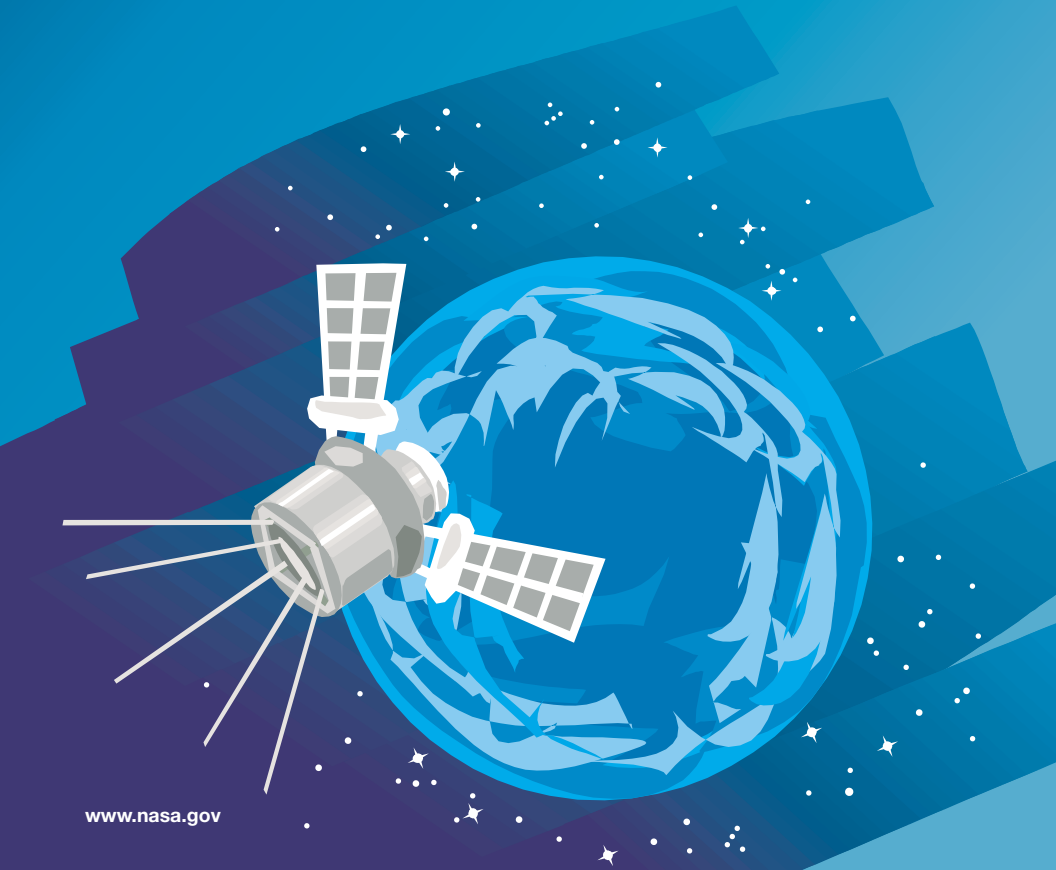
National Aeronautics and Space Administration

Earth Science Fun Pad

PACKED WITH THINGS TO DO!



www.nasa.gov

For more information on NASA and its outreach programs, visit these web sites:

http://education.nasa.gov

http://nasascience.nasa.gov/

http://kids.earth.nasa.gov/

http://jointmission.gsfc.nasa.gov/

http://gpm.gsfc.nasa.gov/

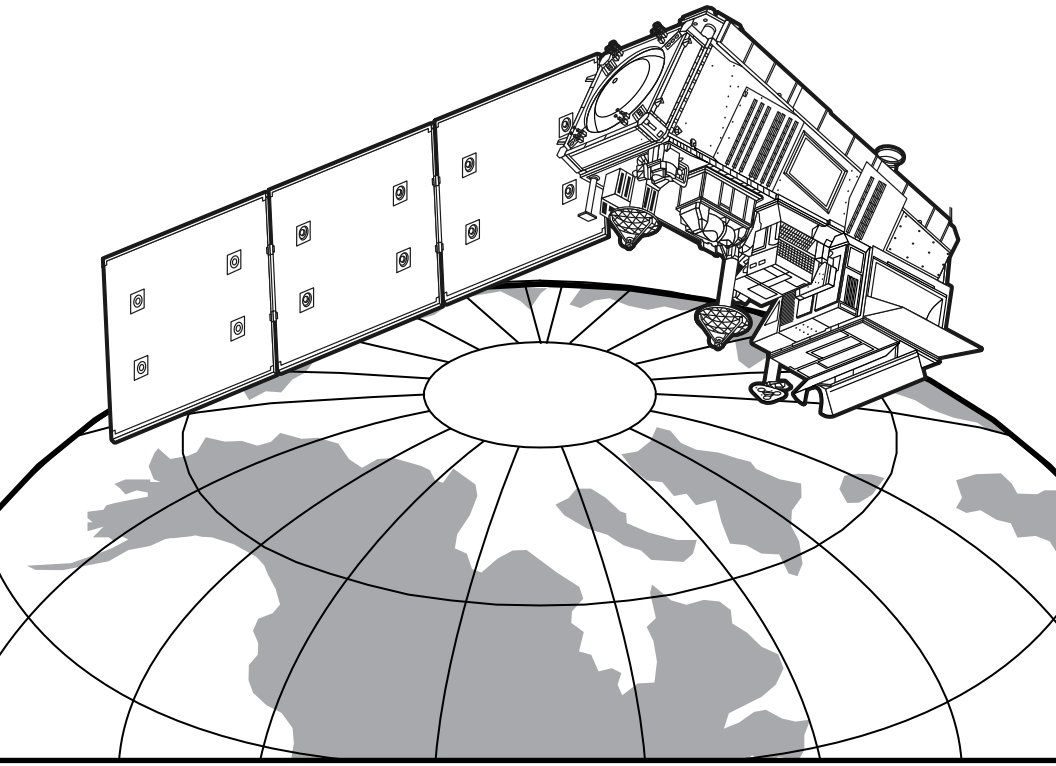
EARTH: OUR HOME PLANET

Color our world

- Earth is the third planet and 92,897,000 miles from the Sun.
- Earth is the fifth largest planet—almost 2 million square miles.
- There are 10 million species of life on Earth.

NPP SATELLITE

A spacecraft that orbits Earth helps us study our atmosphere, weather, and climate.



National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) mission has five scientific instruments that will provide atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

NPP will be launched on a Delta II launch vehicle at Vandenberg Air Force Base in California.

http://jointmission.gsfc.nasa.gov/

NAME THE 7 CONTINENTS

Unscramble the letters to find the answers

CARIFA _ _ _ _ _ _

TANACTIRAC _ _ _ _ _ _ _ _ _ _

SAIA _ _ _ _

RIALASTUA _ _ _ _ _ _ _ _ _

PEREOU _ _ _ _ _ _

HORNT MIRACEA _ _ _ _ _ _ _ _ _ _ _ _

OSHUT CAMEARI _ _ _ _ _ _ _ _ _ _ _ _

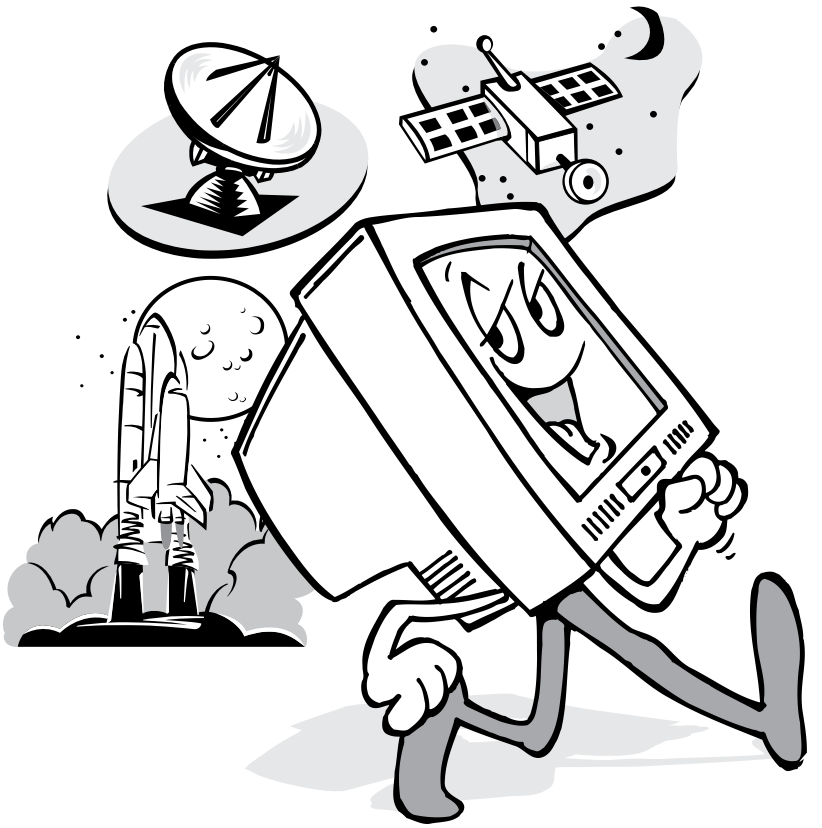
Africa, Antarctica, Asia, Australia, Europe, North America, South America

EARTH COMMUNICATIONS

Find and circle these shapes

COMPUTER WORK

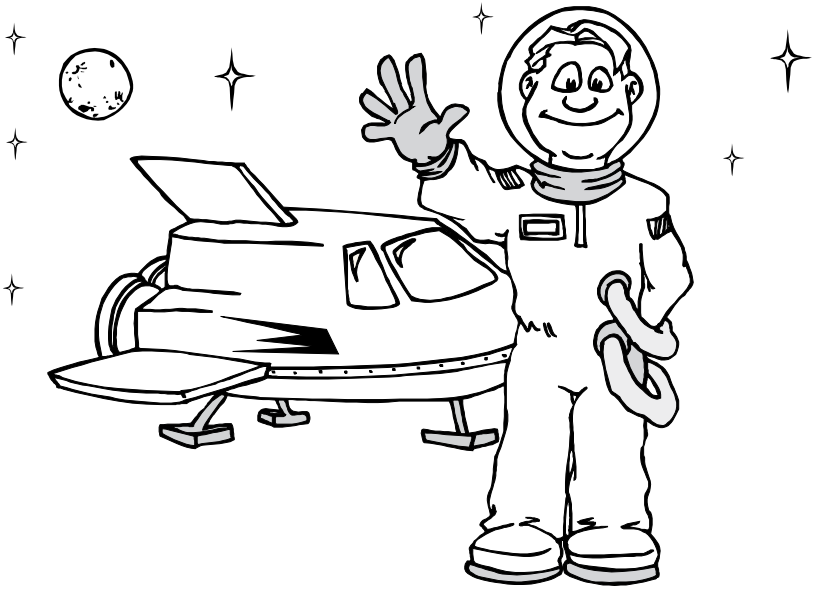
Computers are very important tools for studying the Earth.

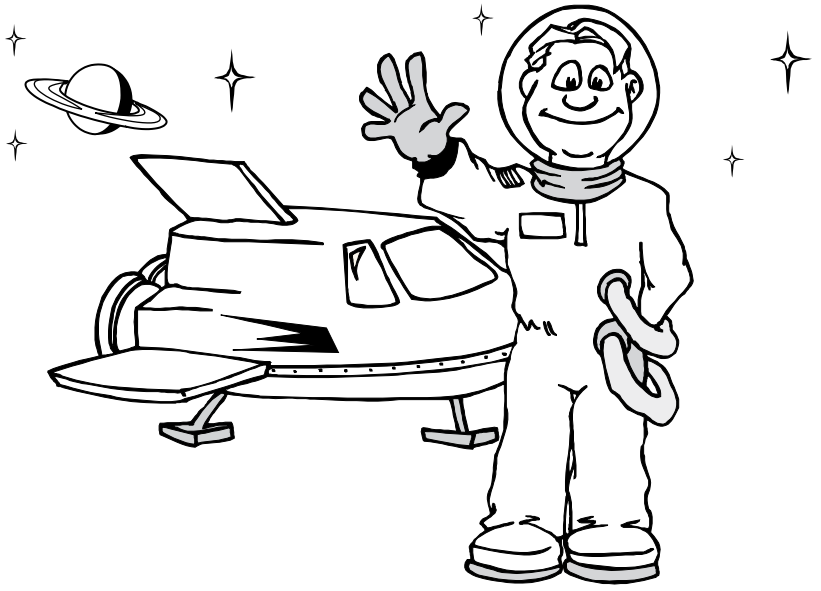


Computers are used to write programs which control spacecraft and their scientific instruments. They are used to help test instruments before they are launched and for communications. Computers are used to study Earth and use this data to produce amazing images and evaluate environemtnal trends and new discoveries. They are also used to help pass this information on to the world through the internet.

