



NPOESS Preparatory Project (NPP) Activity Book

*PACKED WITH FUN
THINGS TO DO!*

Name

School

Grade

Note to Parents:

This Activity Book is designed for ages 5 - 10 years old and is divided into sections.

- The front section contains general information about NPP
- The middle section contains activities for younger children
- The back section contains more challenging activities

*Cover image: Michael Lentz and Walt Feimer,
NASA/GSFC Conceptual Image Lab.*

**EXPLORE
MORE**

For more information on NASA and the NPP mission, visit these web sites:

<http://education.nasa.gov>

<http://nasascience.nasa.gov/>

<http://npp.gsfc.nasa.gov/>

<http://www.nasa.gov>

NPP FUN FACTS

Mission logo



NASA's NPOESS Preparatory Project (NPP) monitors the health of Earth from space, helping scientists understand how our planet is changing over time. Its mission is to keep track of climate change, natural disasters, ozone layer, vegetation, air pollution, atmospheric temperatures, and weather.

<http://npp.gsfc.nasa.gov>

EARTH: OUR HOME

Color our world

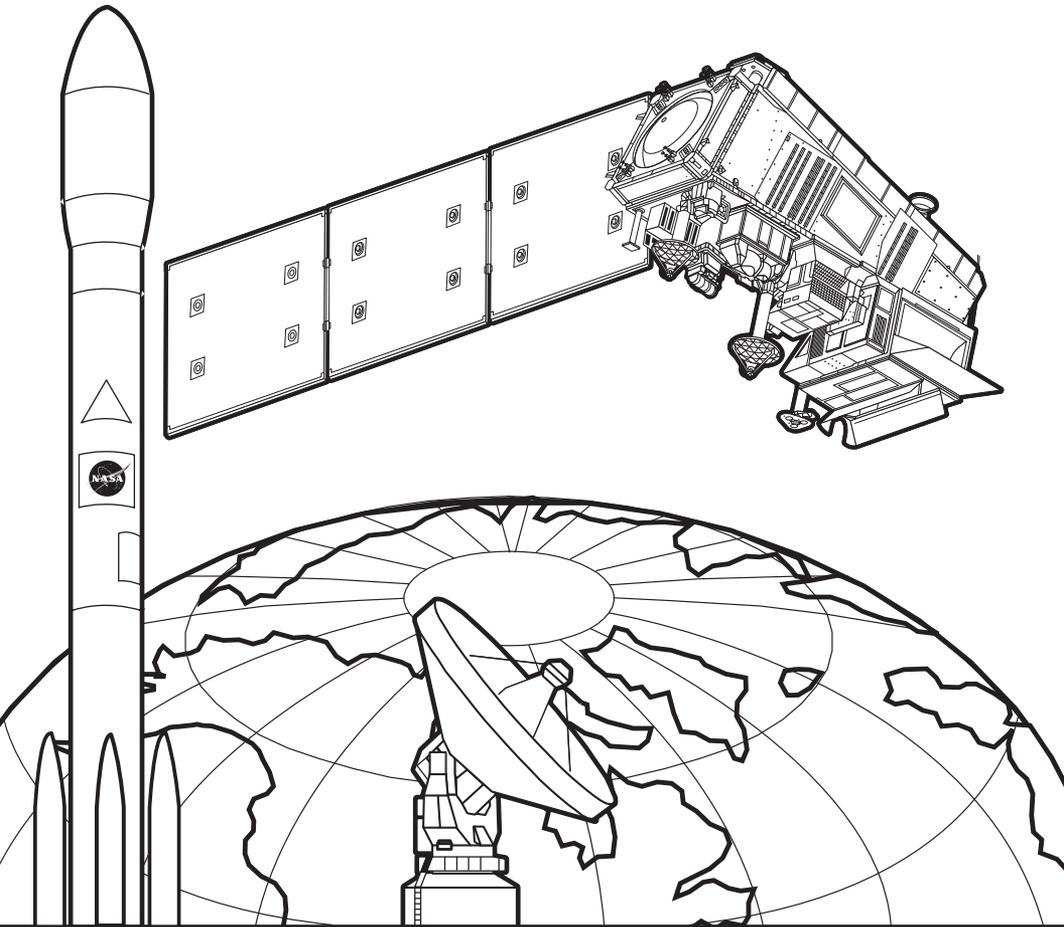


Earth is an ocean planet. Our home has an abundance of water—and life—that makes it unique in our solar system.

Other planets, plus a few moons, have ice, atmospheres, seasons, and even weather, but so far, only on Earth does the whole complicated mix come together in a way that encourages life—and lots of it.

NPP SATELLITE

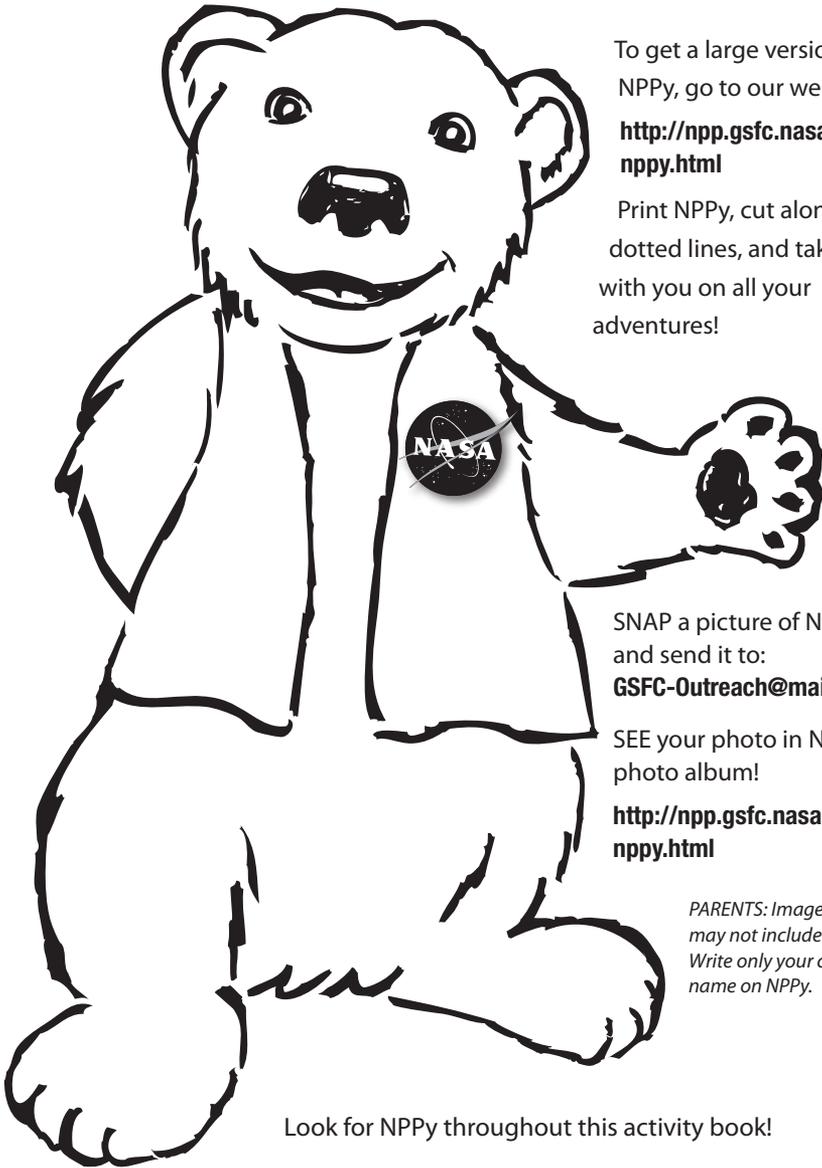
A spacecraft that orbits Earth and helps us study weather and climate.



