Week 2

3rd Grade

Independent Study Packet

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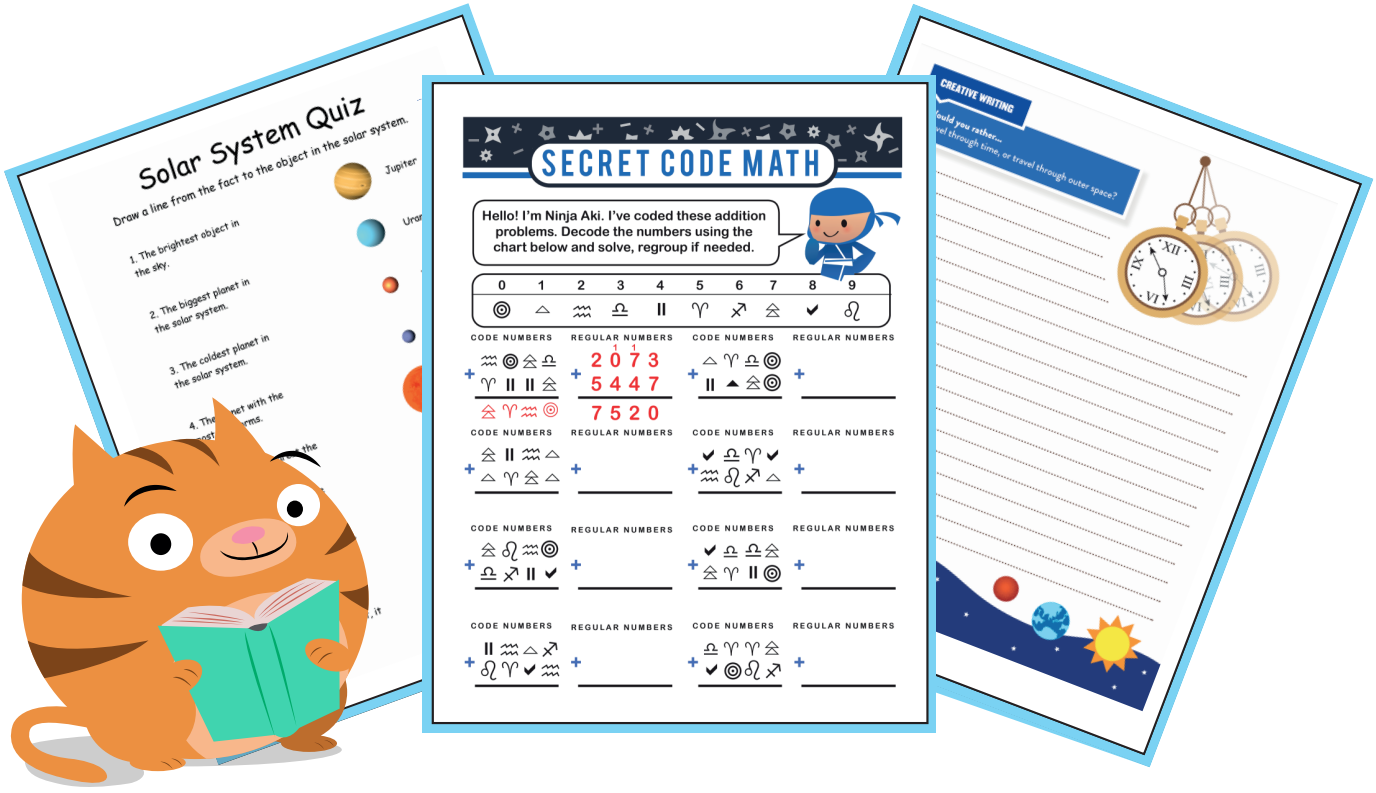


5 MORE Days of Independent Activities in Reading, Writing, Math, Science, and Social Studies

Helpful Hints for Students and Families

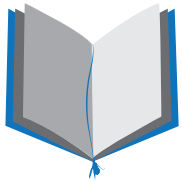
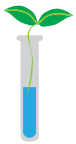
Materials You Will Need:

- Pencils
- Extra paper or a notebook/journal. (You may put everything into one notebook if you like.)
- Colored pencils, markers, or crayons for some of the activities
- Internet access for online research
- You will need different materials for the optional Design Challenge

Directions & Tips

- There is a schedule for each day. You may complete the activities in any order. Social studies and science activities may take you more than one day to complete.
- Make sure to plan your time so that you don't let things pile up at the end.
- Read the directions carefully before completing each activity.
- Check off each of the activities when you finish them on the activity menu.
- Make sure an adult signs the activity menu before you bring it back to school.

Activity Menu

	Day 1	Day 2	Day 3	Day 4	Day 5
Reading 	Read for 20 minutes and answer three of the questions from the reading log on another piece of paper or in a journal. **Challenge:** Try not to repeat a question!				
	Introducing Mae Jemison, the Star	**Who Am I? Women in Space**	Why Does the Earth Spin?	Gemini 4	**Solar System Quiz**
Writing	**Two Truths and One Lie:** Mae Jemison	**Make a Planet**	**Definition of a Planet**	**Writing Science Fiction**	**If I Had a Million...**
Grammar Practice	**Its or It's?**	**Great Grammar:** Compound Sentences	**Great Grammar:** Possessive Pronouns	**Possessive Nouns**	**There, Their, or They're**
Math	**Solar Subscription Subtraction**	**Secret Code Math**	**Collecting Data**	**Follow the Instructions**	**Addition and Subtraction:** Runaway Signs
Social Studies	**U.S. Maps and States**				
Science 	**The Solar System and Solar Energy**				

Parent/Guardian Signature: _____

Reading Log

1. Read a fiction or nonfiction book on your own or with a grown-up.

2. Put your name and the title of the book at the top of a new page.

3. Choose one of the prompts from the chart and write the letter at the top of the page in the title of the book.

4. Write 3–5 sentences about your book. Remember, not all of the questions make sense for every book!

a. What details in the text describe one of the characters? Draw a sketch of the character.	b. Which words in the book were tricky? What strategy did you use to help you understand them?	c. What lesson is the author trying to teach the reader? How do you know?
d. What is your favorite part of the text? Why?	e. What is the most important part of the story? Why?	f. What did the author want you to learn? How do you know?
g. How does the main character feel in this book? How do they change?	h. What is the most interesting part of the text? Why?	i. What are three facts you learned from reading this book?
j. How do the pictures in the text help you understand what you are reading? Give an example.	k. Where does the story take place (the setting)? How does the author describe it?	l. What information was surprising in the text? Why?
m. What is the character's main problem, and how did they solve it? How would you have solved it?	n. How is this book like another you have read? How is it different?	o. What was a major event in the story? Why was it important to the story?

Day 1

Reading	Mae Jemison is a pioneer; she was the first African American female in outer space! This biography details her early life, education, and experience as an astronaut, as well as her life after NASA.
Writing	Use the worksheet to learn more about Mae Jemison and practice separating between facts and a lie.
Grammar Practice	Learn the difference between “it’s” and “its”. It’s important!
Math	Use your subtraction skill to solve the riddle.

Name _____ Date _____

Introducing Mae Jemison, the Star

"It's part of the imagination. All of science, all of space exploration - everything we do in the world is about imagination and using your creativity to expand beyond your normal boundaries."
- Mae Jemison

Introduction

Have you ever used your imagination to make something happen? Like, fly down the stairs to the dinner table, or wave a magic wand to clean your room? Well, you're not alone in using your imagination. Doctor Mae Jemison imagined herself in space as a child, and she is now famous for making that dream come true.

As an astronaut for NASA, Mae became the first African American female to fly into space. She was a mission specialist on the space shuttle *Endeavour* in 1992. Mae studied how living things act in space. She is also a doctor, researcher, teacher, and a businessperson.

Early Life and Education

Mae was born in Decatur, Alabama on October 17, 1956. She lived there until she was three years old, when her family moved to Chicago, Illinois. Her mother was an elementary school teacher, and her father was a carpenter. She has two older siblings, a sister and a brother.

When Mae was younger, she liked dance and science. She liked astronomy. She loved science so much she would help her brother and sister with their science projects. She also read books at the public library, especially about stars. Mae wanted to go to space. She never had any doubt that she would get there.

Mae won a scholarship to Stanford University in California. She was only 16 years old, but she learned a lot in her studies in science and in the arts. She double majored in chemical engineering and Afro-American studies. While on campus, she planned and performed in dance performances. After graduating from Stanford in 1977, she went to Cornell University Medical College in New York. In 1981, Mae became a doctor.