DIFFERENT EARTHLINGS

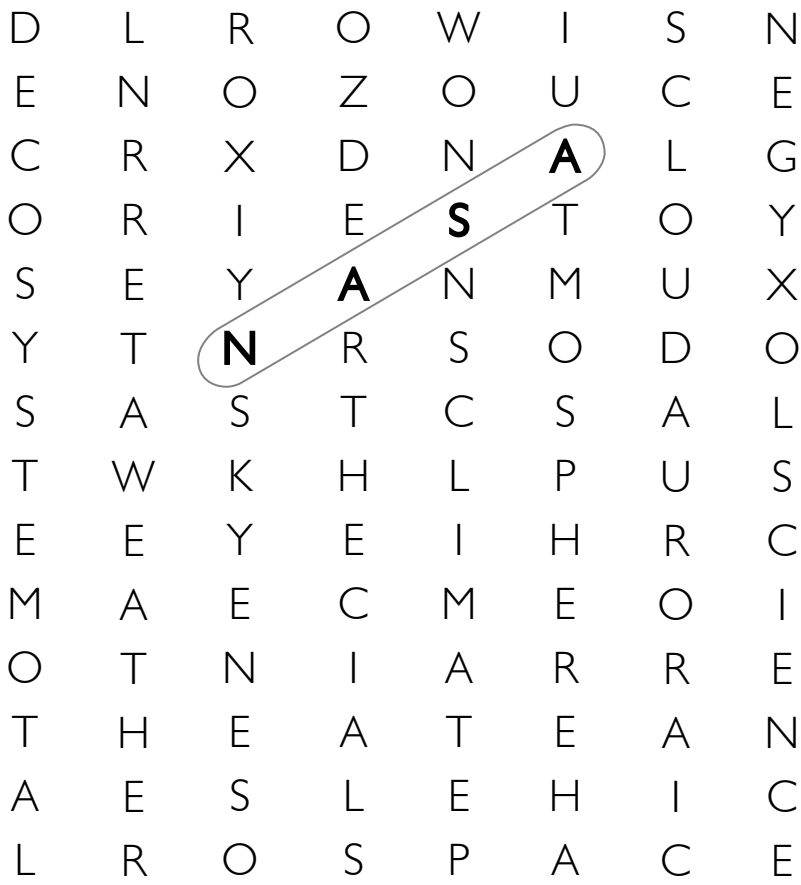
Find and circle 8 different things





FIND A WORD

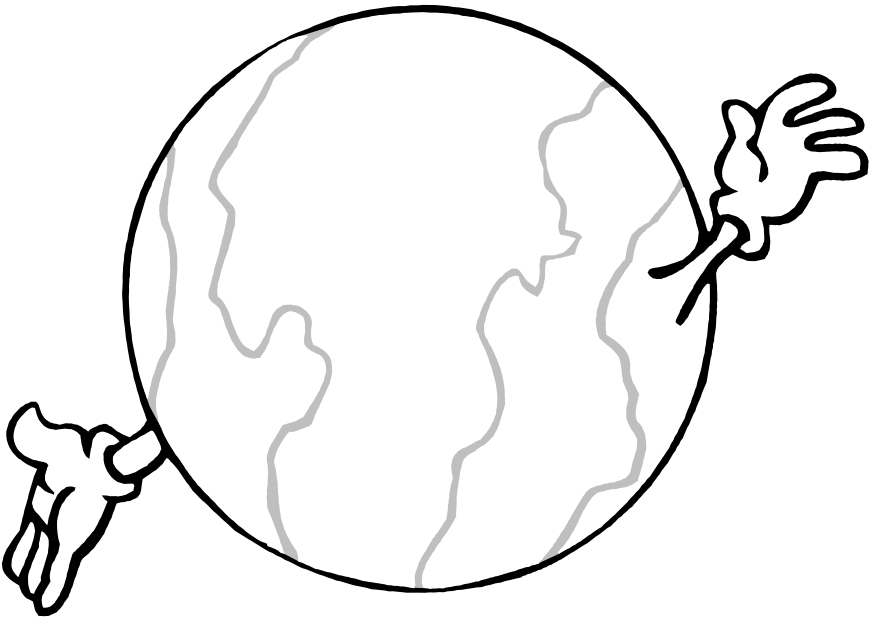
Search for NASA Earth Science words



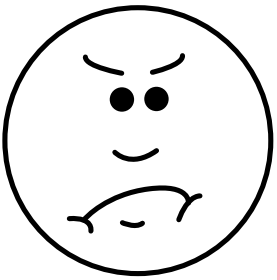
- ✓ NASA
- AIR
- ATMOSPHERE
- ATOM
- AURORA
- CLIMATE
- CLOUD
- EARTH
- ECOSYSTEM
- HEAT
- LAND
- OXYGEN
- OZONE
- RAIN
- SCIENCE
- SEA
- SKY
- SLEET
- SNOW
- SMOG
- SPACE
- SUN
- WATER
- WEATHER
- WORLD

DRAW A FACE ON THE EARTH

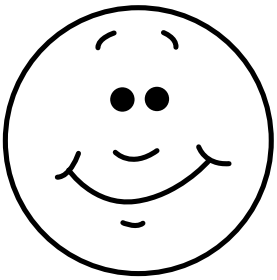
Make it sad, mad or glad!



SAD



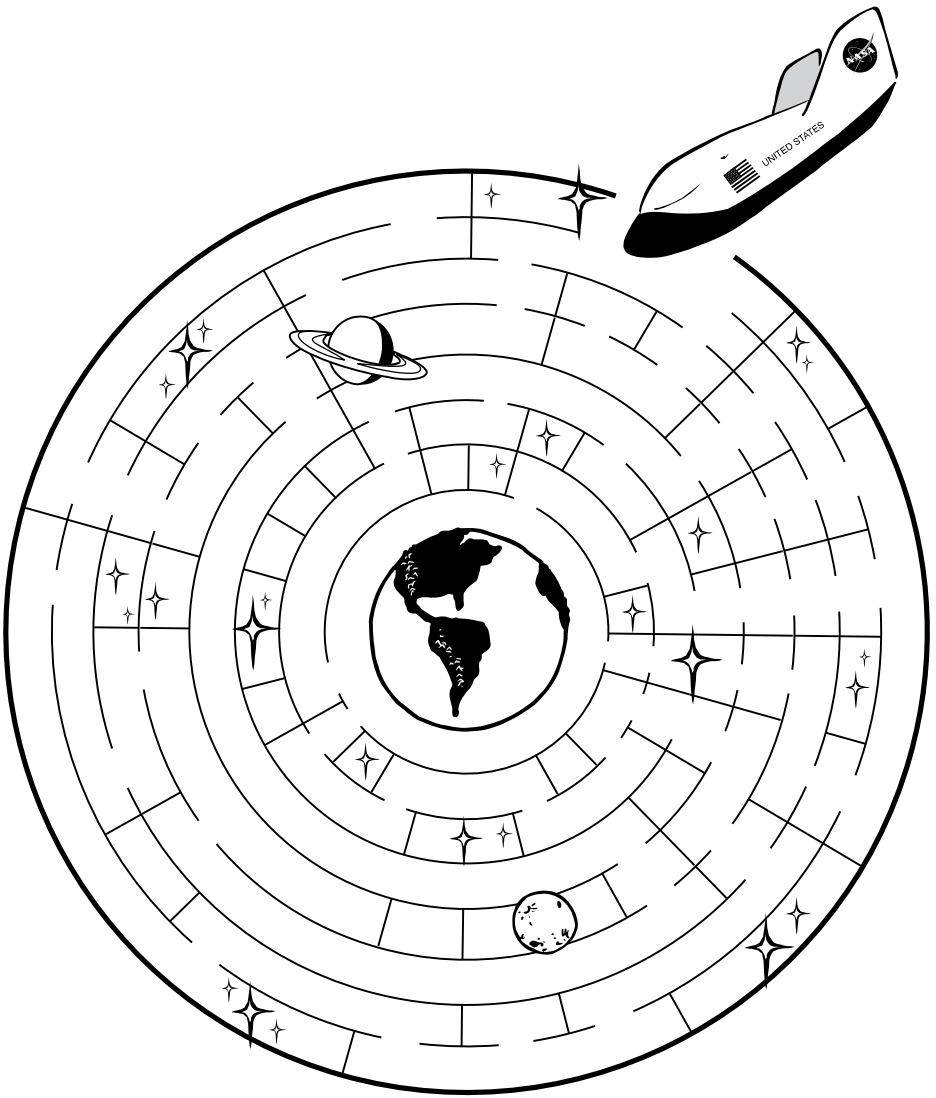
MAD



GLAD

RETURNING TO EARTH

Get the Shuttle home to Earth through the space maze



READY FOR BLAST-OFF

Color the Shuttle and Astronaut

EARTH OBSERVING SATELLITE

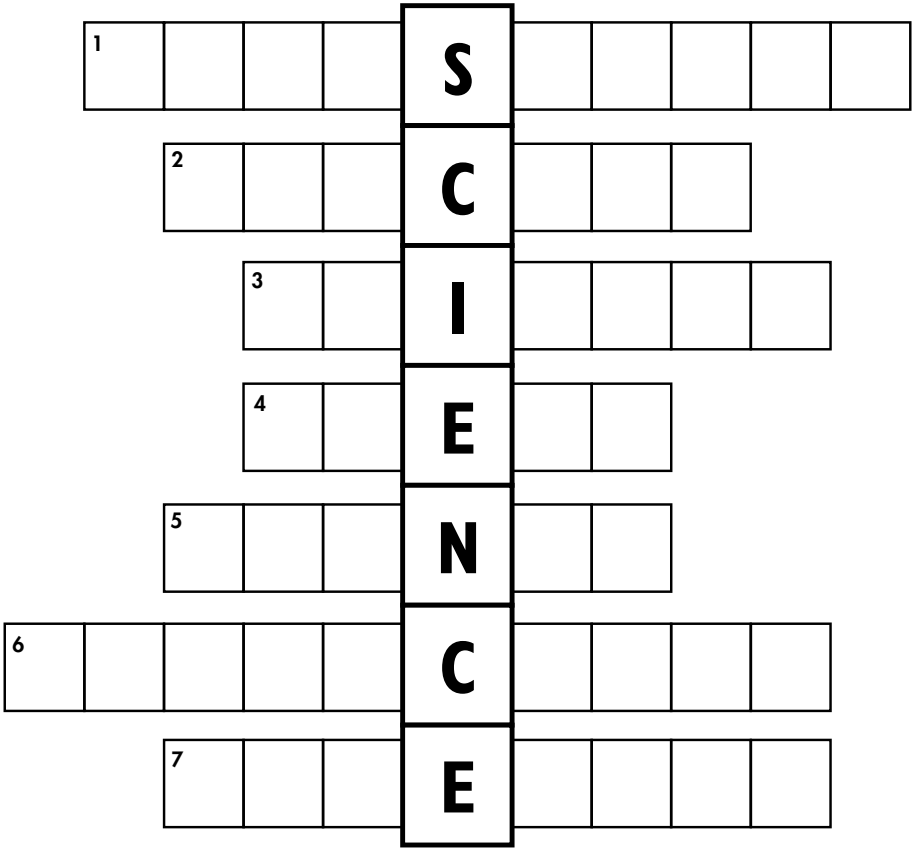
Color this mission logo

The NPOESS Preparatory Project (NPP) is a joint mission between NASA, DoD, and NOAA. Its mission is to measure atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

http://jointmission.gsfc.nasa.gov/

SCIENCE CROSS WORDS

Answer the clues to find the words



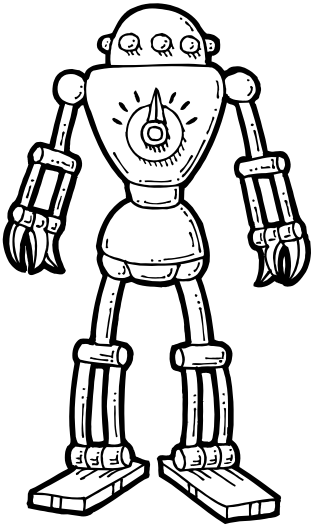
CLUES:

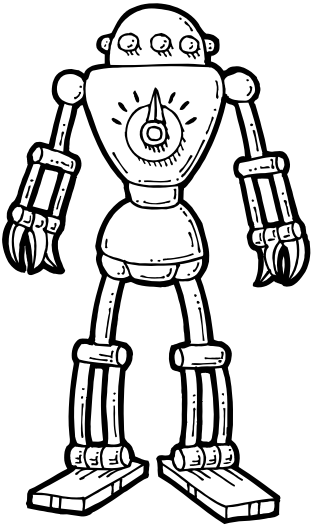
1. The mass of air surrounding the Earth
2. An opening in the earth's crust through which molten lava, ash, and gases are released
3. Weather condition in some locations/regions
4. A body of salt water that covers more than 70% of the Earth's surface
5. The Earth is one
6. A vehicle capable of traveling in outer space
7. Prediction of weather conditions

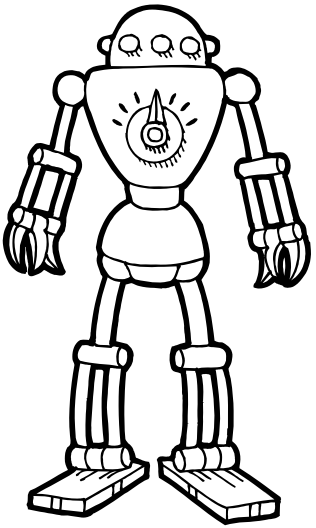
1.Atmosphere 2.Volcano 3.Climate 4.Ocean 5.Planet 6.Spacecraft 7.Forecast

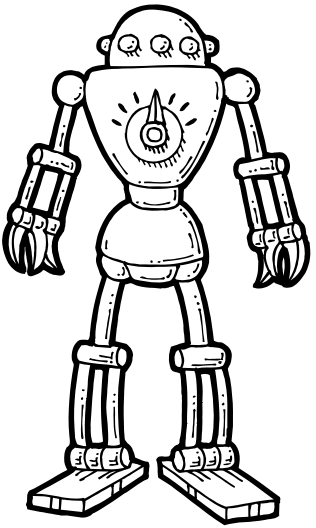
ROBOTICS

Which robot is different than the rest?









MOON DOGGIE

Color-by-number space dog

1 - Green
2 - Blue
3 - Light Blue
4 - Brown
5 - Tan
6 - Red

STUDYING EARTH

NASA Earth Scientists look at the Earth and our universe

NASA's unique way of looking at our world around us lets scientists study the global weather patterns of El Niño to Martian rocks and to galaxies far, far, away.

NASA scientists are beginning to find answers so we can all better understand our Sun and Earth, our solar system, and the universe beyond.

NASA SCRAMBLE

Unscramble the words to spell out what NASA means

NASA brings you an exciting way to look at our Sun and Earth, our solar system, and the universe beyond. From high above our Earth, NASA satellites are studying Earth and space science as well as looking out at the distant worlds of the universe.

National Aeronautics and Space Administration

WEATHER OR NOT?

Name these weather conditions

_ _ _ _ _ _ _ _

_ _ _ _ _

_ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _

_ _ _ _ _

_ _ _ _ _ _

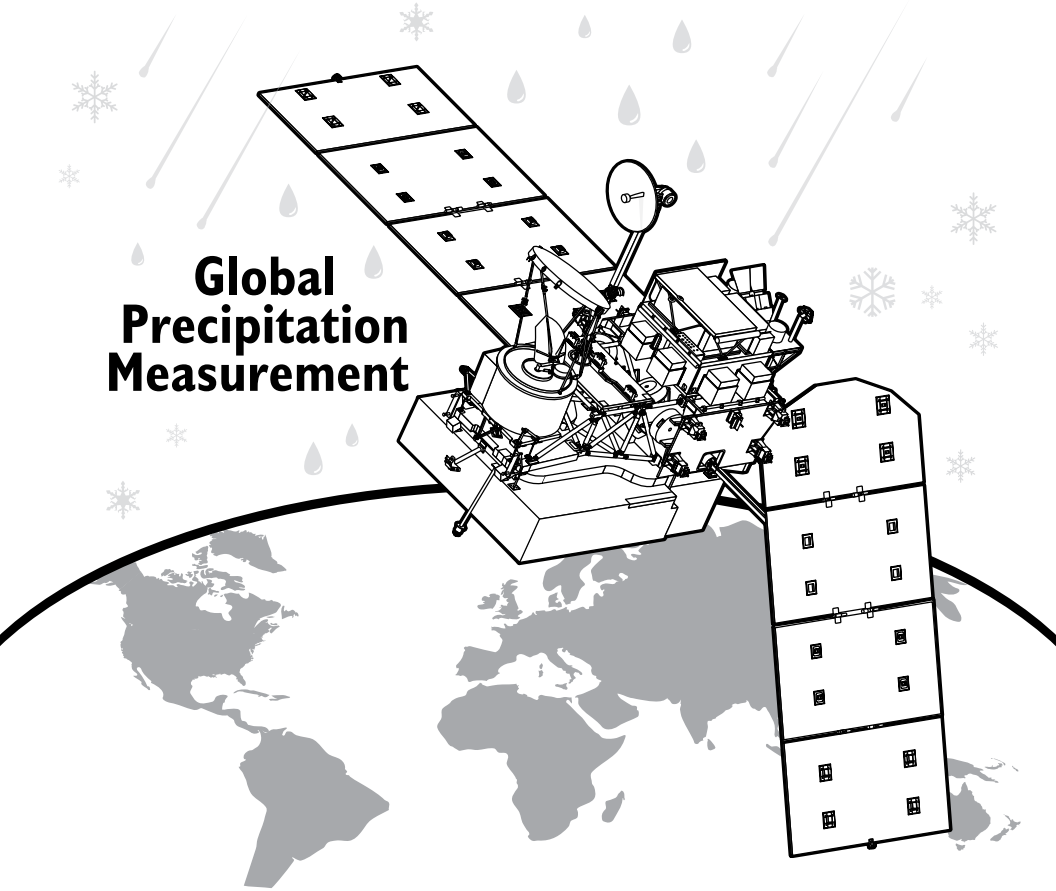
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Snow, Sunny, Windy, Thunderstorm

Tornado, Lightning, Rain, Cloudy

GPM SATELLITE

An international satellite mission measuring global precipitation within hours

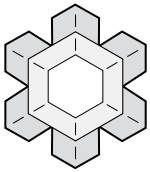


Knowing when, where, and how much it rains or snows around the globe will help us make better predictions of weather, climate, natural hazards (hurricanes, landslides, floods), and freshwater resources.

http://gpm.gsfc.nasa.gov

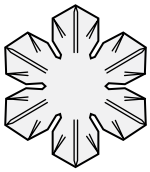
SNOWFLAKE SHAPES

There are differences in each snowflake



Stellar Plates

These common snowflakes are thin, plate-like crystals with six broad arms that form a star-like shape. Their faces are often decorated with amazingly elaborate and symmetrical markings.

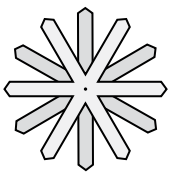


Sectored Plates

Stellar plates often show distinctive ridges that point to the corners between adjacent prism facets. When these ridges are especially prominent, the crystals are called sectored plates.

Stellar Dendrites

Dendritic means "tree-like", so stellar dendrites are plate-like snow crystals that have branches and sidebranches. These are fairly large crystals, typically 2-4 mm in diameter, that are easily seen with the naked eye.



12-Sided Snowflakes

Sometimes capped columns form with a twist, a 30-degree twist to be specific. The two end-plates are both six-branched crystals, but one is rotated 30 degrees relative to the other. This is a form of crystal twinning, in which two crystals grow joined in a specific orientation.

Fernlike Stellar Dendrites

Sometimes the branches of stellar crystals have so many sidebranches they look a bit like ferns, so we call them fernlike stellar dendrites. These are the largest snow crystals, often falling to earth with diameters of 5 mm or more. In spite of their large size, these are single crystals of ice -- the water molecules are lined up from one end to the other.

FIND A WORD

Search for NASA Earth Science words

W	E	**N**	**A**	**S**	**A**	L	T
O	K	A	I	Y	T	A	S
N	A	B	R	R	A	T	U
S	L	E	E	T	E	M	N
F	A	T	S	N	H	O	L
K	A	N	A	E	O	S	I
W	N	E	D	M	U	P	G
V	C	I	L	N	S	H	H
O	L	A	A	O	D	E	T
L	O	H	I	R	N	R	R
C	U	L	Y	I	I	E	E
A	D	K	A	V	W	C	S
N	S	R	E	N	E	W	E
O	T	R	E	E	D	F	D

✓NASA	DESERT	LAKE	RENEW	SKY	TREE
AIR	EARTH	LAND	RIVER	SLEET	VOLCANO
ATMOSPHERE	ENVIRONMENT	MOON	SALT	SNOW	WATER
CLOUDS	HEAT	OCEAN	SAND	SUN	WIND
COAL	ICE	RAIN	SEA	SUNLIGHT	

THE LIFE AROUND US

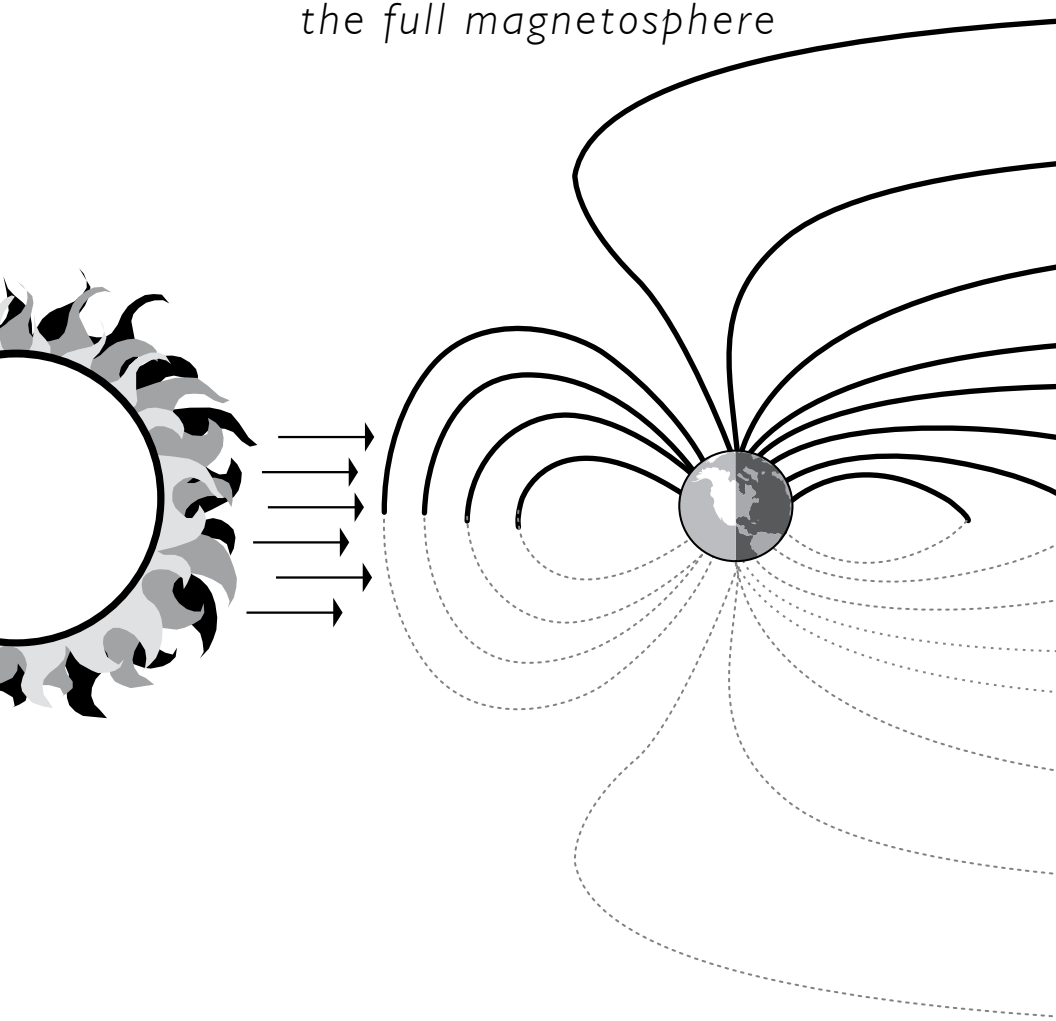
How many words can you spell using the letters in ENVIRONMENT?

