoroids cause meteor showers)*

ASTROIDS AND METEOROIDS

- Small rocky body that revolves around the sun.
- Have different compositions
- Can have odd shapes

ALL THREE

- *Small Solar Body*
- Orbits the Sun
- Made up of material that was left over from when our solar system formed
- *May provide us with information about the early solar system*

Name: _____ Date: _____ Period: _____

Small Solar Bodies: Comets, Asteroids, Meteoroids

Write the appropriate letter or letters next to each statement
Does the statement refer to…

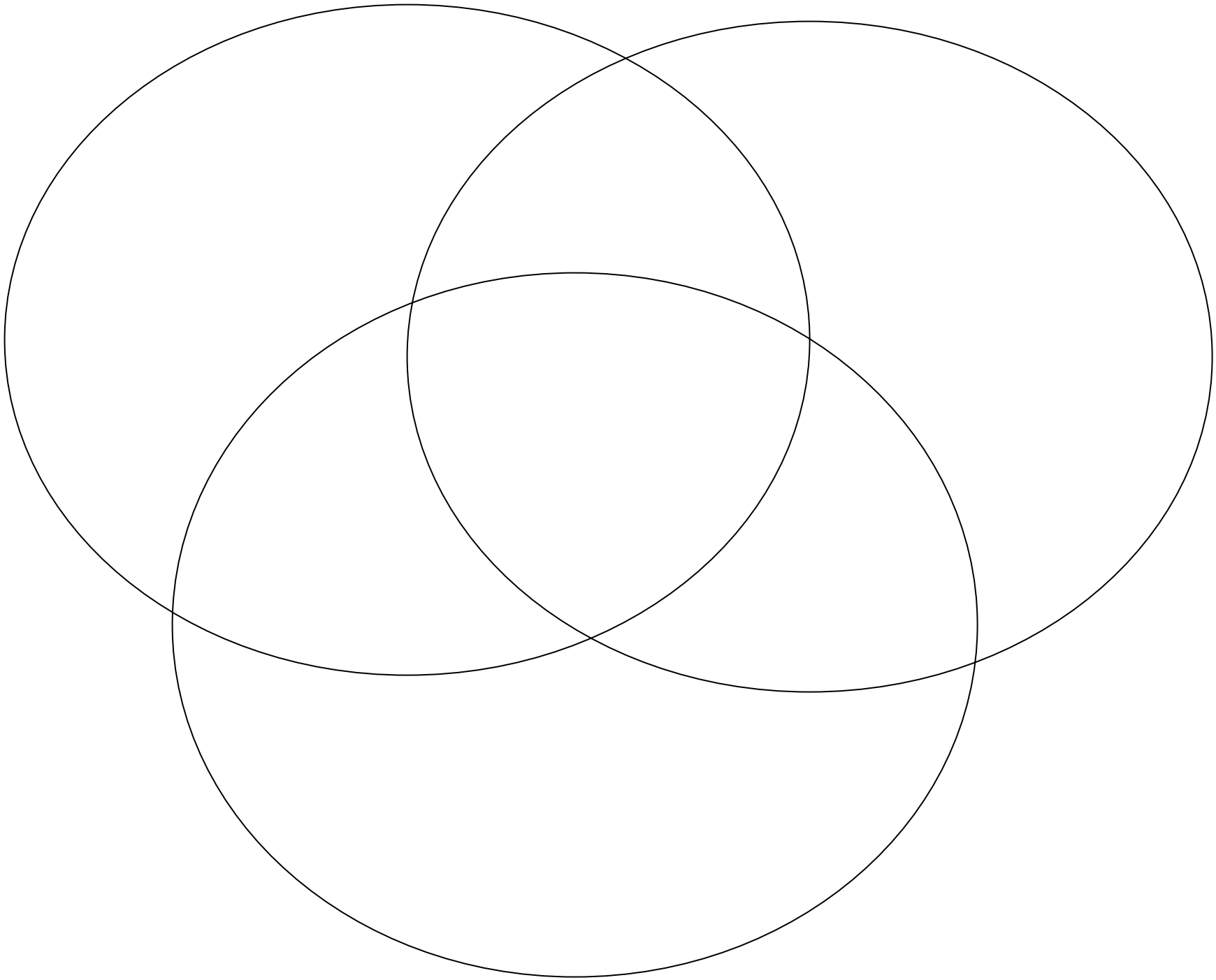
A. Comets B. Asteroids C. Meteoroids

Example:
_A, B, C_ May provide us with information about the early solar system.