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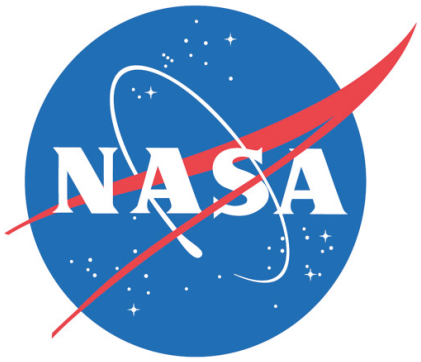
Name _____ Date _____

Introducing Mae Jemison, the Star

During summer breaks from school, Mae went to Cuba and Kenya to learn about medical care in other countries. Mae wanted to use her medical degree to help others. After her experiences abroad, she decided to join the Peace Corps in 1983. She served in the Peace Corps for two and a half years. During her time as a medical officer in the Peace Corps, she was able to use her knowledge of Swahili while working in West Africa. Not only does Mae speak English and Swahili, but she speaks Russian and Japanese as well.

Launching Her Way into the History Books

Over the years, Mae continued to think about her dream to go to space, so she applied to be an astronaut for NASA. Even though Mae's first application was denied because NASA stopped taking on astronauts at the time, she didn't give up! She applied a second time. In 1987, Mae was one of fifteen people chosen to become an astronaut out of 2,000 applicants.



NASA is an acronym for National Aeronautics and Space Administration.

Five years later, Mae worked on the STS-47 mission to study life in space. NASA had a joint mission with Japan for this flight. On the same mission was the first Japanese national to fly in space, Mamoru Mahri. Mae studied in space for eight days. Her experience in space was so important that she wanted to encourage more space travel.

Continuing Her Scientifc Work

After leaving NASA, Mae started her own businesses. One business was a camp called "The Earth We Share." It started through the Dorothy Jemison Foundation for Excellence, named after Mae's mother in honor of her work as an educator. The camp helps kids learn more about science. Kids go to the camp from around the world. At the camp, young scientists get to use their imagination and share their ideas about future missions.

Mae currently lives in Houston, Texas. There she is leading the 100 Year Starship (100YSS) initiative through the United States Defense Advanced Research Projects Agency (DARPA). The goal of this DARPA program is to make sure human space travel to another solar system is possible within the next 100 years. In 2012, Mae's team won a grant to research how to travel to other stars.

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Name _____ Date _____

Introducing Mae Jemison, the Star

Combining Arts and Science

All throughout her life, Mae had an artistic side. She is trained as a dancer, choreographer, and actor. Using her training, she has appeared on television over the years. When she was younger, she looked up to Uhura, a female officer in the television show Star Trek. Her real life blurred with her childhood imagination as she guest starred in the television show Star Trek: The Next Generation. Mae jumped at the chance to play Lt. Palmer in one episode. This was another example of her childhood dream coming true. It was also another experience that showed Mae the importance of the arts in expanding her imagination.

In her TED talk in 2002, Mae said, "We need to revitalize the arts and sciences right now in 2002." She says that understanding the arts can help young learners understand science better. Mae ended her TED talk by saying, "I like to think of ideas as potential energy. They're really wonderful, but nothing will happen until we risk putting them into action." She thinks it's time to act; it's time to teach the arts and science together.

There is no doubt that Mae used her imagination and worked hard to go beyond her normal boundaries. She is still trying to go beyond her earthly boundaries. The world, and maybe even a new star, is her oyster.

Directions: Answer the questions using evidence from the text.

1. What are some things Mae Jemison liked to do?

2. Why is Mae Jemison famous?

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Name _____ Date _____

Introducing Mae Jemison, the Star

3. What is a challenge Mae Jemison had in her life?

4. What does Mae Jemison mean when she says, "I like to think of ideas as potential energy. They're really wonderful, but nothing will happen until we risk putting them into action." Use information from the text to support your answer.

5. Reread the last section of the biography. Do you think teachers should teach arts and science together? Why or why not? Do outside research to support your answer.

6. In all of the journeys in her life, whether they were on earth or outer space, Mae Jemison used her scientific knowledge to help others. Write about a career you would like to try that can help people, too.

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Name _____ Date _____

Two Truths and One Lie: Mae Jemison

Read the three statements about Mae Jemison. Can you figure out which two statements are true and which one is false? Research using books, articles, or websites to confirm your answer. Circle the lie.

1 Doctor Mae Jemison joined the Peace Corps after earning her medical degree from Cornell Medical School.

2 When travelling on the space shuttle *Challenger*, Mae Jemison became the first African American female astronaut to enter space.

3 Jemison grew up in Chicago, and that is where she continued her love of dance and studies in science.

Answer these questions after doing some research.

1. Fix the false statement so that it is now true.

2. Choose a fact about Mae Jemison you think is important.

3. Explain why you chose that fact to share.

4. On a separate sheet of paper, write a paragraph about Mae Jemison using more than two sources for information (like a website and an article).

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Its or It's?

Circle the correct word in each sentence.

Its is a **possessive** pronoun.
It's is a **contraction** that means it is.

The tiger licked its it's paw.

I wonder if its it's going to rain tomorrow.

Its It's time to go to school.

My cat and its it's kittens are taking a nap.

Its It's going to be a long walk to the train.

That dress is beautiful! Its It's color is perfect for you.

I'm glad its it's sunny outside today.

Your puppy is so cute, what's its it's name?

Hurry up and catch the train! Its It's coming!

Have you seen my toy? Its It's not in its it's box.

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Grade 2

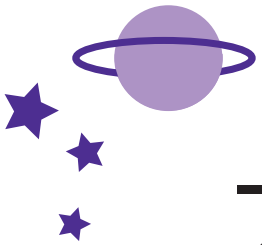
Solar System Subtraction: The 6th Planet

What's the 6th planet from the sun? Find out by finding the difference, then using the letters to spell out the name.

B	G	N	R
94 − 74 = ____	47 − 21 = ____	78 − 45 = ____	98 − 12 = ____

A	U	K	T
49 − 13 = ____	92 − 70 = ____	98 − 21 = ____	97 − 55 = ____

S	C
53 − 40 = ____	77 − 61 = ____



____	____	____	____	____	____
13	36	42	22	86	33

It has sixty one known moons. It is best known for its rings.

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Day 2

Reading	Use your research skills to match each person to the correct description.
Writing	Dream big and design your very own planet.
Grammar Practice	Learn how compound sentences are connected and then practice joining together simple phrases.
Math	Find the sum to break the code.

Name _____ Date _____

Who Am I? Women in Space

Directions: Read each description below. Then, use books and digital research tools to help you match the person to the description. Cut and paste the person's image and name to the correct description. Then, conduct further research using the instructions below.

Research Directions:

- Research one of the women online and/or by finding books at the library.
- Next, create a blog, piece of writing, poster, or artwork to teach others about what you learned.

I was born in Boston and went to Harvard University for college. I am an American engineer and a NASA astronaut. I flew to space onboard three Space Shuttle missions. I'm the second African American female to go into space. I spent 42 days in space, which is the record for the most time any African American astronaut has spent in space.	Who am I?
I was born in California. As a student, I loved math and science. I also loved playing tennis. In 1977, I applied to be an astronaut at NASA and was hired. At first, I worked to support other space shuttle flights. I also helped develop the robotic arm that helps put satellites into space. In 1983, I became the first American woman in space.	Who am I?
I was born in Karnal, Haryana, India. As a kid, I loved to learn about airplanes and flying. I moved to the United States in 1982 after getting my degree in India. I began working at NASA in 1988 as a researcher to learn about takeoff and landing. My first space mission was in 1997, when I was the first Indian woman to fly in space.	Who am I?
I was born in Alabama, but grew up in Chicago. As a child, I loved dancing and science. I joined the Peace Corps after earning a medical degree from Cornell Medical School. I traveled on the space shuttle *Endeavour* as a mission specialist. That is when I became the first African American female astronaut to enter space.	Who am I?