1. _____	**6.** _____	**11.** _____
2. _____	**7.** _____	**12.** _____
3. _____	**8.** _____	**13.** _____
4. _____	**9.** _____	**14.** _____
5. _____	**10.** _____	**15.** _____

Mint, Vent, None, Torn, Ten, Men, More, River, Never, Ton, Met, Net, Nine, Tire, Mine, Vine...

MAGNETOSPHERE

Draw over the dotted lines to complete the full magnetosphere



Earth acts like a very large magnet producing invisible field lines. This magnetic field is enclosed in an area surrounding the Earth called the magnetosphere which shields our planet from the Sun's harmful radiation.

TREE FACTS

How trees help our environment

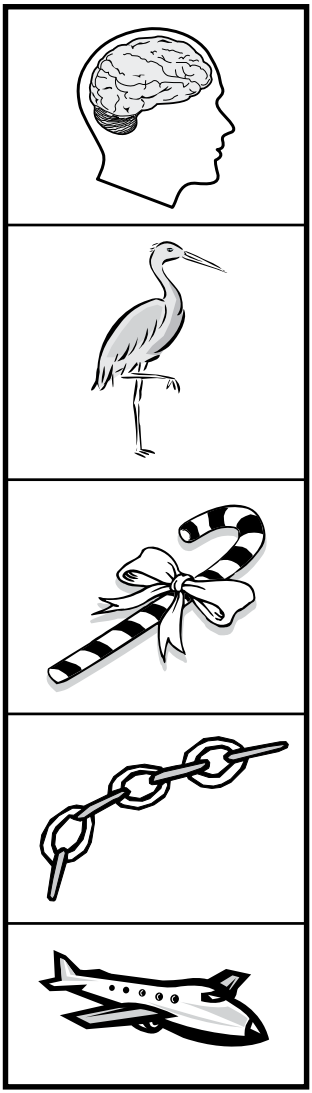
Two mature trees provide enough oxygen for a family of four.	Birds and animals use trees for their homes and shelter and as a source of food.
Trees are good noise barriers, making a city and neighborhood quieter.	Trees help cool down the Earth by cooling the ground and air around them.
Trees produce and give off oxygen while absorbing carbon dioxide and other gases and pollution.	Trees improve the water quality by acting as a filter to unwanted nutrients and pesticides.
Trees help prevent soil erosion and landslides.	Many trees can outlive humans – some can live more than 1,000 years.

Trees make our planet beautiful.

PLANT A TREE FOR A HEALTHY EARTH!

RHYME TIME

What other words rhyme with RAIN?



___ ___ ___ ___ ___

___ ___ ___ ___ ___

___ ___ ___ ___

___ ___ ___ ___ ___

___ ___ ___ ___ ___

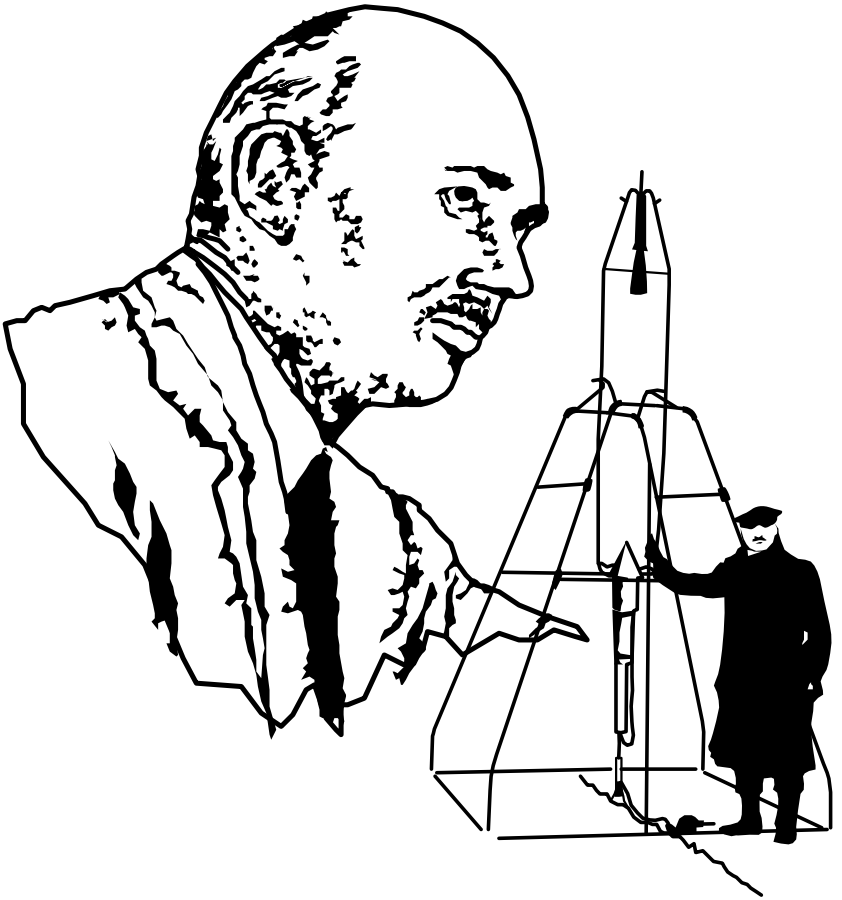
Brain, crane, candy cane, chain, plane

MAKING A DIFFERENCE

Find 8 things that are not the same

ROBERT H. GODDARD

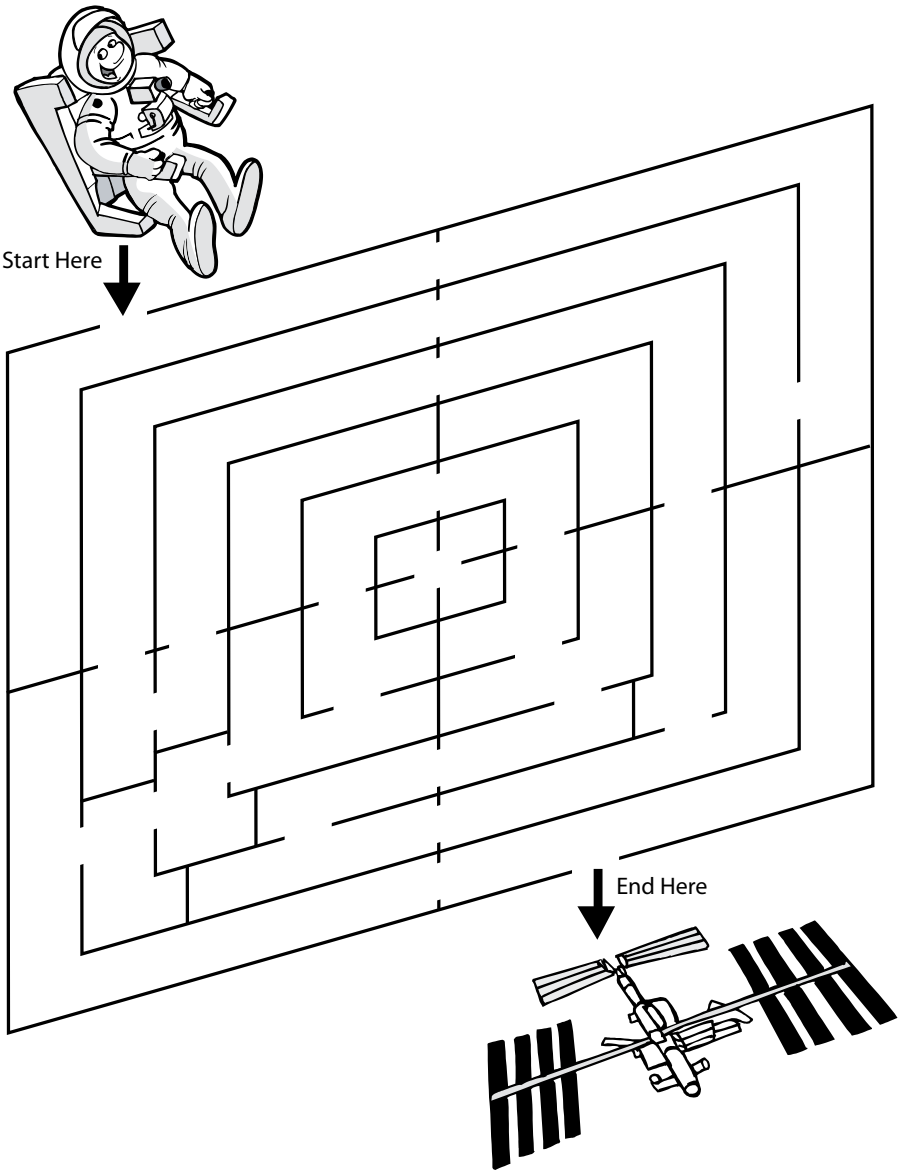
A man with a vision of rockets, missiles, and space travel



Robert Hutchings Goddard (October 5, 1882 – August 10, 1945), U.S. professor of physics and scientist, was a pioneer of controlled rocketry. He launched the world's first liquid-fueled rocket on March 16, 1926. From 1930 to 1935, he launched rockets that attained speeds of up to 550 mph. Though his work in the field was revolutionary, he was sometimes ridiculed for his theories.