To find out more about the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) mission, please visit our web site at <http://npp.gsfc.nasa.gov/>

NPPy'S TRAVELS

Welcome to NPPy's world!!!



To get a large version of NPPy, go to our web site:

<http://npp.gsfc.nasa.gov/nppy.html>

Print NPPy, cut along the dotted lines, and take him with you on all your adventures!

SNAP a picture of NPPy and send it to:

GSFC-Outreach@mail.nasa.gov

SEE your photo in NPPy's photo album!

<http://npp.gsfc.nasa.gov/nppy.html>

PARENTS: Images of NPPy may not include people. Write only your child's FIRST name on NPPy.

Look for NPPy throughout this activity book!

NPP WORD SEARCH

Find NPP-related words

W A T M O S P H E R E
E A R T H R E T A W N
A E C A P S K L S I V
T C L O U D C E R N I
H I L N C L A R O D R
E A U D I E T A S E O
R S P M O N A I N N N
P L A N E T D N E O M
E T I L L E T A S Z E
E V E G E T A T I O N
H A E C N E I C S P T
A S A N A X I S P S O

ATMOSPHERE

AXIS

CLIMATE

CLOUD

DATA

EARTH

ENVIRONMENT

ICE

✓ NASA

NPP

OCEANS

OZONE

PLANET

POLAR

RAIN

SATELLITE

SCIENCE

SEA

SENSORS

SPACE

SUN

WATER

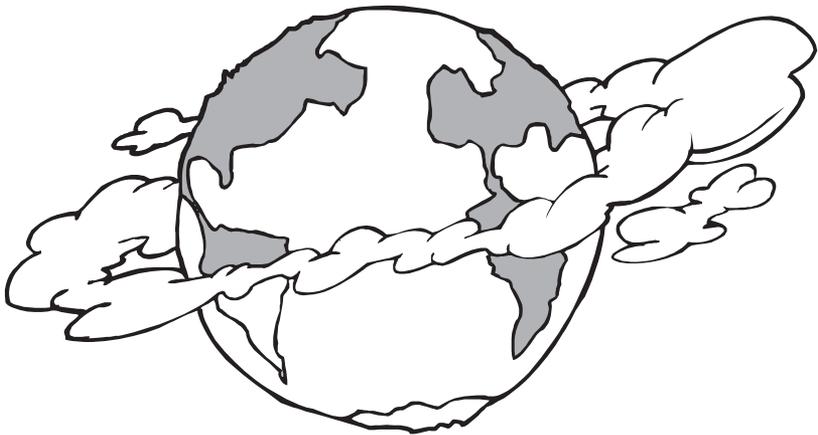
WEATHER

WIND

VEGETATION

WHY ARE CLOUDS WHITE?