Kalpana Chawla

Mae Jemison

Sally Ride

Stephanie Wilson

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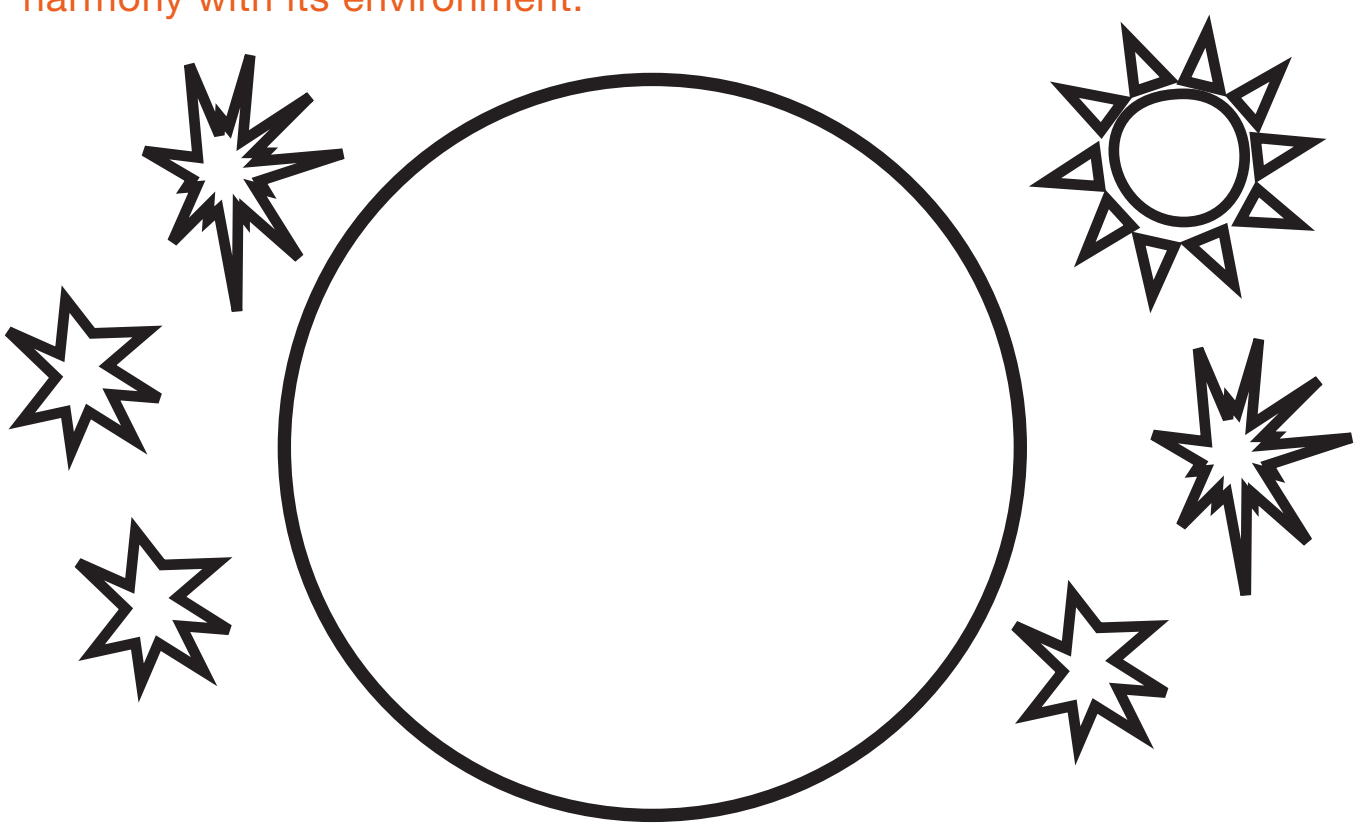
Name Date

MAKE A PLANET

Billions and billions of stars thrive in our universe, and many more planets orbit around those very stars. Astronomers and space enthusiasts hope that one day we will find a planet like Earth and work towards inhabiting it.

Scientists have just discovered a new planet. Draw a picture of it and come up with ways that humans can live on this planet in harmony with its environment.



What is the name of your planet? _____

How will people be able to live there? _____

_____

What steps will you take to protect the planet's environement?

_____

_____

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Compound Sentences

A **compound sentence** is made up of two or more complete sentences connected by a conjuction (a joining word) such as **and, but,** or **so.**

Tom walked through the haunted house,	but	he wasn't scared at all.

Create your own compound sentences on the lines below by combining a sentence from column A with one from column B and connecting them with a conjunction. You can use sentences more than once.

A	B
Jan went to the carnival.	She had a great time.
Jan wanted to ride the roller coaster.	She rode on all the rides.
Jan played arcade games.	She didn't have enough money.
Jan tried to win a stuffed bear.	She didn't stay for long.
Jan started to get hungry.	She stood in a long line.
	It started to rain.
	She won a kewpie doll.
	She bought a hot dog.

example Jan went to the carnival, but she didn't stay for long.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

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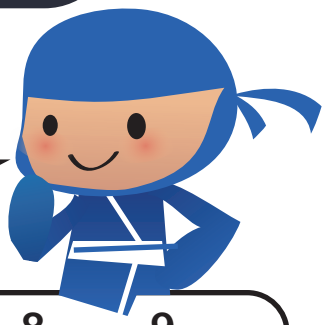
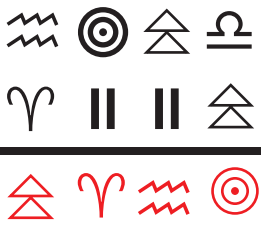
SECRET CODE MATH

Hello! I'm Ninja Aki. I've coded these addition problems. Decode the numbers using the chart below and solve, regroup if needed.



0	1	2	3	4	5	6	7	8	9
◎	△	♒	♎	♊	♈	♐	♢	✔	♌

CODE NUMBERS



REGULAR NUMBERS

1 1
2 0 7 3
+ 5 4 4 7
7 5 2 0

CODE NUMBERS

REGULAR NUMBERS

CODE NUMBERS

REGULAR NUMBERS

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REGULAR NUMBERS

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Day 3

Reading	Right now the Earth is spinning, even though we can't feel it. Do you know why?
Writing	Would you rather travel through time or travel through space?
Grammar Practice	Use these possessive pronouns to rewrite sentences, making them shorter and cleaner.
Math	Collect data around the house for this graph.

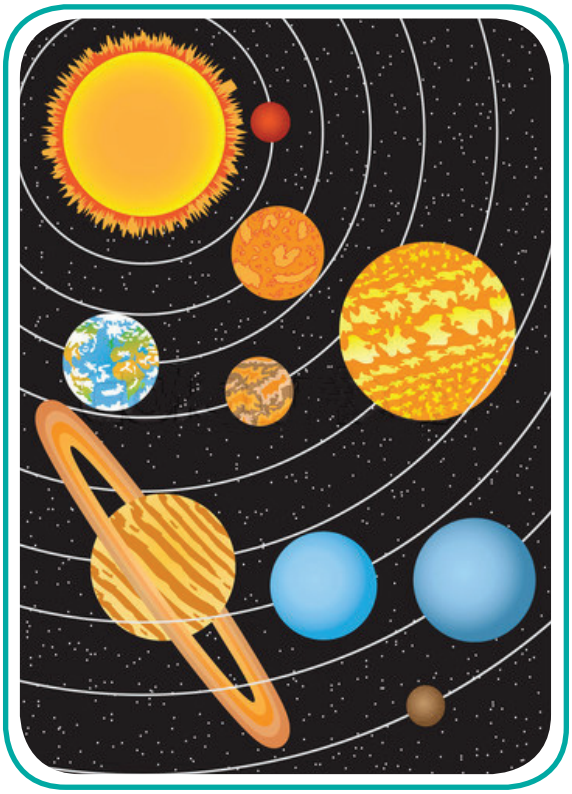
WHY AND HOW

Why does the earth spin?

The Earth spins because there is nothing in its way to stop it!

Long before our planet was a solid sphere, there was just a mass of dust and gas. Earth was formed when all this matter began to spin. That's how most planets and stars are formed!

Thousands of years later, the spinning cloud of dust and gas became our planet, and thanks to our position in the Solar System, neither the sun nor the moon had the power to slow Earth's rotation enough to halt it completely.



QUESTION & ANSWER:

What was Earth before it became a solid sphere?

. . . . . .

. . . . . .

How was Earth formed?

. . . . . .

. . . . . .

Can the sun and the moon stop Earth from spinning?

. . . . . .

. . . . . .

Imagine the Earth did not spin. How would this affect your life?

★ Remember that the Earth's rotation is responsible for the sun rising and setting. If the Earth did not spin, parts of our planet would spend half a year in darkness and another half a year in full sunlight.

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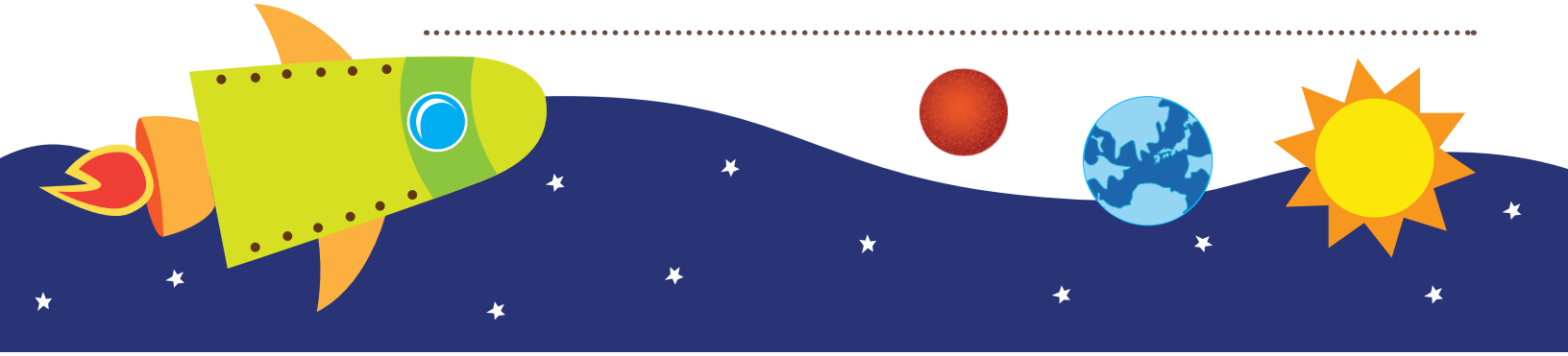
CREATIVE WRITING

Would you rather...
Travel through time, or travel through outer space?