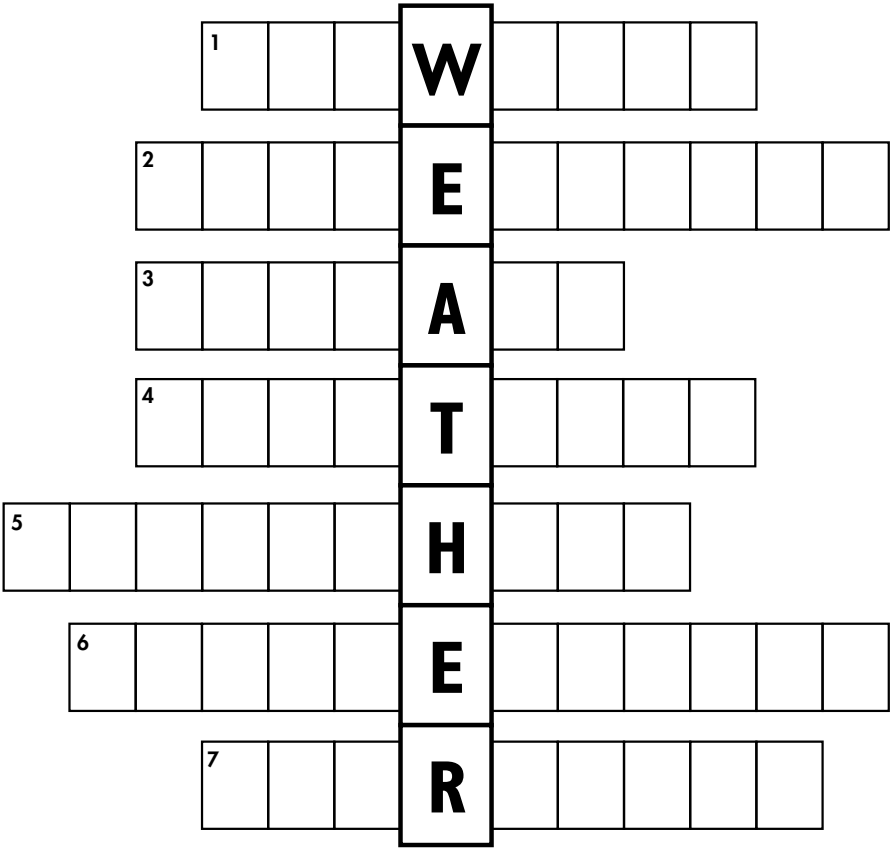
A-MAZING SPACE

Get the astronaut back to the Space Station



WEATHER CROSS WORDS

Answer the clues to find the words



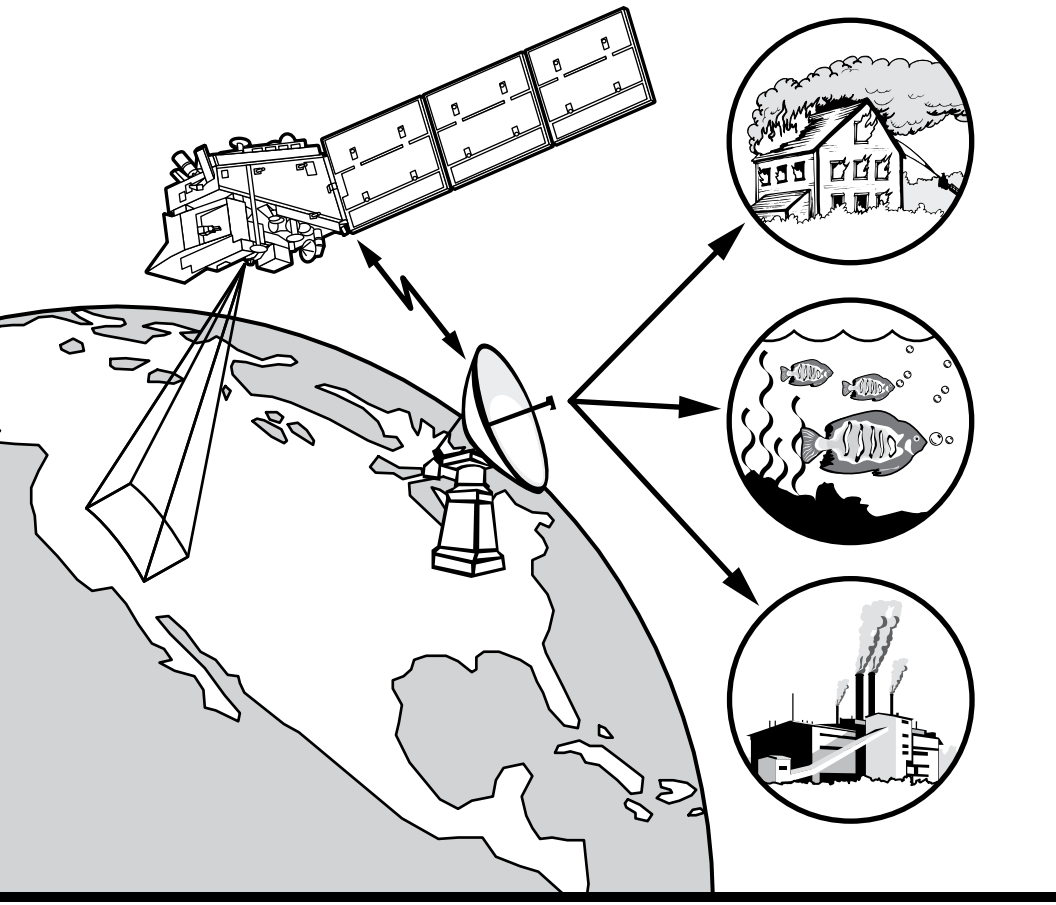
CLUES:

1. Measured depth of a certain precipitation
2. Degree measurement of hot or cold
3. A violent, rotating column of air attached to a thundercloud and the Earth's surface
4. A rapid, visible discharge of energy– hotter than the surface of the Sun
5. A blanket of air that surrounds the Earth
6. A short weather event that contains rain, wind, lightning, and hail
7. Tropical cyclone with 74 mph winds or greater seen in the North Atlantic Ocean, Caribbean Sea, and Gulf of Mexico

1.Snowfall 2.Temperature 3.Tornado 4.Lightning 5.Atmosphere 6.Thunderstorm 7.Hurricane

DIRECT READOUT LABORATORY

Helping us to see the Earth

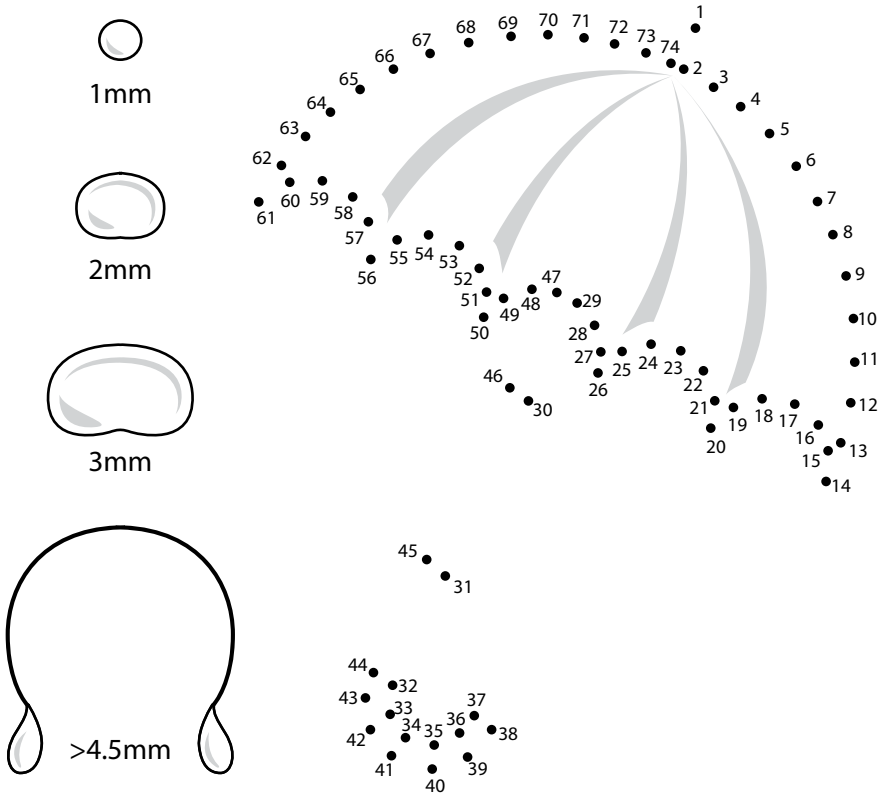


The Direct Readout Laboratory develops tools to view satellite images as soon as the satellite data is received by antennas on Earth. These satellite images are used all over the world and in many different ways. The images help us to fight fires on land, find fish in the sea, and study pollution in the air.

http://directreadout.sci.gsfc.nasa.gov/

REAL RAINDROP SHAPES

Connect the dots for rain cover



Small raindrops (radius < 1 mm) are spherical; larger ones assume a shape more like that of a hamburger bun. When they get larger than a radius of about 4.5 mm they rapidly become distorted into a shape rather like a parachute with a tube of water around the base --- and then they break up into smaller drops.

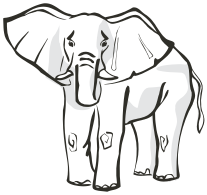
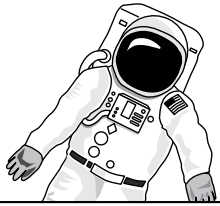
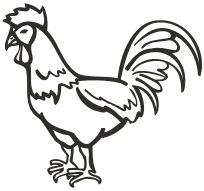
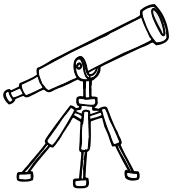
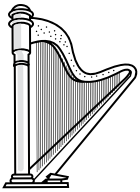
TECHNO-COLOR

Color-by-number space travelers

1 - Tan
2 - Yellow
3 - Light Gray
4 - Light Blue
5 - Red
6 - Dark Gray
7 - Blue
8 - Purple

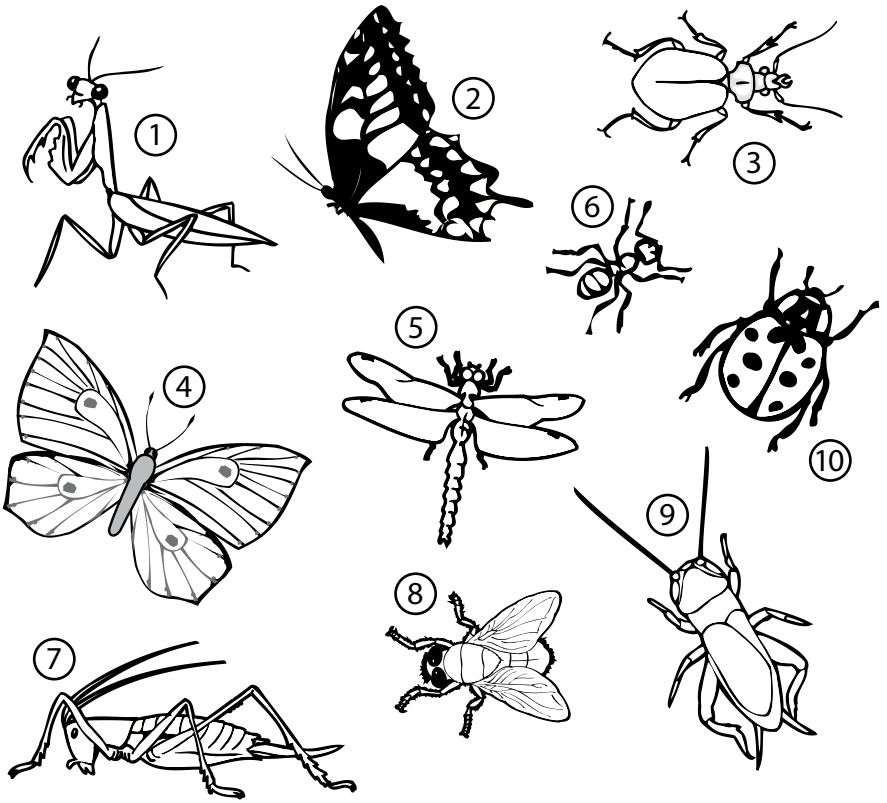
NAME OUR HOME PLANET

Find the answer by writing the first letter of each object in the box beside the picture

STOP BUGGING ME

Name these insects

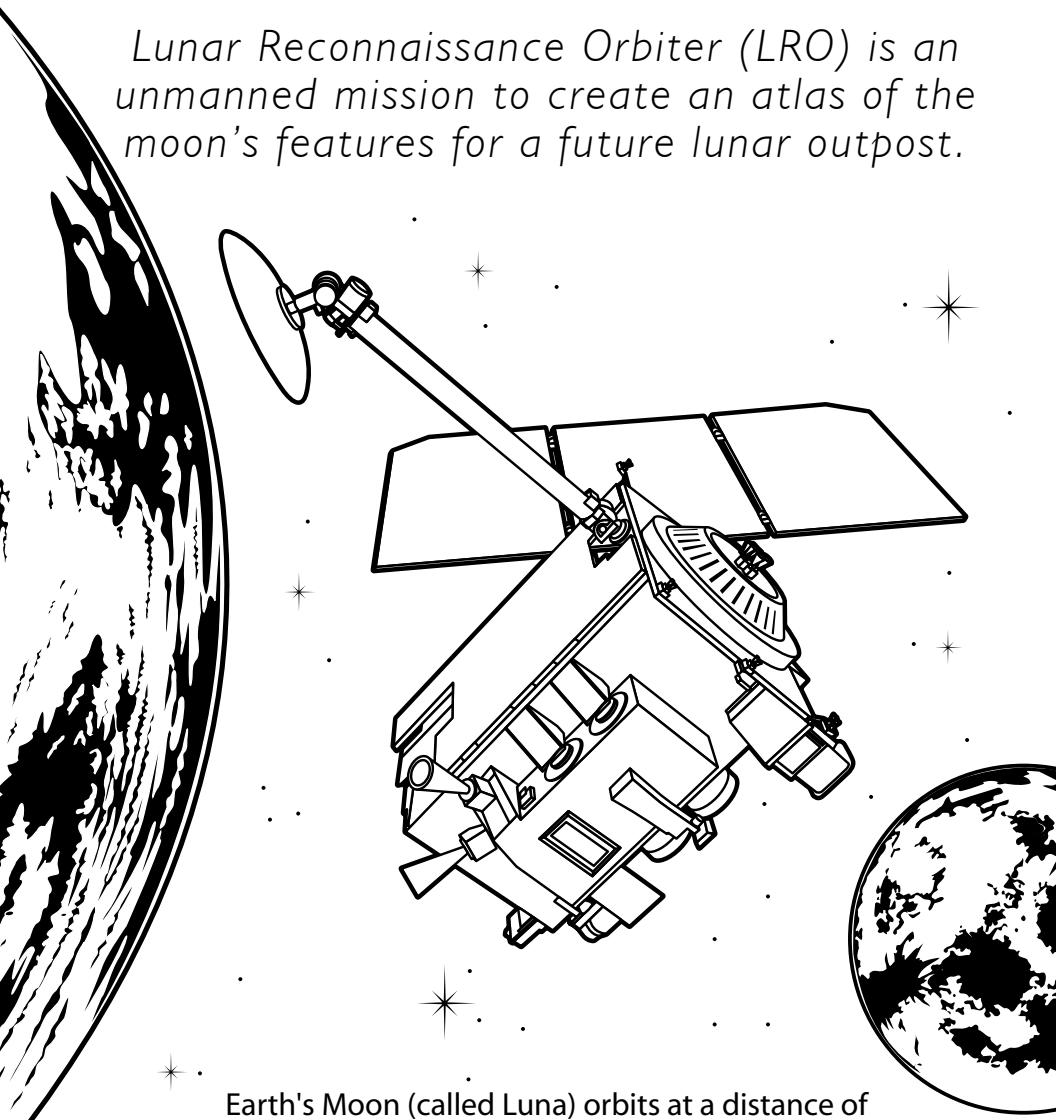


1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

1.Praying Mantis 2.Butterfly 3.Beetle 4.Moth 5.Dragonfly 6.Ant 7.Grasshopper 8.Fly 9.Cricket 10.Ladybug

MAPPING THE MOON

Lunar Reconnaissance Orbiter (LRO) is an unmanned mission to create an atlas of the moon's features for a future lunar outpost.