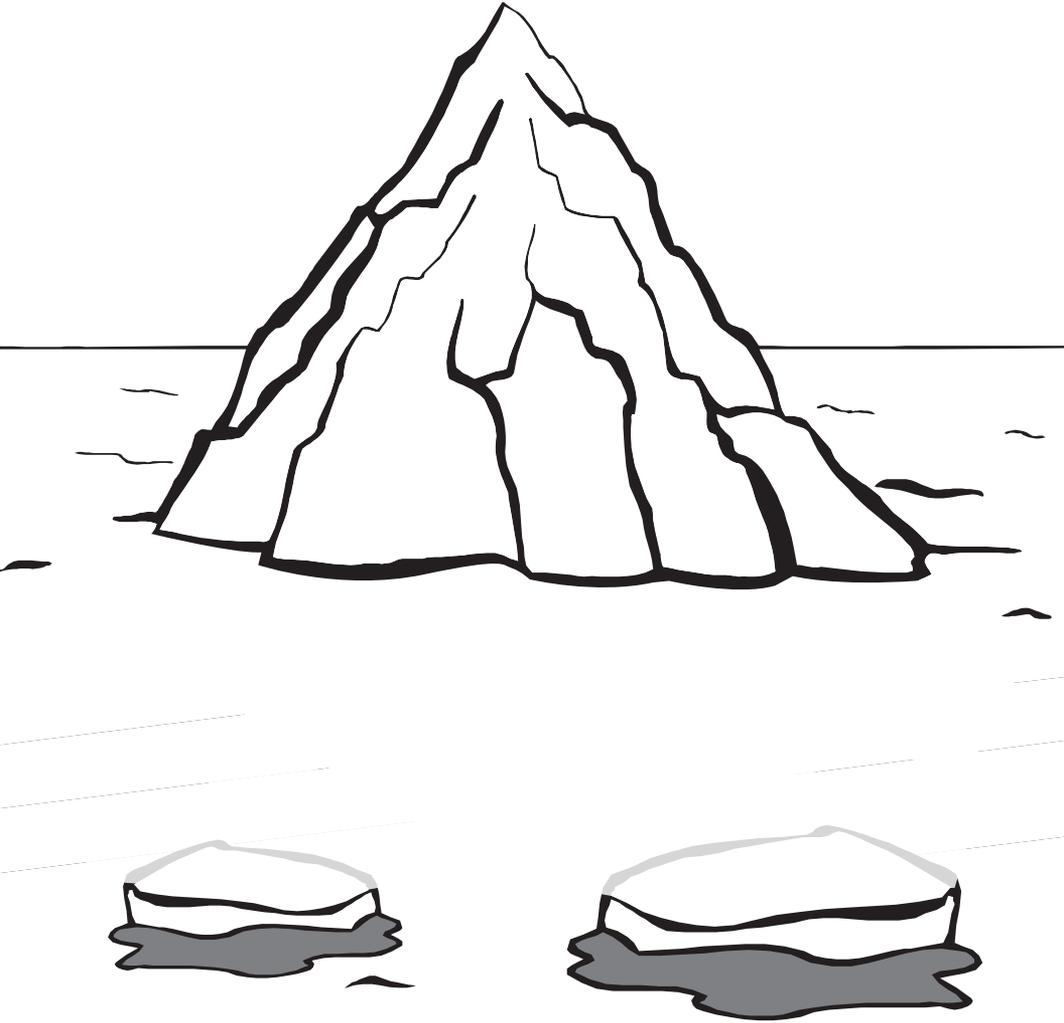
Circle the 7 differences



Clouds are white because they reflect the light of the Sun. Light is made up of colors of the rainbow and when you add them all together you get white. Clouds reflect all the colors in the same amount so they look white.

DRAWING NEAR

Draw your own polar bears on the sea ice



An iceberg is a large piece of ice that has broken off from a large ice formation into the water. Polar bears live along shores and on sea ice in the icy cold Arctic.

SHAPING UP

Find and circle these shapes



RHYMING WITH NPPy

*How many words can you
rhyme with Polar Bear?*

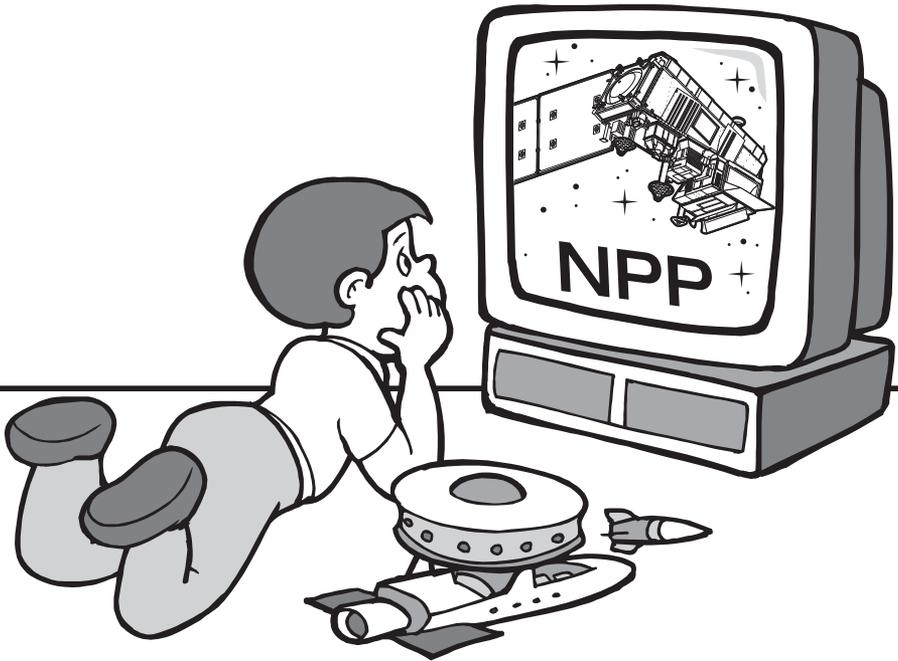


NPPy

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

NPP AND YOU

What you need to know...



Over the last decade, NASA launched a series of satellites that view the Earth from space. That series, known as NASA's Earth Observing System (EOS), has provided new insights into many features of Earth, including its clouds, oceans, vegetation, ice, and atmosphere. However, as the EOS satellites age, a new generation of Earth-observing satellites will take over.

The NPOESS Preparatory Project (NPP) is a critical first step in building this next-generation satellite system. Goddard Space Flight Center is leading NASA's effort to launch a satellite that will carry the first of these new sensors.

GLOBAL WARMING

Too hot to handle?



A temperature change of a few degrees could drastically change our world. If global temperatures rise, the heat would melt glacial ice and raise sea levels. All of NPP's 24 data products will have some bearing on global change and climate science.

GLOBAL COOLING

Put these words in alphabetical order



Crater Smoke
Lava
Flows Fire
Landslide
Dust
Eruption

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

Naturally occurring volcanic eruptions and large forest fires can impact the Earth's system just like human-caused air pollution. These events can fill the atmosphere with dust and darken the global "greenhouse roof," which results in cooling. This is why scientists must study Earth as a system to understand how the planet is changing beyond these natural events.

OBSERVING EARTH

What kinds of scientists study the Earth?

TIHECSM

This scientist finds ways to make chemicals useful to us and also try to improve things that people use daily, such as paint, medicine, and cosmetics, as well as cars and airplanes.

OANBITST

This scientist studies plants. The information they gather includes how a plant functions, where they grow, how they evolved over time, and how they are related.

COGRENAHEPAOR

This scientist studies the ocean and the life in it. They generally have a background in Earth science and marine biology.

TPIHSOGEYICS

This scientist studies the Earth using gravity, magnetic, electrical, and seismic methods.