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Possessive Pronouns

Pronouns take the place of nouns in a sentence. A **possessive pronoun** shows ownership.

Whose face is on the quarter?

Circle the **possessive pronouns**.

my your you its our her him

his your their there whose you

Rewrite each sentence to include a **possessive pronoun** with the noun.

1. I saw the dog that belongs to you. **I saw your dog.**
2. The coat that belongs to me is warm. _____
3. This is the house that belongs to Sue. _____
4. Tim's brother is five years old. _____
5. The horse's leg is sore. _____
6. Dad is driving the car that belong to us. _____

Some **possessive pronouns** can stand alone. These pronouns include **yours, mine, ours, hers, his and theirs**.

Complete each sentence with a possessive pronoun that stands alone.

1. This room belongs to my sisters. This room is **theirs**.
2. Those glasses belongs to you. Those glasses are _____.
3. These books belong to Bruce. These books are _____.
4. Two of these dollars belong to me. Two of these dollars are _____ .

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Collecting Data Sets

Collecting data is an important part of math and science. For practice, let's use the home or classroom as an investigative environment. Fill in the chart below by counting up the items that you see in your home or classroom.

desks									
books									
windows									
chairs									
lamps									
pictures on walls									
shelves									
	1	2	3	4	5	6	7	8	9

The data collection process is more than just counting. For example, the set of desks in a classroom will likely include a large number of student desks, but it will also include the teacher's desk and maybe other desks or tables.

How do you record the teacher's desk? It's not a "student" desk, but it still belongs in the set of desks. How do you record the difference?

In the set of shelves, other choices will have to be made. What if some of your shelves are attached to the walls, and some are not? They all belong in the set of shelves, but how will you record the difference?

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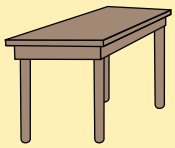
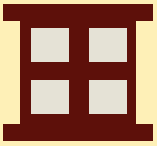
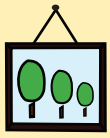
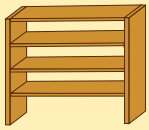
Collecting Data Sets

Think of different ways to organize each set into categories. Some sets may have only two categories, but others may have a lot. Record the number of items in each category using tally marks.

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Day 4

Reading	Gemini 4 set the scene for later space triumphs for the United States.
Writing	Learn about what makes a planet, a planet.
Grammar Practice	Learn all about apostrophes in possessives.
Math	Follow the directions to add, subtract or multiply.

U.S. SPACE MISSIONS

GEMINI 4

Astronauts Edward White and James McDivitt

Part of Project Gemini, Gemini 4 launched on June 3, 1965. Project Gemini was part of the U.S. space program to explore space. The project followed Project Mercury, which introduced manned space flight. The Gemini missions were important, as they had two astronauts on board each flight.

The astronauts on Gemini 4 were Edward White and James McDivitt. The Gemini 4 mission performed many things for the first time:

Launch of Gemini 4

- The first flight to go over one day. It was important for scientists to know if humans could stay in space long enough to travel to the moon.
- The first flight to be managed from the new Mission Control Center in Houston, Texas.
- The first flight to try and meet up with another spacecraft. While this was not successful, it gave scientists valuable information.
- Most importantly, Gemini 4 was the first flight where an astronaut would leave the capsule and go into space. Called a space walk, this was a dangerous, but important, objective of the mission. On June 3, for 20 minutes, Edward White left the capsule and floated in space. He was attached to the capsule by a cord. White took photographs of Earth during his space walk.

Gemini 4 splashed down safely on June 7, 1965 after four days in space. It had orbited the earth 66 times.

Q&A

How many astronauts were on board Gemini 4?

_____

What is it called when an astronaut leaves the command module and floats in space??

_____

What year was Gemini 4 launched?

_____

How many days was the Gemini 4 in space?

_____

Astronaut Edward White during his space walk.

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Name Date

WHAT IS A PLANET?

There wasn't a definition written for planet until 2006! According to the official definition, a planet is a celestial body moving in an orbit around a star that has no other bodies of similar size near it. When telescopes were invented and people began to look at the sky, they noticed some things they could see in the sky looked like stars, but acted differently. They appeared to be in different places at different times of the year. We later came to realize that these were the planets in our solar system.

We currently have eight planets and five dwarf planets in our solar system. A dwarf planet is an object that orbits around a star but is not powerful enough to have moved other objects away from it. Before 2006, there was another planet called Pluto. When scientists wrote out the definition of a planet, they realized Pluto did not fit. Pluto was renamed a dwarf planet in 2006.

Look at the astronomy words below. Use books or the internet to write a definition for each word.

star

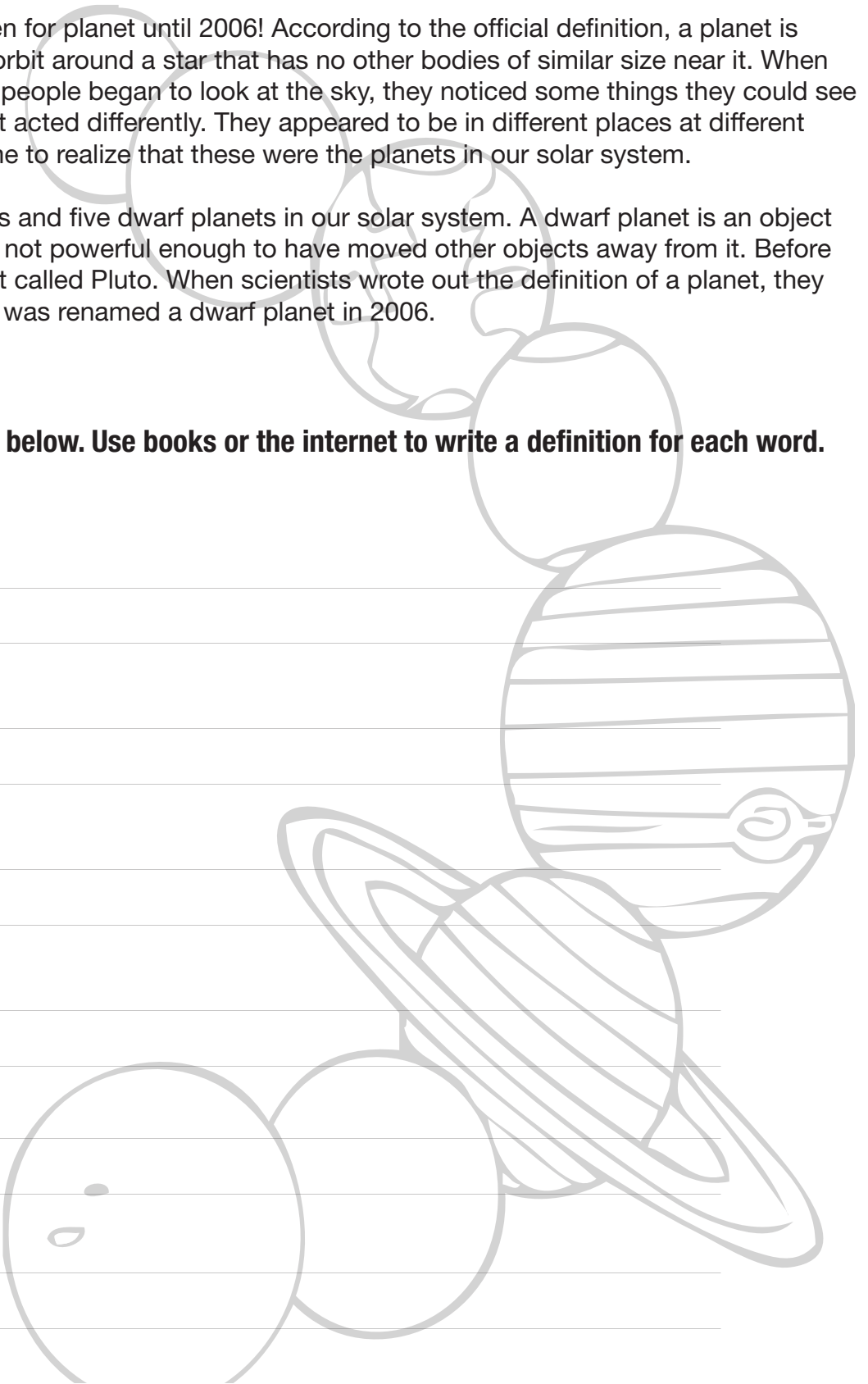
orbit

mass

satellite

moon

dwarf planet



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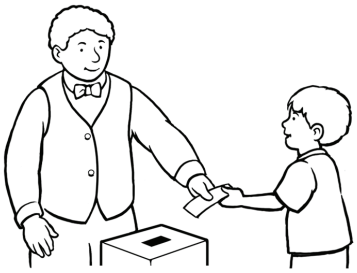
Singular Possessive Nouns



A possessive noun shows ownership. Most singular possessive nouns are made by adding 's to them.