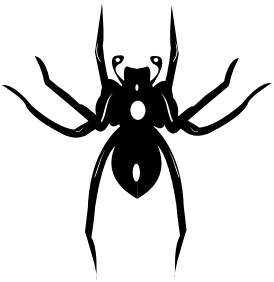


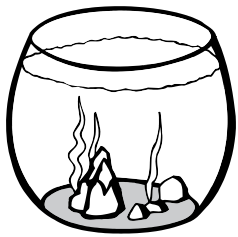
Earth's Moon (called Luna) orbits at a distance of 238,857 miles (384,000 km). The Moon has no atmosphere, but there is water ice in some of the deep craters. The Moon is the only extra-planetary body that a human has visited.

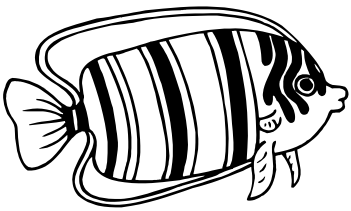
http://lunar.gsfc.nasa.gov/

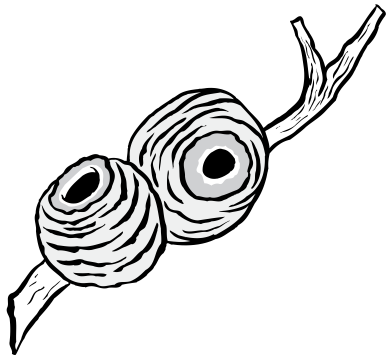
MATCH THEM UP

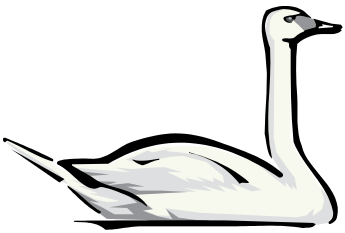
Where do we belong?

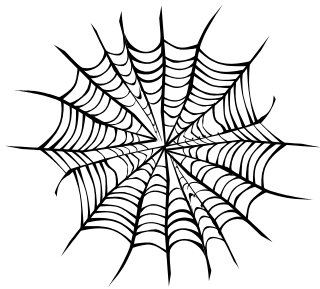












MAKING NEW WORDS

How many words can you spell using the letters in PRECIPITATION?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Precipitation is moisture that falls from clouds in the form of rain, snow, sleet, or hail. Without rain or other forms of precipitation, the ground becomes dry, and crops cannot grow.

RECYCLING WORKS

For a happy, healthy planet

Recycle: Take something old and turn it into something new!

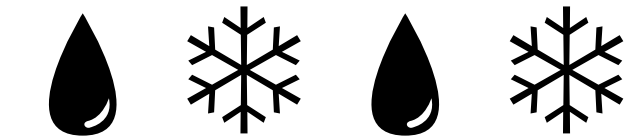
Reduce: Find ways to lessen the amount of garbage we throw away.

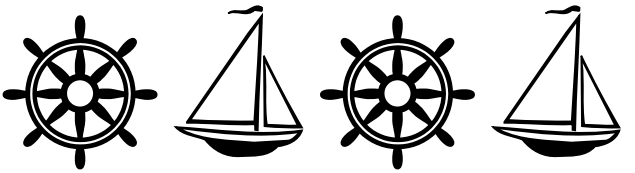
Reuse: Find ways to use things over and over again rather than throw them away.

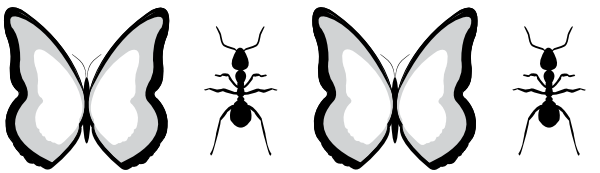
People all over the world are helping to recycle and take better care of our planet. The most common recyclable items include glass, plastic, paper, and aluminum.

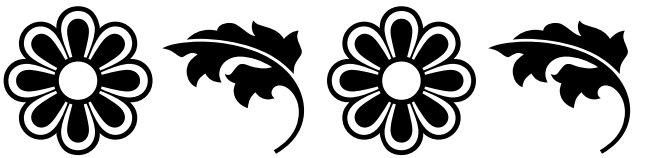
WHAT COMES NEXT?

Draw the picture that comes next in each row



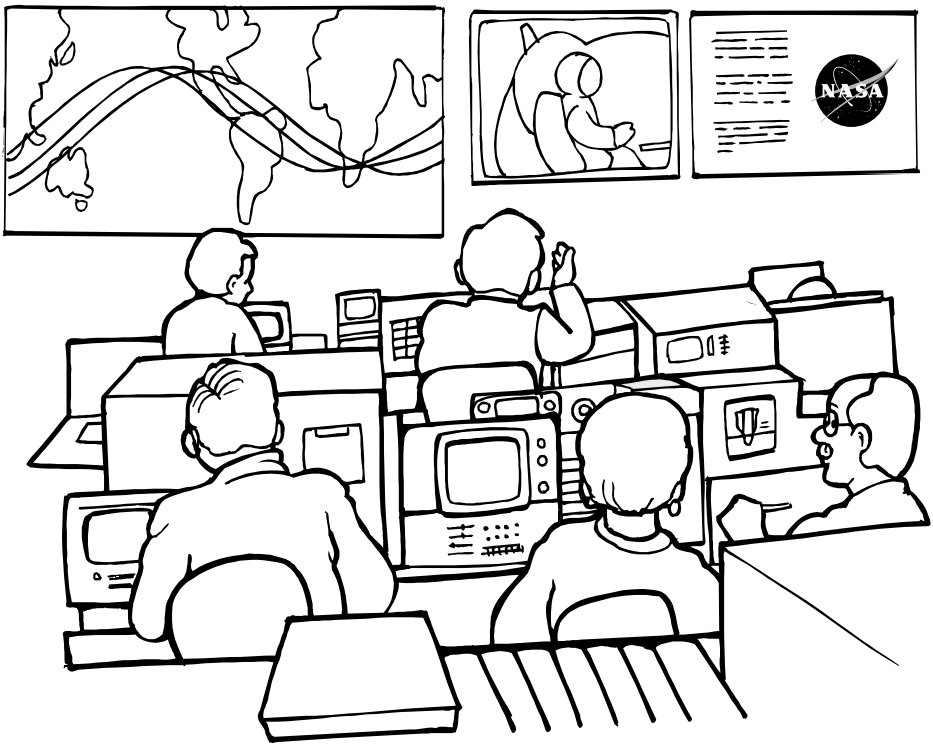






MISSION CONTROL

Color this busy operations center

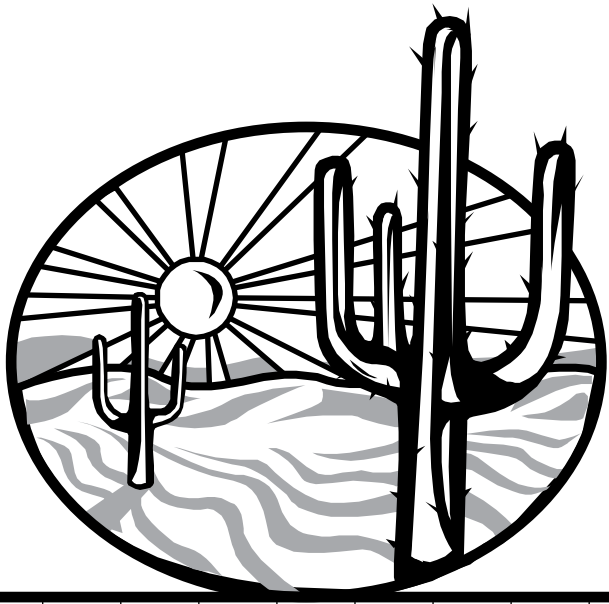


Every day, NASA's satellites are making new breakthroughs in our knowledge of the Earth and the universe. However, none of these successes would be possible without teams of people working behind the scenes. One of the key elements is the flight operations control team for each mission.

These teams are some of the most talented and qualified engineers around the world. They come from a wide variety of educational and career backgrounds who are experts in different areas of satellite technology.

COUNTING ON "NATURE"

How many can you find?



N	A	T	U	R	E	N	T	N
A	N	E	N	A	E	A	A	T
T	A	R	E	R	U	T	A	N
U	T	U	U	U	U	U	A	A
R	U	T	T	R	E	R	T	T
E	A	A	E	N	A	E	R	U
E	N	N	A	T	U	R	E	R

NAME THE 5 OCEANS

Unscramble the letters to find the answers

NTTIACLA

— — — — — — — — —

FICPIAC

— — — — — — — —

DANINI

— — — — — — —

HOTUNSER

— — — — — — — — —

CTAIRC

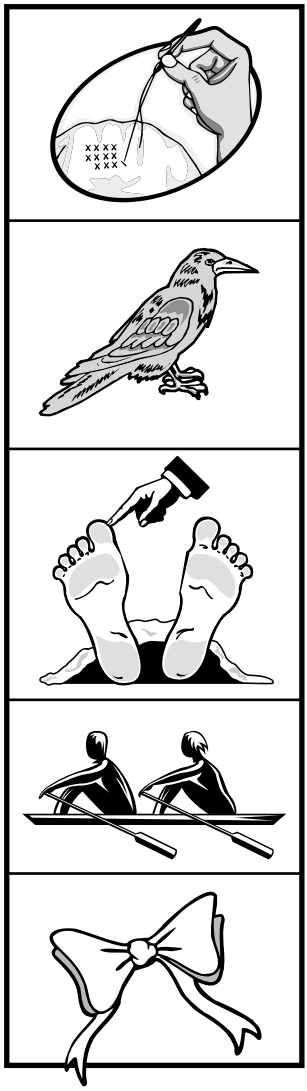
— — — — — — —

Atlantic, Pacific, Indian, Southern (or Antarctica), Arctic

RHYME TIME

What other words rhyme with...

SNOW



___ ___ ___

___ ___ ___ ___

___ ___ ___

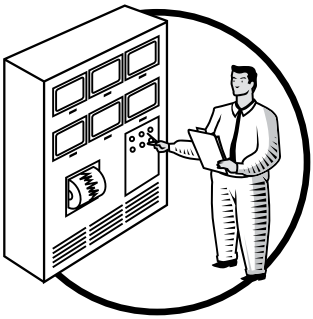
___ ___ ___

___ ___ ___

Sew, Crow, Toe, Row, Bow

WORKING AT NASA

Can you guess what these people do?
Unscramble the clues.