GSIEOTLOG

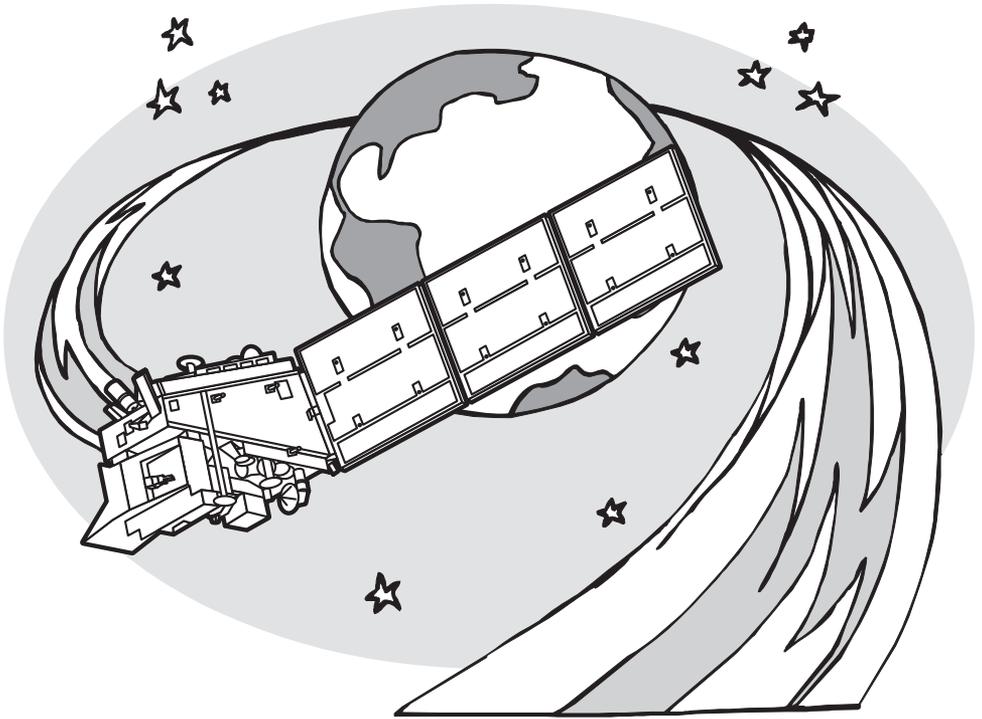
This scientist studies the Earth, the materials of which it is made, the structure of those materials, and the processes acting upon them. It includes the study of organisms that have inhabited our planet.



Scientists are using satellite-borne instruments to measure the interactions of the atmosphere, oceans, and solid Earth through hydrologic and biogeochemical cycles. Scientists need data from many sources to get a better picture of the whole system.

SATELLITES SEE...

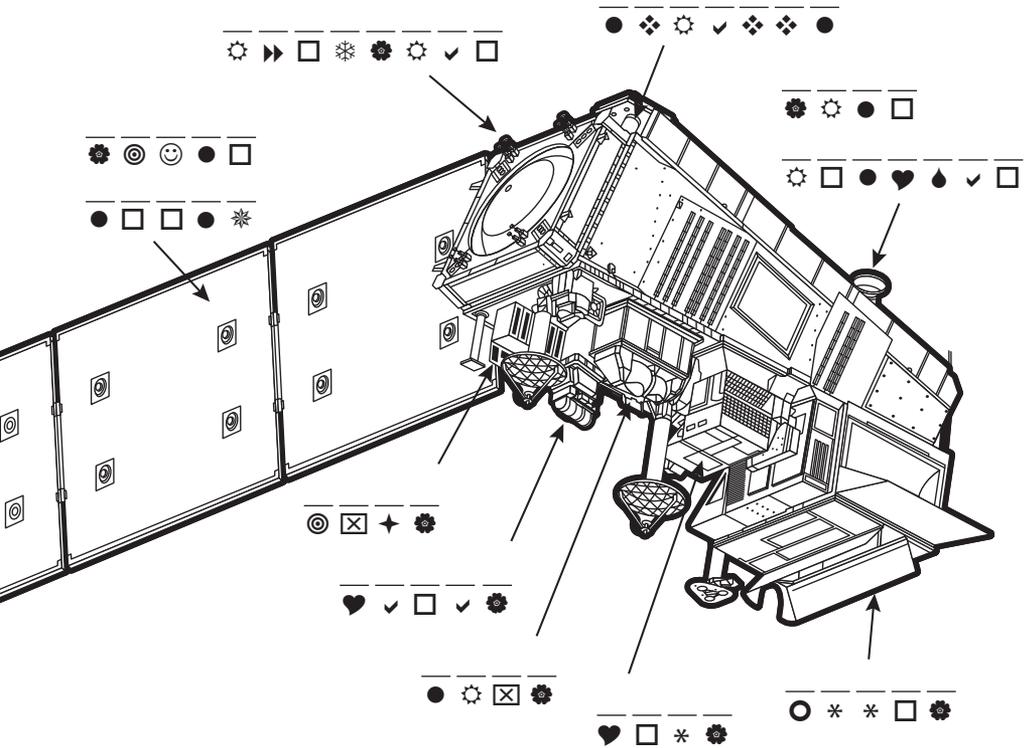
...what we can't see



Satellites are particularly effective because they can cover the entire globe every few days. They can see a whole ocean at once to study wind, temperatures, and currents. With data about how Earth works as a system, we can understand human impacts and cooperate as nations to make sure the planet remains healthy and life-sustaining.

NPP PIECES

Use the code to name the parts of the spacecraft

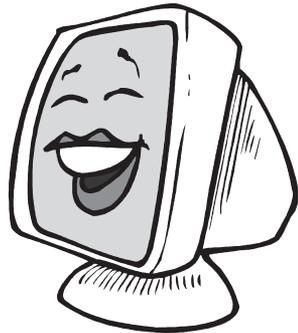
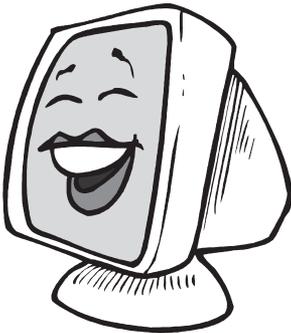
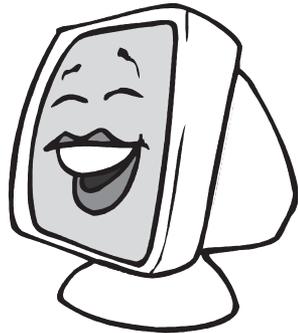
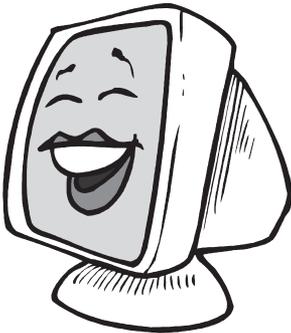
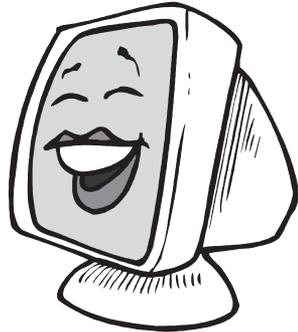
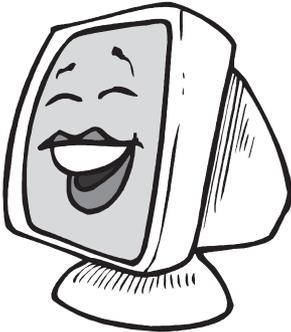