Rewrite each sentence to include a singular possessive noun.

1. She dropped the toy of the baby. She dropped the baby's toy.
2. He painted the house of my dog. _____
3. I wore the cap of my friend. _____
4. The class of Mr. Gee is in the hall. _____
5. The singing of Mom woke me up. _____
6. I washed the windows of the car. _____

Complete each sentence by adding a **singular possessive noun**. Add articles as needed.

1. Mrs. Brooks shook the president's hand.
2. I went with _____ sister to the zoo.
3. She threw _____ ball over the fence.
4. He searched through _____ rooms for the book.
5. Carlos rode _____ bicycle around the block.

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How well can you follow directions?

Start with the string of numbers labeled "A". Follow the first set of directions and put the answer in the first box provided. Then cross out the numbers in string "A" that are used in the first set of directions. Write the unused numbers in string "A", in the same order, in the boxes provided. Continue with the next string of numbers (B, C, D, etc.) and set of directions (2, 3, 4, etc.).

A	9	~~4~~	2	9	~~8~~	5	4	1	0	3	6

EX. 1. Add the second number and fifth number. (4 + 8)

B	12	9	2	9	5	4	1	0	3	6

2. Multiply the third number and sixth number.

C									

3. Multiply the fourth number and eighth number.

D								

4. Add the last three numbers.

E						

5. Subtract the fourth number from the second number.

F					

6. Subtract the third number from the first number.

G				

7. Add the first number, second number and fourth number.

H		

8. Subtract the last number from the first number.

answer

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Day 5

Reading	Do some online research to answer this Solar System Quiz!
Writing	Imagine what you would like a million of, write about what you would do with it.
Grammar Practice	Learn about the difference between these homophones and fill in the sentences correctly.
Math	Plus and minus have run away! Fix the equations so that they are complete.

Solar System Quiz

Draw a line from the fact to the object in the solar system.

1. The brightest object in the sky.

2. The biggest planet in the solar system.

3. The coldest planet in the solar system.

4. The planet with the most life forms.

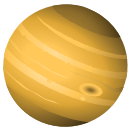
5. The planet nearest the sun.

6. Hottest planet in the solar system.

7. The planet with the nickname "The Red Planet."

8. Planet farthest from the sun.

9. This planet is so light, it could float in water.



Jupiter

Uranus

Venus

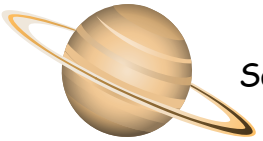
Mercury

Sun

Earth

Neptune

Mars



Saturn

ANSWERS: 1. Sun 2. Jupiter 3. Uranus 4. Earth 5. Mercury 6. Venus 7. Mars 8. Neptune 9. Saturn

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Name _____ Date _____

Fill-in-the-Blank

If I Had a Million...

What would you like one million of? Fill in the blanks below to show what you would do with it!

Example: If I had a million cats I would teach them how to fetch and dance. And then, I would open a cat circus, the first in the world, for all my friends to see. I would give Sasha 15 cats, and she would open a cat cafe so people who didn't have cats could come and play.

If I had a million _____ (plural noun) I would _____

_____

_____

_____

And then, I would _____

_____

_____

_____

I would give _____ (name of person) _____ (a number) _____ (same plural noun as previous)
and they would _____

_____

_____

_____

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There, Their, or They're?

Complete each sentence with there, their, or they're.

The words there, their, and they're are often confused.

There is used to refer to a place. Example: Fred is over there.
Their means belonging to them. Example: This is their cat.
They're is a contraction meaning they are. Example: I hope they're coming.

They went to visit _____ aunt.

Please put your coats _____ .

Kim likes eggs only when _____ hard-boiled.

_____ house is almost one hundred years old!

Have you been _____ yet?

_____ looking for _____ lost cat.

Tomorrow, _____ throwing a graduation party.

_____ going to Hawaii for summer vacation.

_____ is no more milk left.

What did you see over _____ ?

On Sunday, _____ family plays tennis.

Eva played with _____ new puppy.

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Runaway Signs

The plus and minus signs have run away! Now these equations are missing the **plus** and **minus sign**. Write the correct sign in each box.

8 ☐ 12 = 20

11 ☐ 6 = 5

7 ☐ 9 = 16

100 ☐ 75 = 25

67 ☐ 22 = 45

34 ☐ 13 = 21

150 ☐ 50 ☐ 20 = 120

12 ☐ 12 ☐ 20 = 4

20 ☐ 32 ☐ 4 = 56

42 ☐ 10 = 32

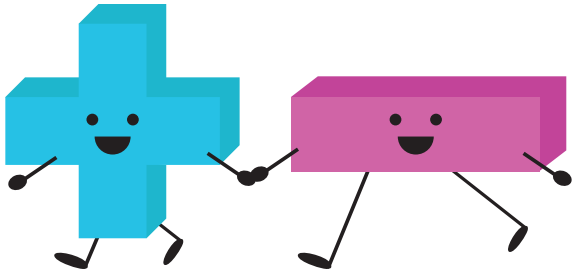
12 ☐ 12 = 24

55 ☐ 20 = 75

87 ☐ 2 = 85

20 ☐ 22 = 42

56 ☐ 16 = 40



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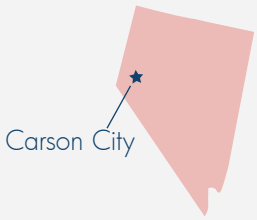
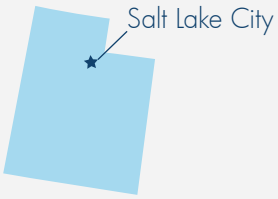
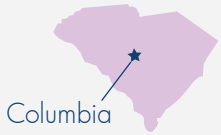
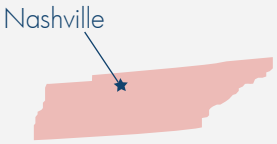
What's That State? 1

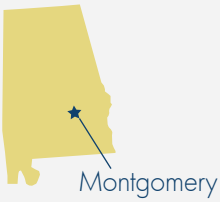
Use a map to help you identify the states by their shapes.
You can also use the state capitals as clues.

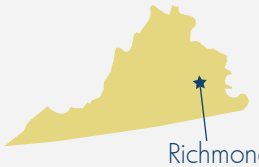












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Color the States!

Color the state where you live **red**.
Color the states you have visited **green**.
Color the states you want to visit **blue**.

Note: Alaska and Hawaii are not to scale.

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Color the States!

Look at the states you colored **green**. Why did you visit these states?

Look at the states you colored **blue**. Why do you want to visit these states?

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Road Trip!

Samantha and Jordan are going on a road trip from New York to California. They are going to stop at the capital of every state they pass through. Can you name the states they will pass through?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

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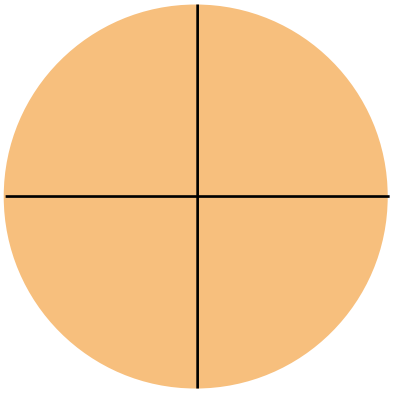
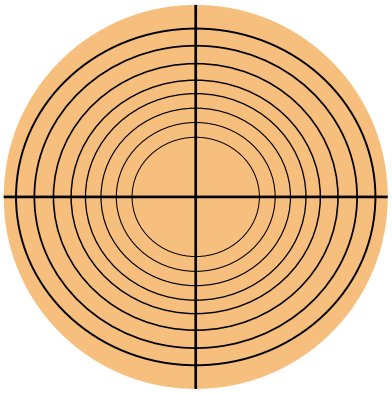
Make a Solar System Mobile

You will need:

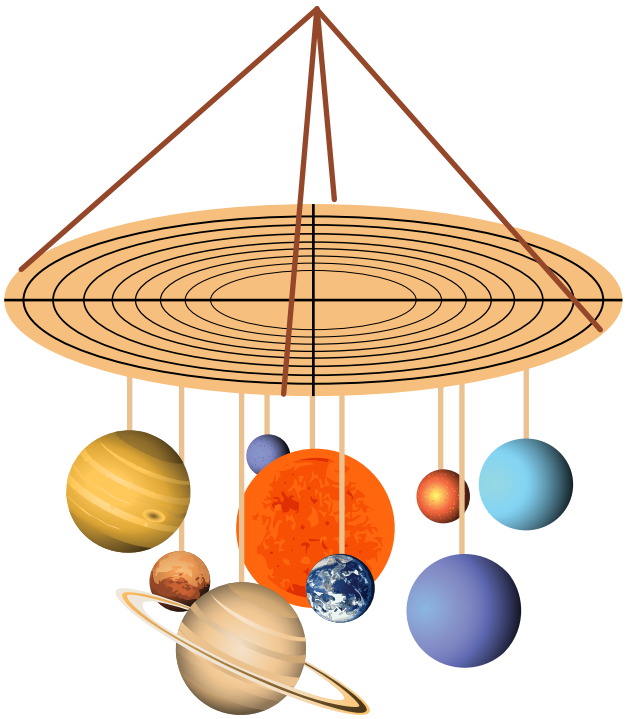
- String or yarn
- Tape or glue
- Scissors
- Hole punch or large nail
- Cardboard circle (one from a pizza works great)



1. Print out the sun and 8 planets on the following pages. Cut out each planet. (If you want, print out two of each planet and glue them together so that each planet has two sides.) Attach a piece of string to each with a piece of tape.