GENEIRNE

_ _ _ _ _ _ _ _ _

TCAHREE

_ _ _ _ _ _ _ _

HESTCIM

_ _ _ _ _ _ _ _

GRAMREPOMR

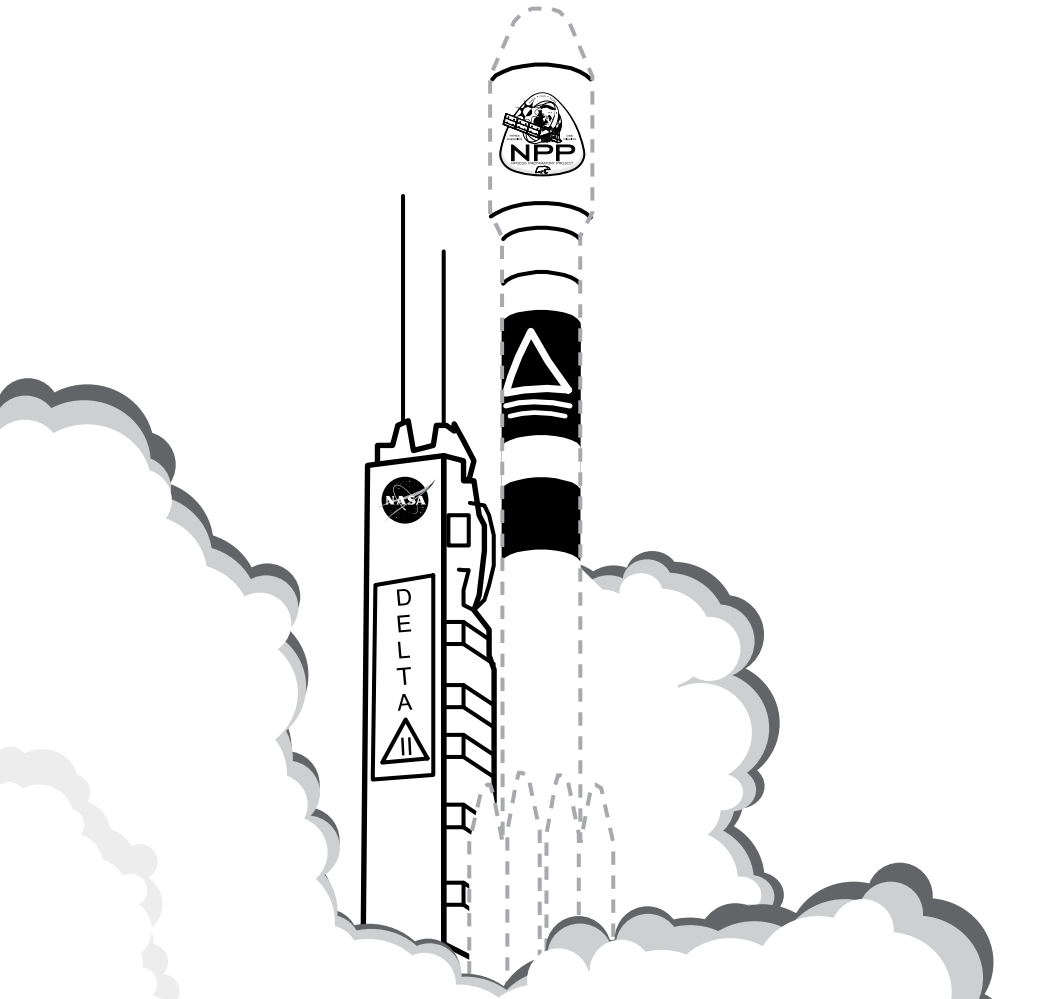
_ _ _ _ _ _ _ _ _ _ _

One of NASA's biggest assets has always been its people. Through distinguished service, ability, courage, and education you can personally make a contribution to the advancment of NASA Earth Science. Choose to be an Atmospheric Scientist, Geologist, Meteorologist, Oceanographer, Marine Biologist, Engineer—the possiblities are endless.

Engineer, Teacher, Chemist, Programmer

LIFTOFF!

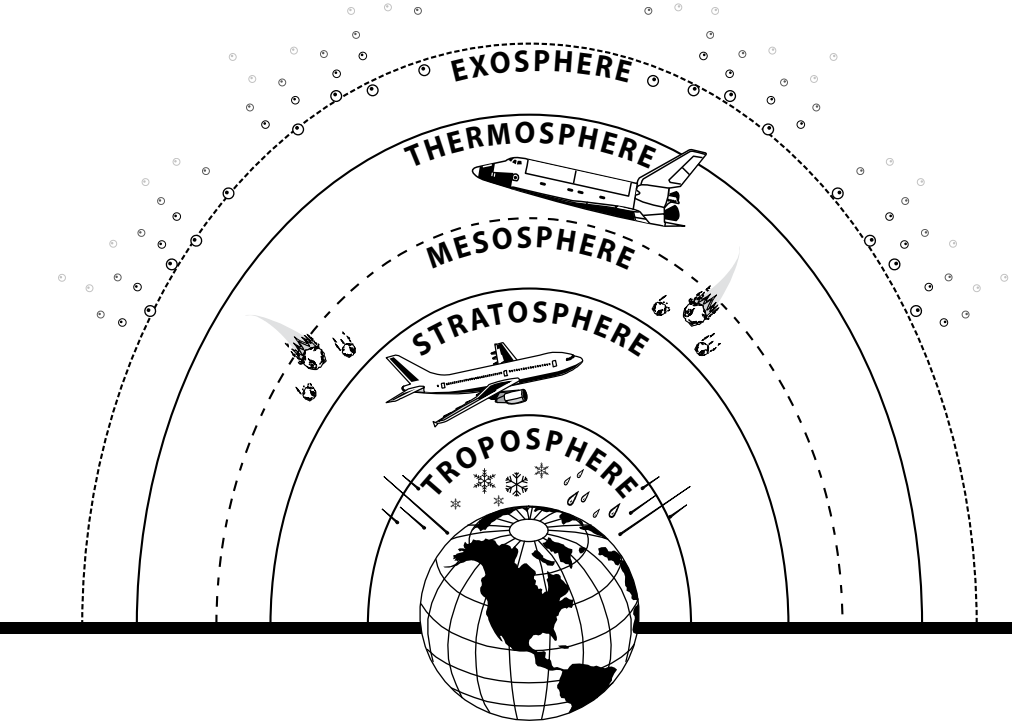
Trace over the dotted line to complete the rocket launch



The NPP spacecraft will be launching on a Delta II rocket to reach its polar orbit around the Earth.

FIVE LAYERS OF SPHERES

The makeup of our atmosphere



Troposphere: First layer above the surface and contains half of the Earth's atmosphere. Weather occurs in this layer.

Stratosphere: Many jet aircraft fly in this area because it is very stable. Also, the ozone layer absorbs harmful rays from the Sun.

Mesosphere: In this region, meteors or rock fragments burn up. The top of this area is the coldest part of Earth's atmosphere.

Thermosphere: Auroras occur in this area. It is also where the Space Shuttle orbits.

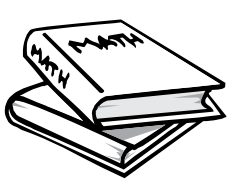
Exosphere: This very thin region is where atoms and molecules escape into space. This is the upper limit of our atmosphere.

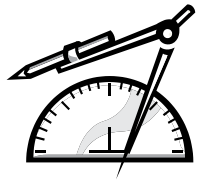
COMPUTER WHIZ

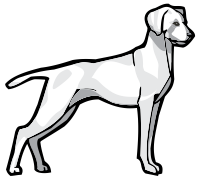
Find and circle these shapes

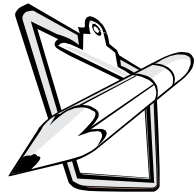
WHAT DOES NOT BELONG?

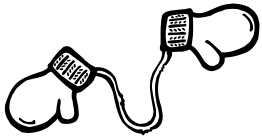
Circle the one that doesn't fit in

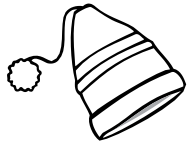


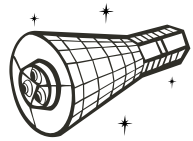


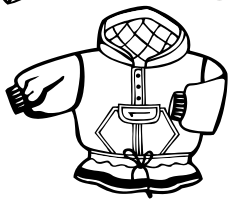


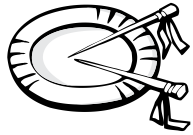


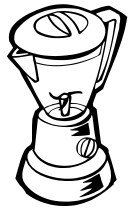


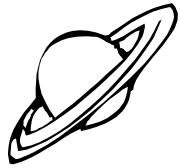












Dog, Satellite, Saturn

SOUNDS LIKE...

What other words rhyme with HAIL?

___ ___ ___ ___ ___

___ ___ ___ ___

___ ___ ___ ___

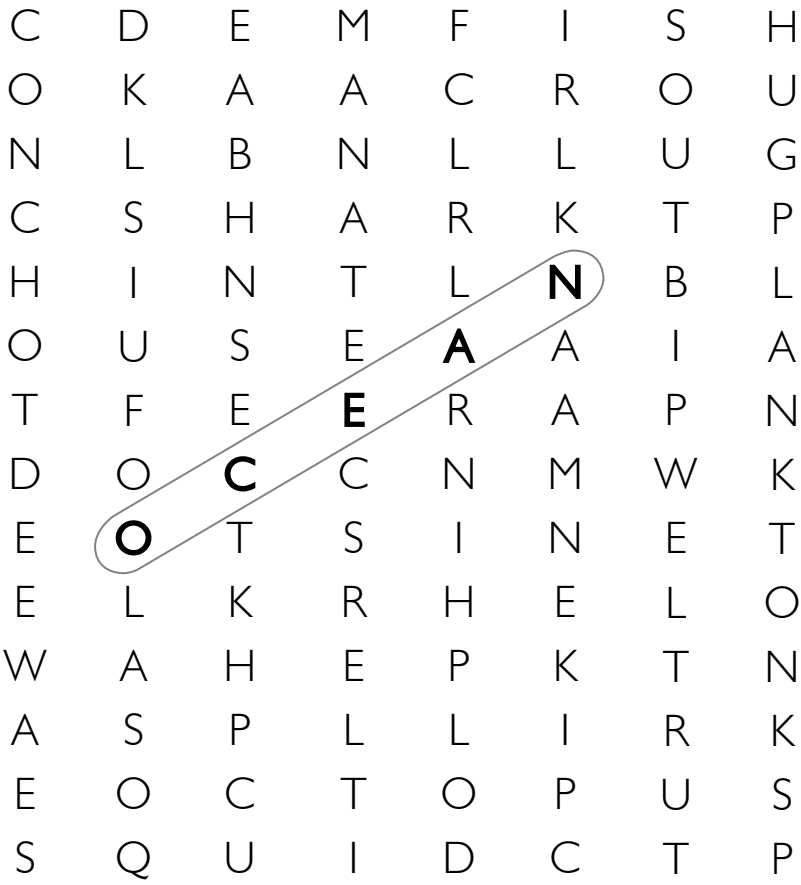
___ ___ ___ ___ ___

___ ___ ___ ___

Snail, Nail, Mail, Whale, Jail

UNDER THE SEA

Search for ocean life words



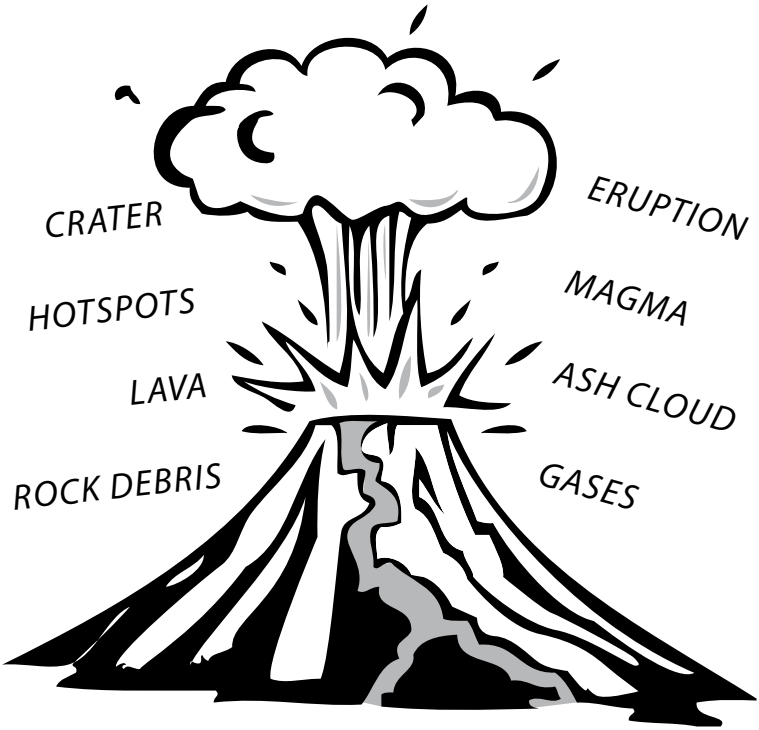
✓OCEAN	DOLPHIN	KRILL	PLANKTON	SHRIMP
CLAM	EEL	MANATEE	REEF	SNAIL
COD	FISH	OCTOPUS	SEA	SQUID
CONCH	GULL	ORCA	SEAWEED	TUNA
CRAB	KELP	PIKE	SHARK	TURTLE