All of these components and the OMPS, CERES, VIIRS, ATMS, and CRIS instruments on the satellite will study Earth from space.

| | | | | | |
|-------|--------|-------|-------|-------|-------|
| A = ● | F = △ | K = ☹ | O = ◎ | S = ⚙ | W = ☆ |
| B = ▲ | G = 👁 | L = 😊 | P = ✦ | T = ⚙ | X = ☎ |
| C = ♥ | H = ▶▶ | M = ☒ | Q = 😊 | U = ❄ | Y = ✨ |
| D = ⊙ | I = ✨ | N = ❖ | R = □ | V = ○ | Z = ▼ |
| E = ✓ | J = ☒ | | | | |

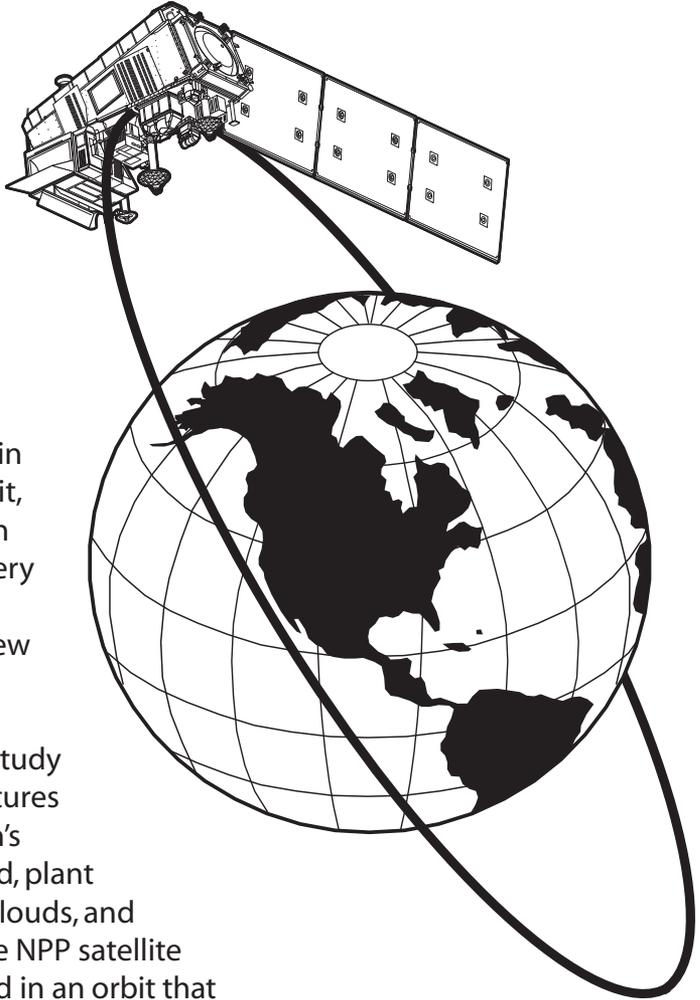
COMPUTER DESIGN

Circle the computer that is different



ORBITS

Satellites circling the globe



Satellites are so high above Earth and travel so quickly that, in the right orbit, a satellite can pass over every part of Earth once every few hours. Such orbits allow satellites to study and take pictures of all of Earth's features: land, plant life, oceans, clouds, and polar ice. The NPP satellite will be placed in an orbit that passes over the North and South Poles to look at Earth continuously and will complete about 14 orbits per day.

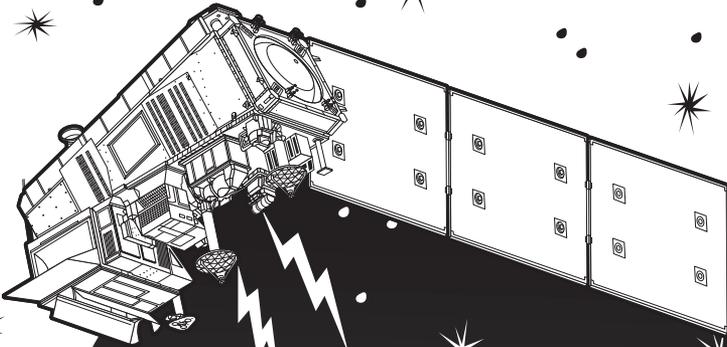
PLAYING INSTRUMENTS

How satellite instruments can help us on Earth



Satellite instruments are like special cameras that see and take pictures in different kinds of light, such as in ultraviolet (invisible energy from the Sun that causes sunburns) and infrared (heat waves). From satellite data, we can see farmers' fields and tell whether crops are healthy. This tells us about the food supply. We can see forest fires and tell how fast the forests are being cut down. Satellites also see clouds, hurricanes, lightning, and rain. In addition, we can see the temperatures and movements of ocean currents. And from the color of the oceans, we can see the abundance of tiny plants, called phytoplankton, which are an important food source for fish.