2. Draw a cross down the center of a round piece of cardboard.Then, using a compass, draw 8 circles, each bigger than the last. These will be the orbits of your planets.



3. With a hole punch or a large nail, make holes in the middle of the cardboard for the sun. Then punch a hole on each orbit, spacing them out. Attach the sun in the middle, and each planet on its orbit in this order, from closest to the sun to farthest: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

4. To hang your solar system mobile, make four holes on the edge of the cardboard circle and tie on four pieces of string, then tie them together.

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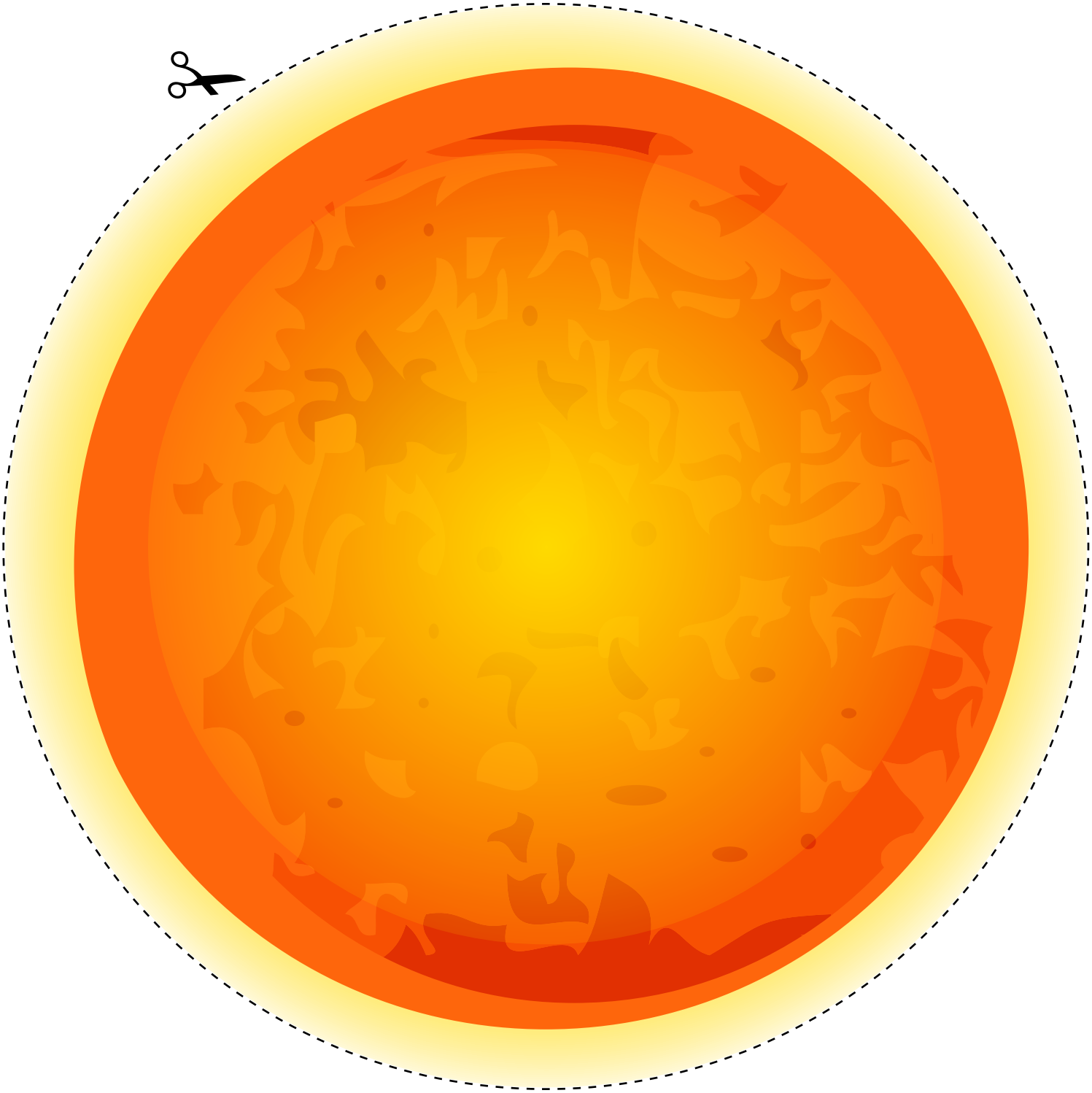
Make a Solar System Mobile

The Sun

The sun is much too big to show in accurate proportion to the planets, so we will just make it the biggest. Without the warmth and light of the sun, nothing could survive on our planet.



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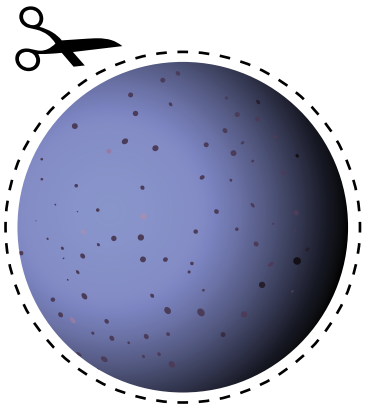
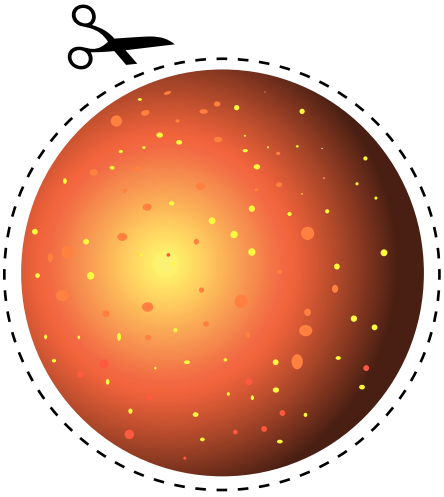


Mercury

Mercury is the closest planet to the sun. The surface of this barren planet is covered with craters. These craters have been created by thousands of years of being hit with asteroids and comets. There is no atmosphere on Mercury.

Venus

Venus is second closest to the sun. It is the hottest planet in the solar system. It is the brightest of all the planets, and is also known as the evening star and the morning star.



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Earth

The Earth is the third planet from the sun, and the fifth largest of the eight planets in our solar system. It was formed 4.5 billion years ago, and life appeared on its surface within 1 billion years. Earth is home to millions of species, including humans — and that means you!

Mars

Mars has three moons, and has the nickname "The Red Planet." Mars is the only planet whose surface can be seen in detail from the Earth. Mars is the fourth closest planet to the sun.