1. _____ Orbits the Sun.
2. _____ Can cause what looks like bright streaks in the sky.
3. _____ Small rocky body that revolves around the sun.
4. _____ Located in the Asteroid Belt.
5. _____ Are like asteroids, but much smaller.
6. _____ Small body of rock, ice, and cosmic dust loosely packed together.
7. _____ Made up of material that was left over from when our solar system formed.
8. _____ May have 2 tails: the Dust tail that stretched out behind it up to millions of kilometers and the Ion tail that is made our of electrically charged particles and always points away from the sun because of solar winds.
9. _____ Have a large elliptical orbit.
10. _____ The ones toward the outer region of the asteroid belt are a dark reddish brown to black and may contain organic material; the ones in the middle are dark gray and may be rich in iron; the ones on the inside are light gray and may have a stony or metallic composition.
11. _____ Three major compositions are stony, metallic, and stony-iron.
12. _____ Can have odd shapes.
13. _____ When they fall to earth they are called meteorites.
14. _____ When they burn up in Earths atmosphere and create light they are called meteors.
15. _____ Have different compositions.
16. _____ Are most likely pieces of asteroids.
17. _____ Can range in size from a few meters to more than 900 km in diameter.
18. _____ Formed in the cold outer regions of the solar system.
19. Why is the study of comets, asteroids, and meteorites important in understanding the formation of our solar system?

20. Why do comets 2 tails often point in different directions?

Comets, Asteroids, and Meteoroids



Name: _____ Date: _____ Period: _____

THE MOONS

1. Why does the moon have more impact craters than Earth?

2. How does the moon affect Earth?

3. What makes the relationship between Pluto and Charon unique?

4. What are 2 properties of Neptune's moon Triton that make it unusual?

5. How does knowing the age of a lunar rock help astronomers estimate the age of a planet?

Astronomy Web Search

You guys have asked some GREAT questions over the past few weeks. Here is your opportunity to discover the answers and discover astronomy on your own!

Use the internet to answer the following Questions. When you are finished feel free to keep exploring other topics, or check out the cool links I've provided at the bottom of the page.