SATELLITE DESIGN



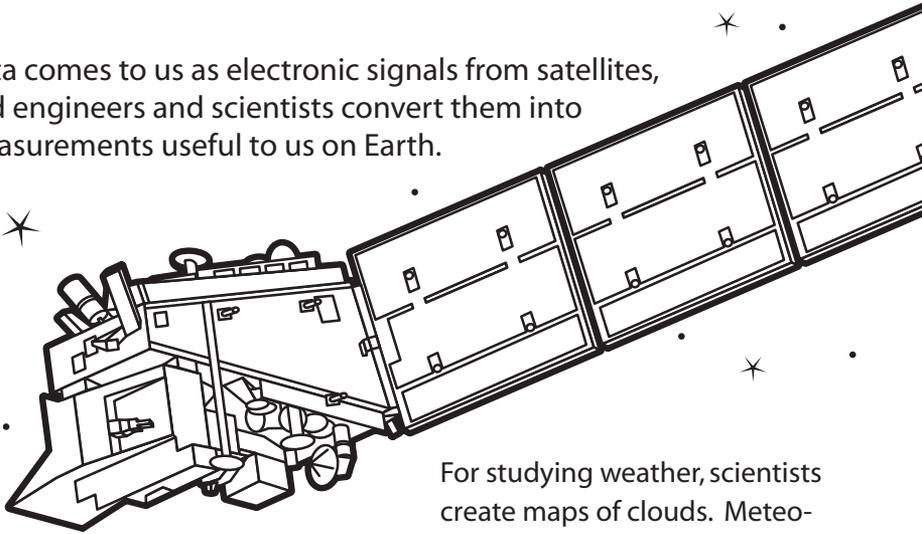
Engineers design satellites to support instruments flown in space. Satellites must be light enough to be carried into space on rockets, yet strong enough to withstand the forces of launching. The materials used must handle hot and cold temperature extremes because most satellites will pass from the day to night side of Earth many times in 24 hours. Scientists use special paints on the instruments to control temperature. Satellites' solar cells extend like wings to capture solar energy and convert it into electricity. When the satellite is on the night side of Earth, it runs on batteries that are recharged during the day from solar energy.



WORLDS OF DATA

How do we use all this information?

Data comes to us as electronic signals from satellites, and engineers and scientists convert them into measurements useful to us on Earth.

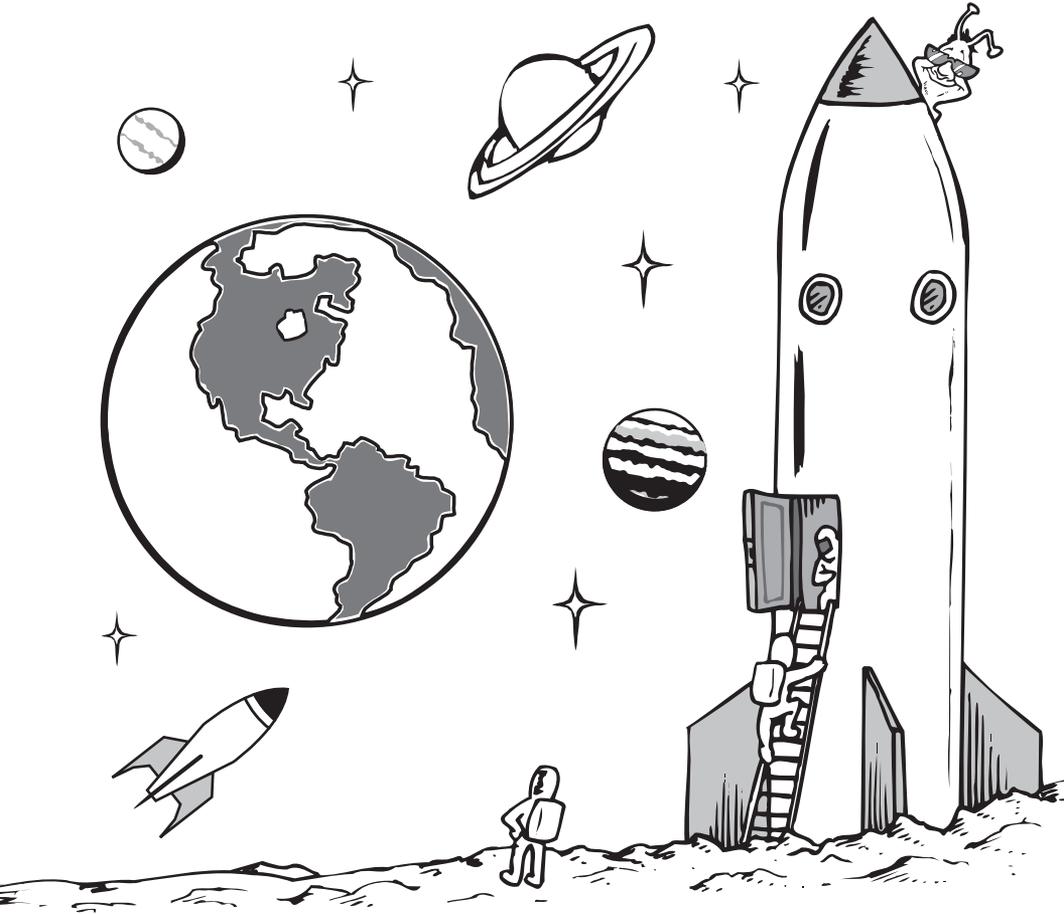


For studying weather, scientists create maps of clouds. Meteorologists compare the satellite maps to their ground data and learn more about weather patterns. Scientists compare ocean-color data gathered by a satellite to measurements taken by oceanographers on ships showing the abundance of phytoplankton. Microwave radar signals from space are compared to rainfall measurements on Earth. Computer engineers organize and store vast quantities of satellite data so that the information can be sent via computer networks to scientists around the globe.



COUNTING OFF TO LIFTOFF

How many objects can you find?