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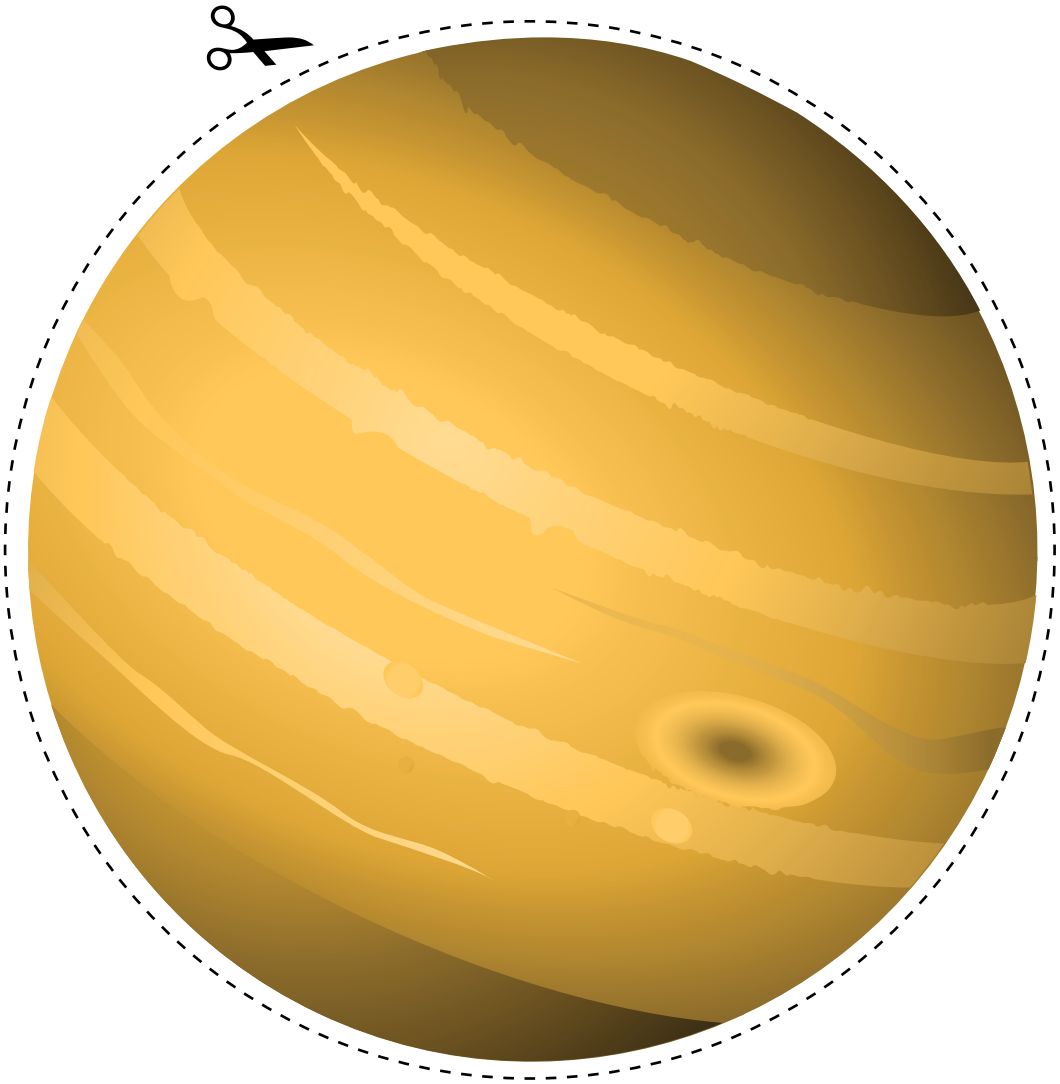
Jupiter

Jupiter is the largest planet in the solar system, and the fifth closest planet to our sun. If you weigh 100 pounds on Earth, you would weigh 264 pounds on Jupiter. Jupiter rotates faster than any other planet. It rotates so quickly that the days are only 10 hours long. The great red spot on Jupiter is a storm that has been going on for over 300 years.



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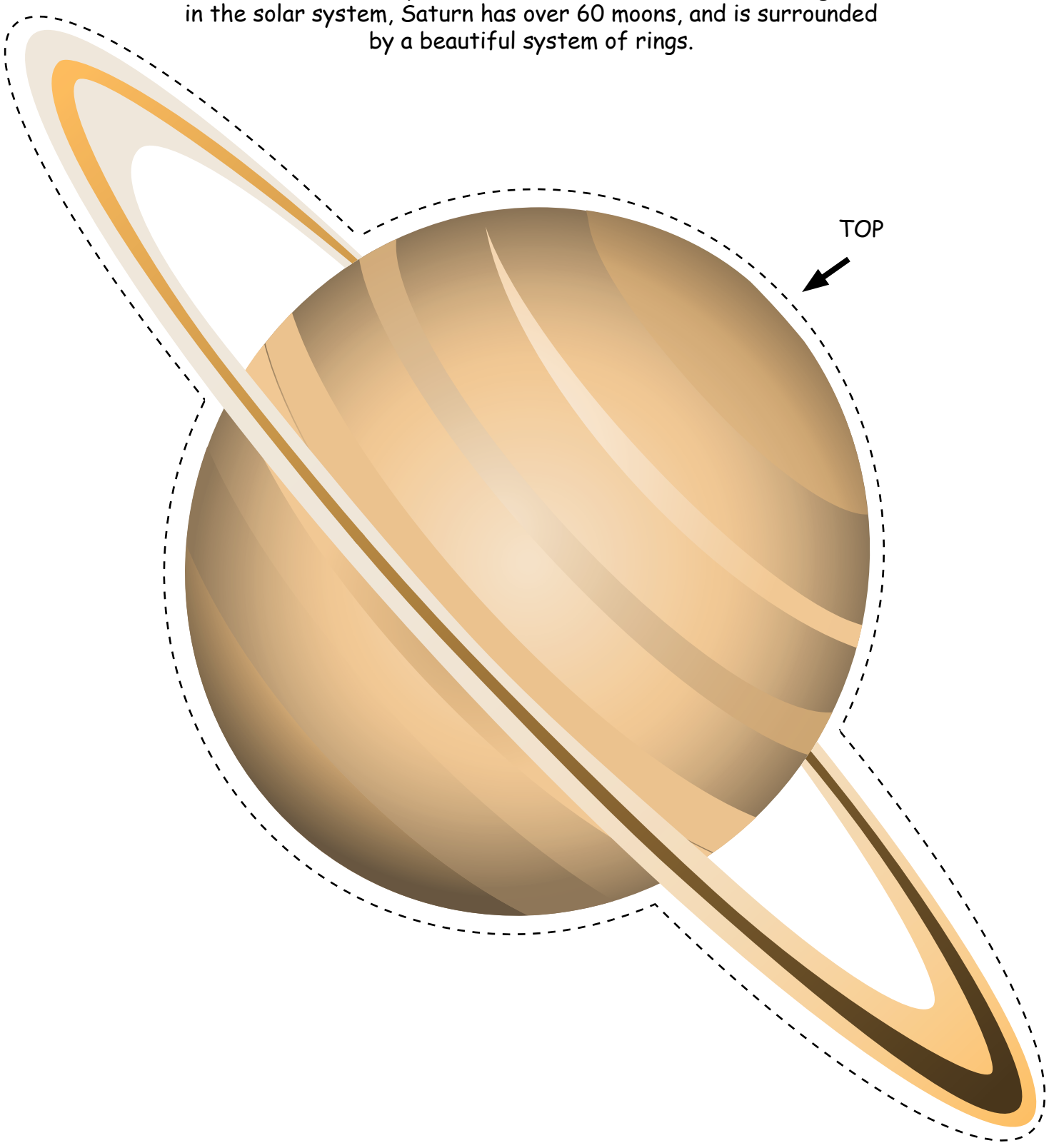
Saturn

Saturn is the sixth planet from the sun and the second largest in the solar system, Saturn has over 60 moons, and is surrounded by a beautiful system of rings.



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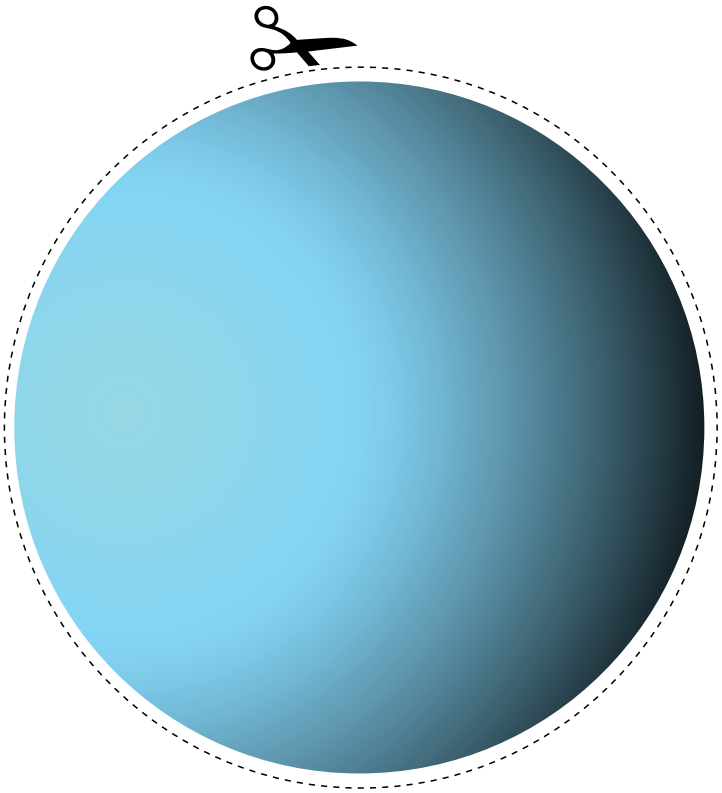
Uranus

Uranus is the seventh planet from the sun. Because of the strange way it spins, nights on some parts of Uranus can last for more than 40 years. Uranus is a very cold planet. It is made up of rock and ice and has a large rocky core. It has the nickname "Ice Giant." It is possible there are diamonds on the surface of this planet.