Black Holes

http://imagine.gsfc.nasa.gov/docs/science/know_l2/black_holes.html

1. What is a black hole?

   ANSWER THE QUESTION HERE

2. What would happen if you tried to enter a black hole?

   ANSWER THE QUESTION HERE

Pluto

http://www.msnbc.msn.com/id/14489259/

1. Why isn't Pluto considered a planet anymore?

   ANSWER THE QUESTION HERE

2. What is it considered now?

   ANSWER THE QUESTION HERE

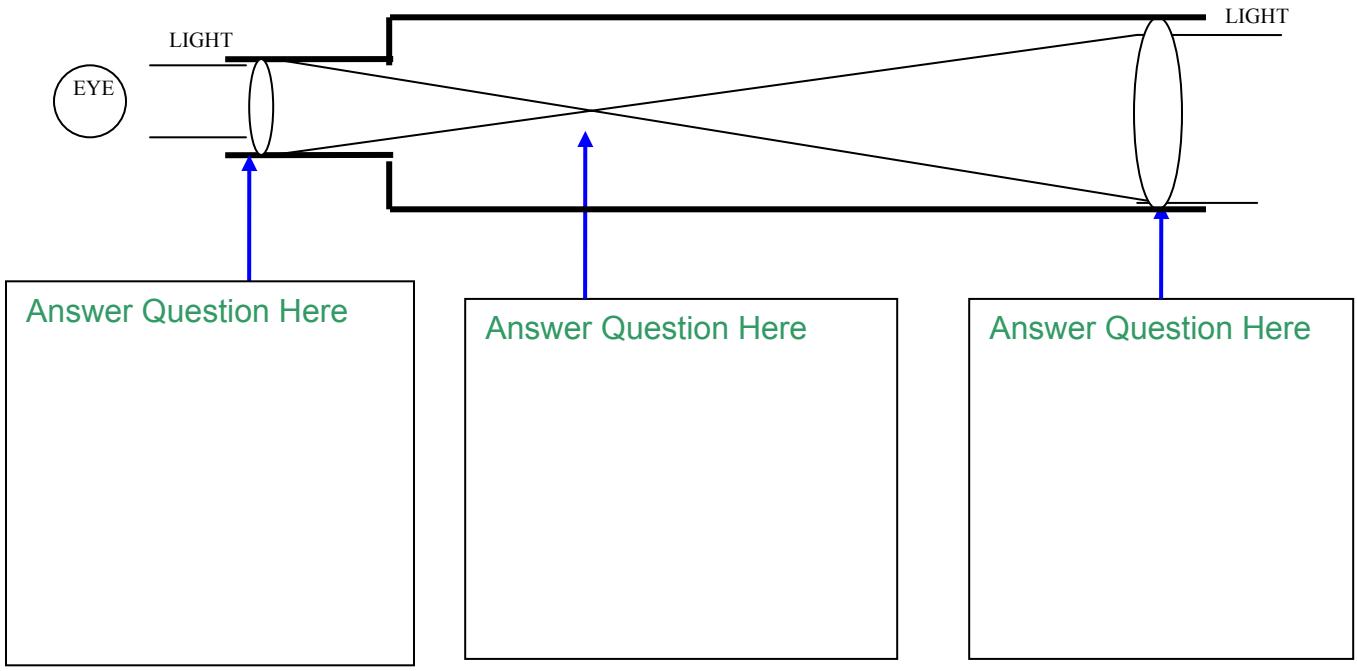
Telescopes- How do they work?

http://www.howstuffworks.com/telescope1.htm

1. What are the two types of telescopes?

ANSWER THE QUESTION HERE

2. Label the diagram below and describe what happens in each part of the telescope



Rockets

http://www.howstuffworks.com/rocket.htm

1. Why is space exploration difficult?

ANSWER THE QUESTION HERE

2. How are rocket engines different from regular engines like the ones in our cars?

ANSWER QUESTION HERE

The Universe

http://math.ucr.edu/home/baez/physics/Relativity/GR/centre.html

1. Where is the center of the universe? (Or is there one?)

ANSWER QUESTION HERE

2. How is the universe like a balloon that is being blown up?

ANSWER QUESTION HERE

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Check out these cool web sites when you are done

NASA's "Imagine the Universe" page is put together by the Goddard Space Flight Center and has lots of cool information:
http://imagine.gsfc.nasa.gov/docs/science/science.html

Explore some of your curiosities about physics and astronomy at URC's FAQ Page:
http://math.ucr.edu/home/baez/physics/index.html

Fine our more about our solar system, and space exploration at Kid's Astronomy. You can also play some cool games!
http://www.kidsastronomy.com/
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Missions to the Moon

The Luna Program was one of two lunar exploration programs conducted by the Soviet Union. This was a very long program that ran from 1959-1976. The program collected data about the moon for scientific purposes and to help plan future missions to the moon. In 1966 The Soviet union put the first space probe on the moon, the *Luna* 9. During the next 10 years the Soviet Union and the United States made more than 30 lunar missions to collect data and take picture.

In 1994, the United Sates launched the probe *Clementine*. *Clementine* was the first of a new class of small, lightweight spacecrafts that was designed to remain in space for longer periods. The spacecraft was put into orbit around the moon and mapped the moon's surface. *Clementine* returned valuable information to earth including possible evidence of water at the south pole of the moon. Anywhere else on the moon, sunlight would cause any ice or water to vaporize.

The most well known Lunar Missions are the Apollo Missions. On July 16, 1969, at 8:32 am, the United States landed two men, on the surface of the moon in Apollo 11. Neil Armstrong was the first man on the moon and spoke the famous words, "One small step for man, one giant leap for mankind as he stepped out onto the surface of the moon. Many experiments were conducted and many moon rocks were taken back to Earth to be studied in labs.

http://www.lpi.usra.edu/expmoon/
Holt Science and Technology for 6th Grade

What are the key points you will bring back to your group to teach them about missions to the moon?

Missions to Mars

Missions to Venus

Missions to the Outer Planets

Comets and future Missions

Space Exploration Q&A