THE SHELL GAME

Match up each sea shell with their shadow

BLOW YOUR TOP

Alphabetize these volcano-related words



1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

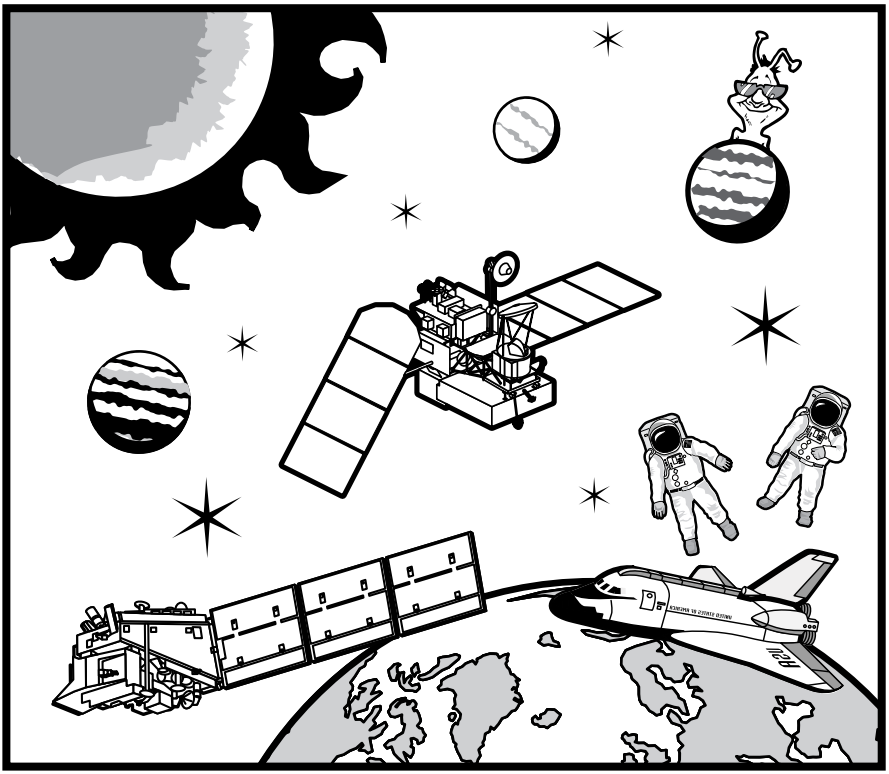
4. _____ 8. _____

A volcano is a mountain that opens downward to a pool of molten rock below the surface of the earth. When pressure builds up, eruptions occur. Gases and rock shoot up through the opening and spill over or fill the air with lava fragments.

1. Ash Cloud 2. Crater 3. Eruption 4. Gases 5. Hotspots 6. Lava 7. Magma 8. Rock Debris

SPACE COUNTING

How many space objects can you find?



How many aliens? _____

How many astronauts? _____

How many spacecraft? _____

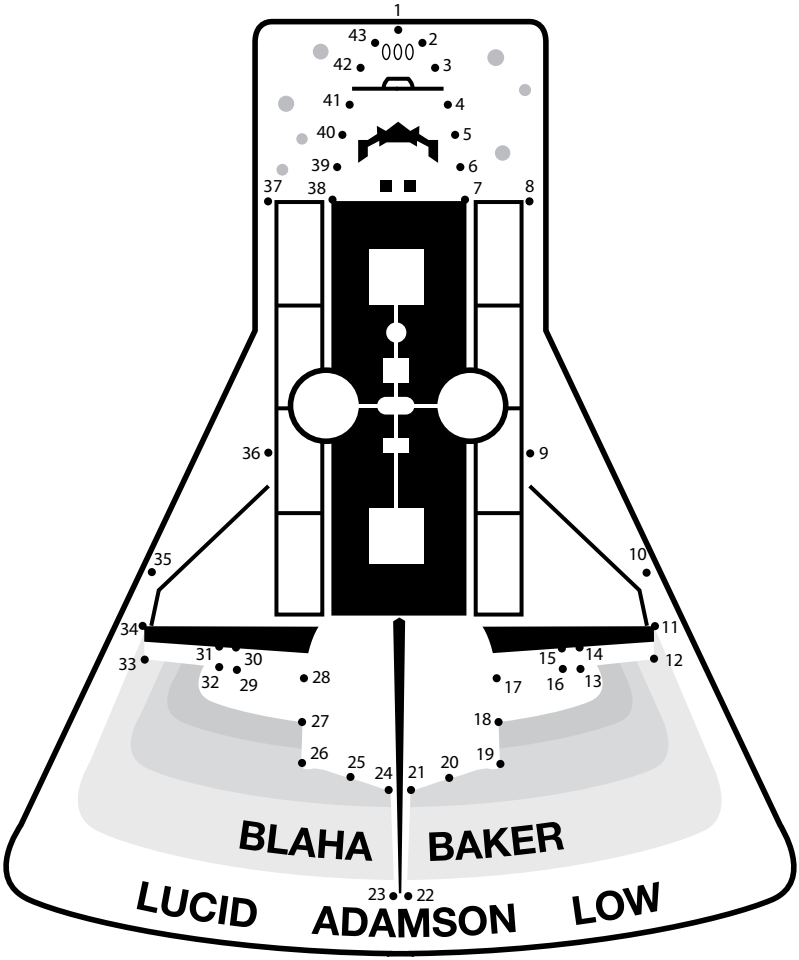
How many planets? _____

How many stars? _____

1 Alien, 2 Astronauts, 3 Spacecraft, 5 Planets, 6 Stars

MISSION PATCH

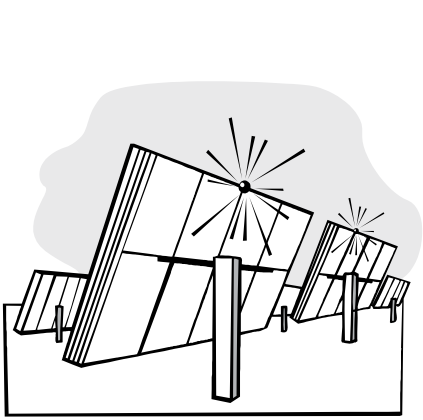
Connect the dots to complete the logo

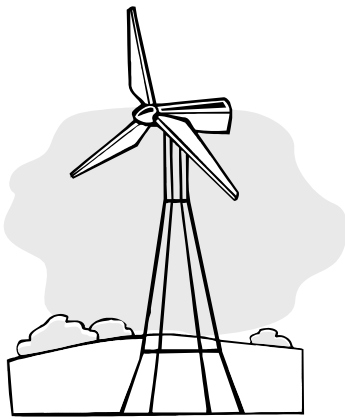


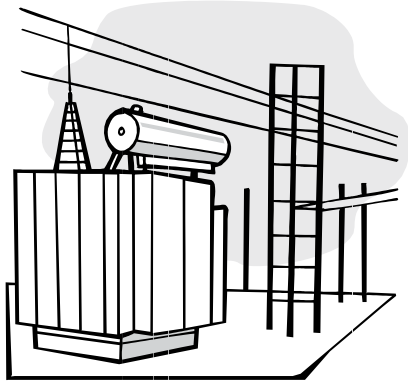
The Space Shuttle Atlantis mission (STS-43) launched on August 2, 1991. Its primary payload, the Tracking and Data Relay Satellite-5 (TDRS-5) deployed about six hours into flight and propelled satellite into geosynchronous orbit.

RENEW FOR THE FUTURE

Renewable energy can power the Earth



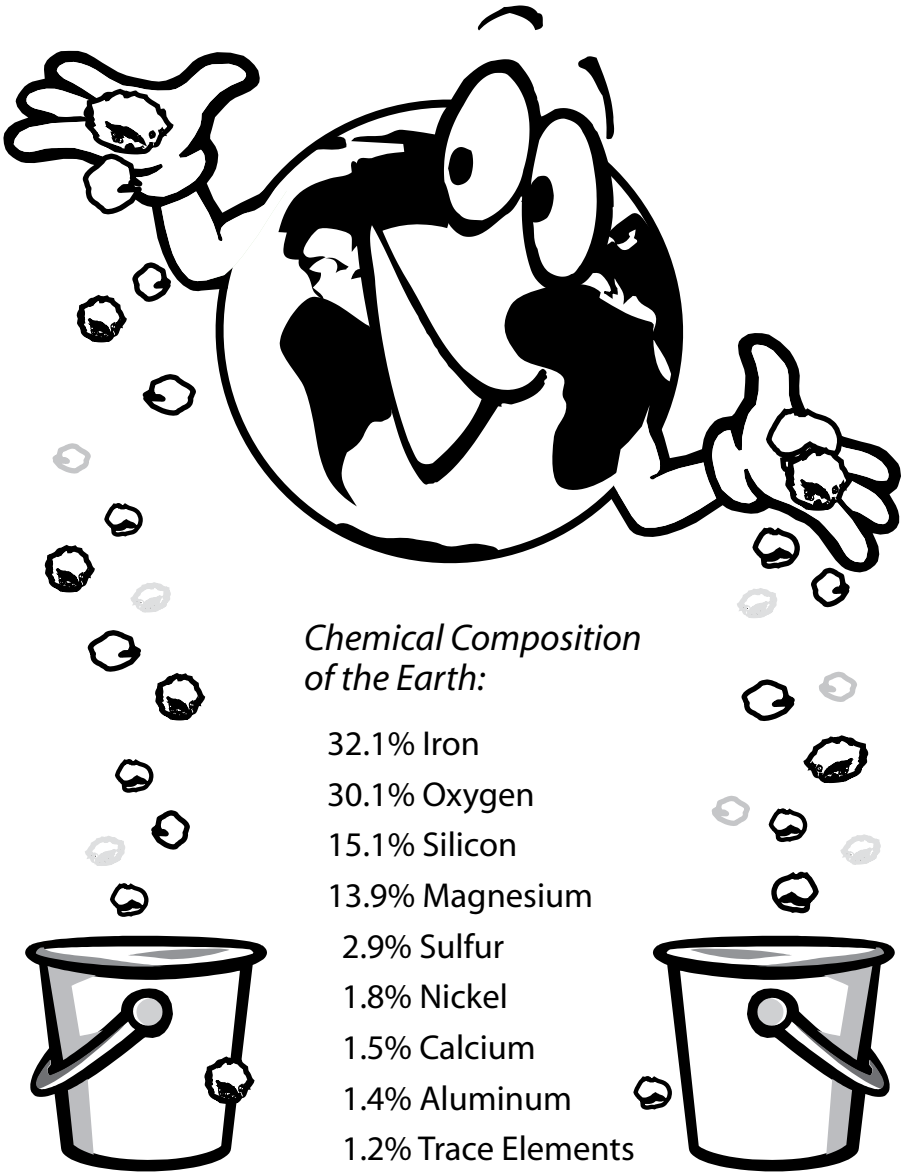




Renewable energy is that form of energy that doesn't exhaust the natural resources of the Earth. We need to use renewable sources of energy. We should strive to eliminate the use of fuels that cannot be recreated or made available again after they have been used once. Solar or wind energy can be converted into electricity. These renewable sources are unlimited and they can help preserve the Earth's environment.

EARTH MATTERS

Earth is made up of many different elements



Chemical Composition of the Earth:

32.1% Iron
30.1% Oxygen
15.1% Silicon
13.9% Magnesium
2.9% Sulfur
1.8% Nickel
1.5% Calcium
1.4% Aluminum
1.2% Trace Elements

A BETTER PLANET FOR ALL

Taking care of the Earth is everyone's job

The Earth still has amazing secrets just waiting to be discovered. We need to help our planet survive by using our creativity and imagination, so one day we can build tools that may help solve the problems we face. The Earth is our home and it is up to all of us to take special care of it.

For more information on NASA and its outreach programs, visit these web sites:

http://education.nasa.gov

http://nasascience.nasa.gov/

http://kids.earth.nasa.gov/

http://jointmission.gsfc.nasa.gov/

http://gpm.gsfc.nasa.gov/

National Aeronautics and Space Administration

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