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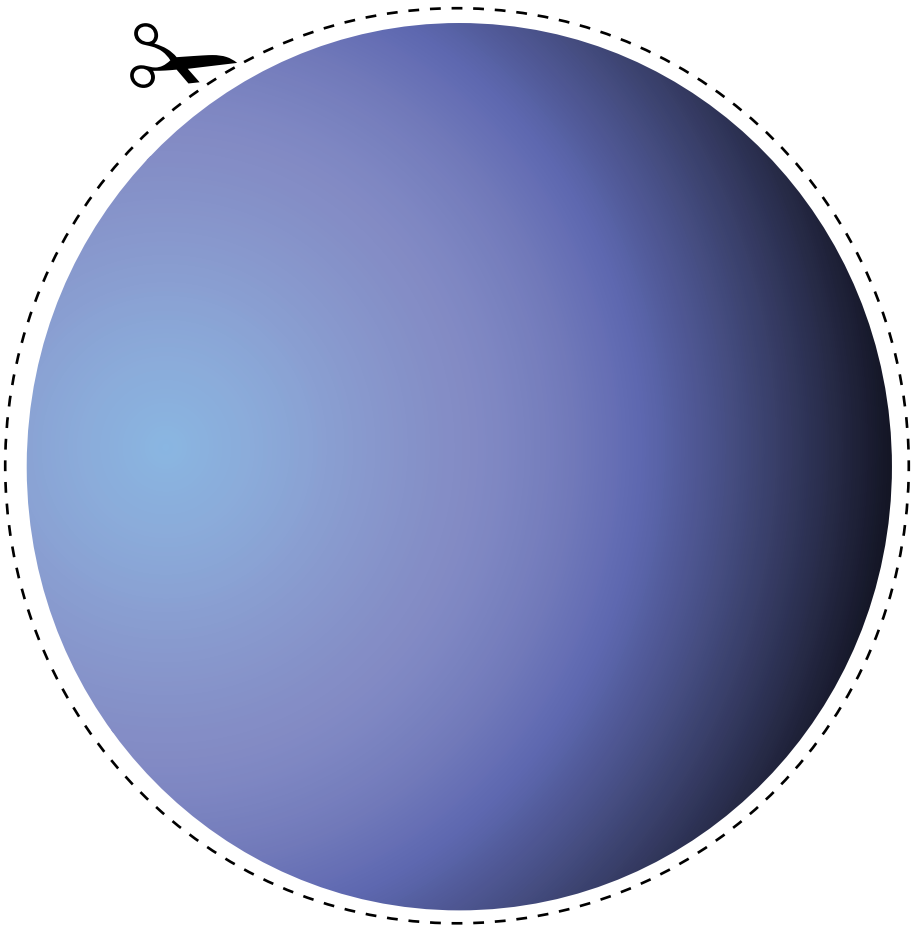
Make a Solar System Mobile

Neptune

Neptune is the eighth planet. It is the farthest planet from the sun.
It is the fourth largest planet. The interior of Neptune,
like that of Uranus, is made mostly of ice and rock.
A gas called methane causes Neptune to look blue.



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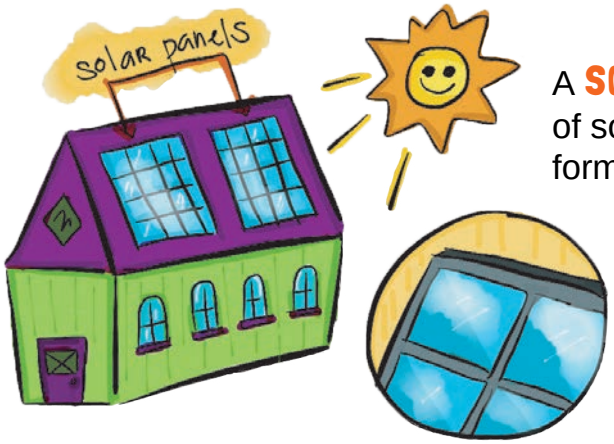
WHAT IS SOLAR ENERGY?

Solar energy comes from the sun. The sun is an important resource, as it helps sustain life. Without the sun, our planet would have no life. Through the use of technology, we are able to harness the energy from the sun to convert it to electricity.

SOLAR CELLS are tools that change light energy from the sun and other light sources into electricity. Many calculators use solar cells to power them.



A **SOLAR PANEL** is a group of solar cells connected to form a large, flat surface.

THINK AND DRAW

What do you think a car powered by the sun would look like? Draw a picture.

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Design Challenge: Making a Solar Oven

In this fun activity, your child will create their very own solar oven to bake cookies or s'mores! We have given instructions which you can use to guide your child through the design thinking process. Since this is a design challenge, your child can be entirely creative with how they choose to make their oven using typical household items. However, we have also given a step-by-step procedure for making a solar oven in case your child is struggling to come up with ideas. Feel free to rely entirely on your child's creativity, take some inspiration from our procedure, or follow our procedure exactly. Be sure to engage your child by asking them questions that have them think critically about the design process.

What You Need:

- Cardboard pizza box
- Box cutter or scissors
- Aluminum foil
- Plastic wrap
- Black construction paper
- Ruler
- Cooking ingredients of your choice (Some options are s'mores or nachos. Avoid cooking raw meat or raw eggs using your solar oven.)
- Any other household items
- Pen and paper for taking notes

What You Do:

1. First, explain to your child their task in this activity. Explain to them that their job is to create a solar oven out of a cardboard pizza box in order to cook the food of their choice.
2. Ask your child what they would like to cook in their solar oven. Prepare the ingredients.
    a. Some ideas are s'mores, nachos, and cookies (if possible, use edible cookie dough in case the oven doesn't work very well).
3. Ask your child the following questions so that they begin thinking critically about the design process:
    a. What does your oven need in order to cook the food? (Answer: heat.)
    b. What are some of the best objects or colors that absorb heat? (Answer: the color black is good at absorbing heat.)
4. Show your child the materials they have, but don't have them start building just yet. Instead, ask them to **brainstorm** how they will use these materials in order to create a solar oven. Have them write out or draw their ideas on a piece of paper.
5. After your child has finished brainstorming, ask them to choose the design they think will work best. Remind them of the purpose of their oven: to cook the food of their choice.
    a. This is an important step of the design thinking process because it teaches your child to prioritize the functionality of their design over personal preferences, and it prevents them from getting too emotionally attached to one design.
6. Once your child has decided on a design, they can start **building**. Be sure to supervise and help out as needed.
7. After your child is done building, it's time to **test** it out! The best time to use your solar oven is between 11 a.m. and 2 p.m. when the sun's rays are strongest. Make sure to set the food on a dish so you don't make a mess inside the oven.
8. Depending on the food your child has decided to make, the cooking process will vary.
    a. To make a solar s'more: Place one or two marshmallows on top of a graham cracker. Put two to three squares of chocolate on top of the marshmallow. Wait until the chocolate and marshmallow are done cooking to top them with the second graham cracker.
        i. Ask your child why it might be a good idea to have the chocolate on top. (Answer: dark colors, like brown or black, are best at absorbing heat. If the chocolate is on top, it will absorb heat into the entire s'more.)
    b. To make nachos: place grated cheese on top of tortilla chips and wait for the sun to melt the cheese.
9. Wait for your child's oven to cook the food. (Timing will vary depending on the oven and food choice.) Be sure to frequently check back on the oven and observe whether the food is gradually cooking.
    a. If your child's oven eventually cooks the food, congratulate your child on their success!
    b. If your child's oven doesn't work, help them find out what went wrong. You could ask them if they think there was a mistake with the way they constructed the oven or if they forgot to add a necessary material. Then, encourage your child to go back and repeat this process until they make an oven that works.

Here is a procedure for creating a solar oven in case your child is struggling to come up with designs:

1. Take an empty pizza box and clean out any stray bits of cheese, sauce, or crumbs.
2. Using a ruler and pencil, draw a square that is one inch from the edges of the top of the box.
3. Use a box cutter or knife to cut out three of the four sides of the square, leaving the crease-side of the box attached.
4. Make a crease along the uncut side of the square to create a flap that stands up.
5. Cut a piece of aluminum foil that is large enough to cover the inner side of the cardboard flap.

6. Wrap the foil tightly and secure with tape.
    a. Ask your child what they think the purpose of the foil is. (Answer: aluminum foil reflects sunlight and brings heat into the oven.)
7. Line the bottom of the pizza box with black construction paper.
    a. Ask your child why they think black paper is useful and if white paper would work as well. Why or why not? (Answer: the color black absorbs sunlight best, and therefore black paper absorbs the sun's heat. White paper would not work well because it would reflect a lot of sunlight instead of absorbing it.)
8. Cut two pieces of plastic wrap that are the same size as the top of the pizza box.
9. Use tape to secure the plastic wrap to the inside edges of the square window you cut into the box. You are creating an airtight window.
    a. Ask your child why they think it's important to create an airtight oven. (Answer: your oven should be airtight in order to prevent any of the sun's heat from escaping it.)
10. Roll up some newspaper pages into tubes to stuff into the sides of the box. Make sure you are still able to close the lid of the pizza box.
    a. Ask your child what they think the purpose of the newspaper is. (Answer: newspaper insulates the oven and prevents heat loss.)
11. Finally, it's time to test out your oven by cooking something!

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