How many stars? _____

How many planets? _____

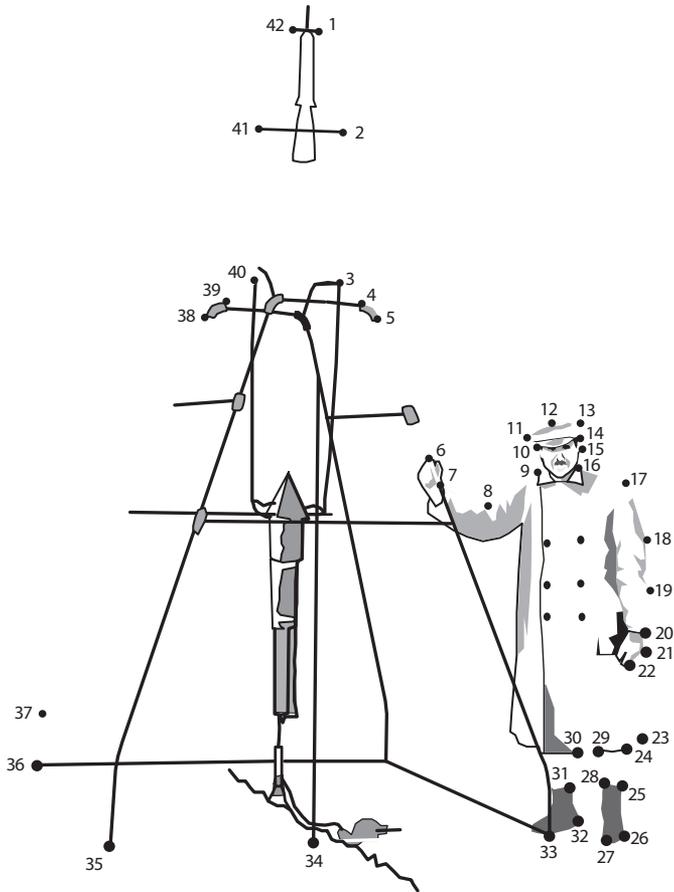
How many astronauts? _____

How many rockets? _____

How many aliens? _____

ROBERT H. GODDARD

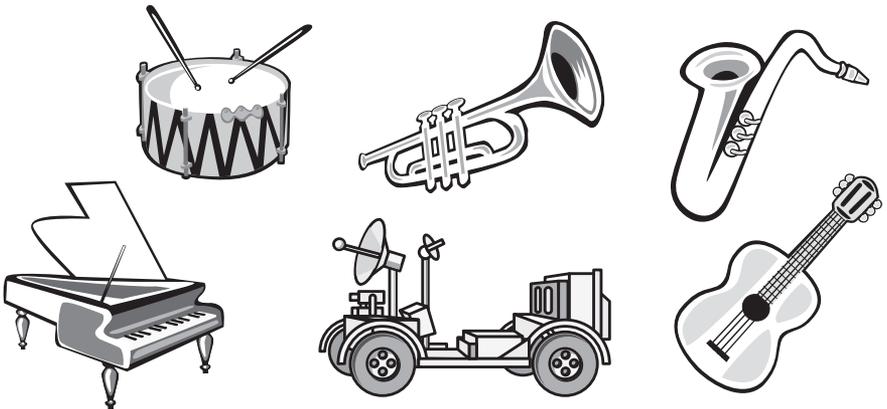
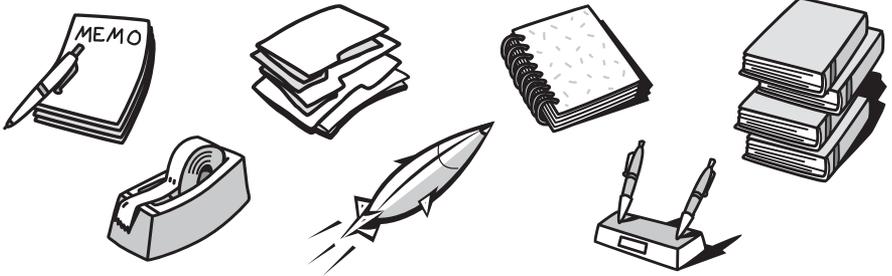
Connect the dots to see the rocket man



This is Robert H. Goddard, one of the founding fathers of modern rocketry and spaceflight theory, beside a 1926 liquid-fueled rocket. The rocket is on top, receiving its fuel by two lines from the tank at the bottom. In memory of the brilliant scientist, NASA's Goddard Space Flight Center in Greenbelt, Maryland was established on May 1, 1959.

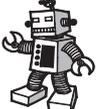
NOT TOGETHER

Circle the one that doesn't belong in the group



BLOCK IT OFF

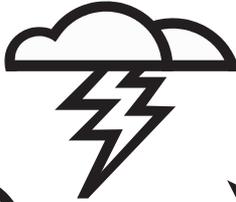
Find the answer by writing the first letter of each object in the box

| | |
|--|---|
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |

The biosphere is that part of Earth's atmosphere, land, and oceans that supports any living plant, animal, or organism. It is the place where plants and animals, including humans, live.

SCRAMBLE IT UP

*Unscramble the letters to spell
weather-related words*



UNEIHSNS

HRNTUDE

LAHI

TROFS

DOTARON

ICURNERHA

Climate is not the same as weather, but rather, it is the average pattern of weather for a particular region. Weather describes the short-term state of the atmosphere. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity, phenomena such as fog, frost, and hail storms, and other weather patterns.

DECODE THIS SECRET MESSAGE

Match the numbers to the letters using the code below to solve the puzzle

20 8 5 14 16 16

13 9 19 19 9 15 14

9 19 20 8 5

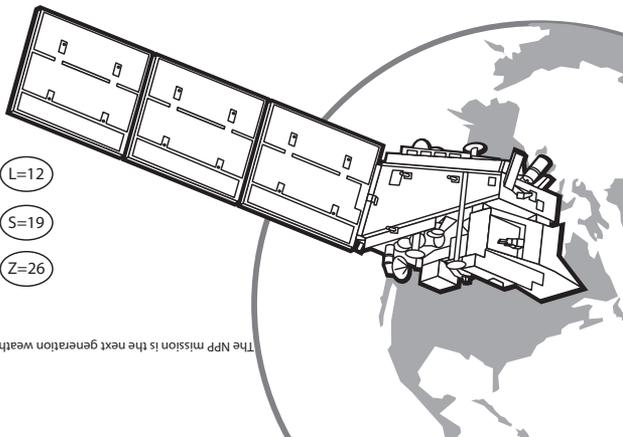
14 5 25 20

7 5 14 5 18 1 20 9 15 14

24 5 1 20 8 5 18

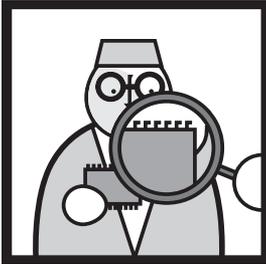
19 1 20 5 12 12 9 20 5

- A=1 B=2 C=3 D=4 E=5
- F=6 G=7 H=8 I=9 J=10 K=11 L=12
- M=13 N=14 O=15 P=16 Q=17 R=18 S=19
- T=20 U=21 V=23 W=24 X=25 Y=26 Z=26



NASA'S PIONEERS

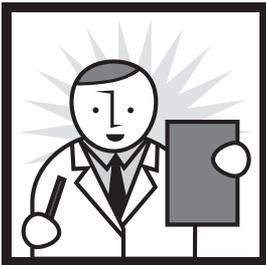
Unscramble the words to find out who makes NPP possible



TISCINSTE



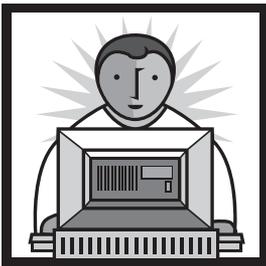
AMENGAR



GEINERNE



ICATECNINH



GRAMREPOMR

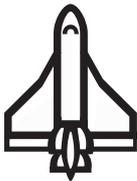
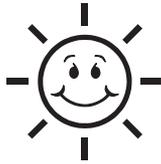
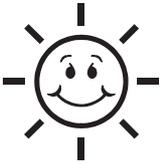


CTASERYRE

AND MANY MORE!!!

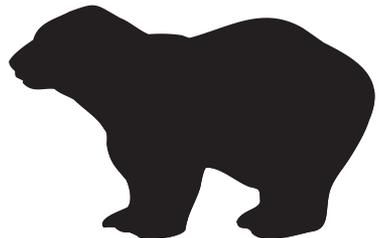
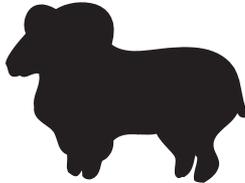
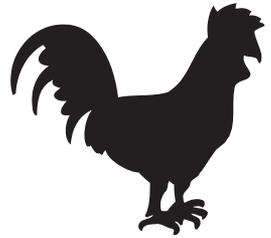
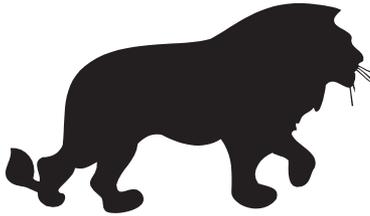
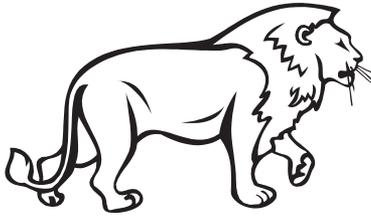
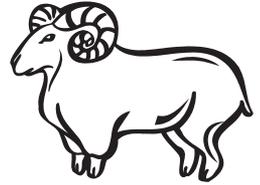
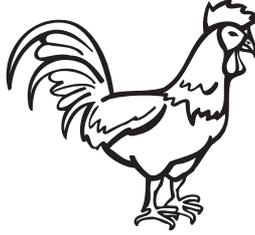
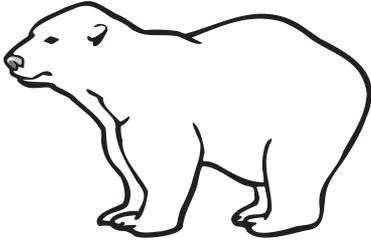
WHAT COMES NEXT?

Draw the picture that comes next in each row



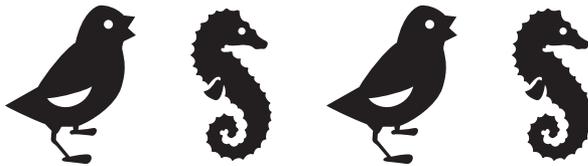
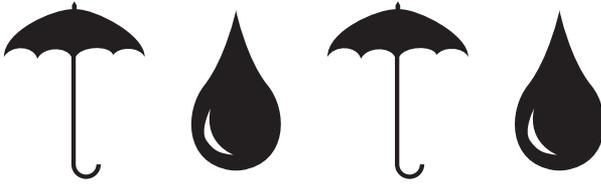
ONLY THE SHADOW KNOWS

Match up the item to their shadow



WHAT COMES NEXT?

Draw the picture that comes next in each row



TWISTER AND SHOUT

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



1. _____

7. _____

2. _____

8. _____

3. _____

9. _____

4. _____

10. _____

5. _____

11. _____

6. _____

12. _____

UP, UP, AND AWAY

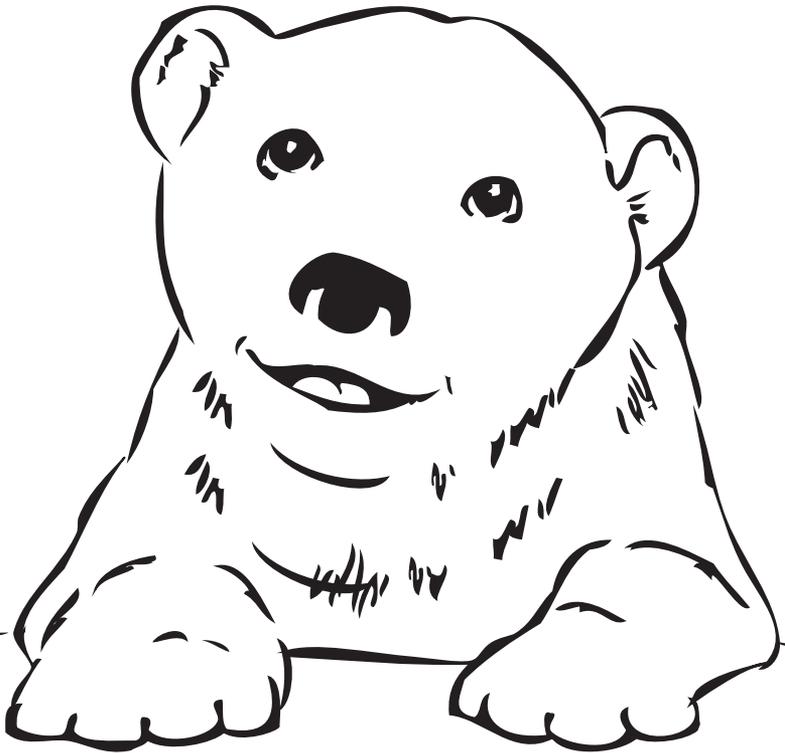
How many words can you rhyme with FLY?



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

NPPy THE POLAR BEAR

Read all about our mascot



NPPy is a polar bear who spied the NPP satellite as it flew over his home near the North Pole. A naturally curious young bear, NPPy decided to find out all he could about satellites and how they're used to learn more about our Earth.

<http://npp.gsfc.nasa.gov/nppy.html/>

GLOBAL INFORMATION

Computers help us every day



NASA provides a wealth of resources that are safe, fun, and educational for students. You can find reliable information on space-related topics, as well as games, web quests, and even chat with NASA experts!

Visit our web site at www.nasa.gov

EARTH IS WHERE THE HEART IS...

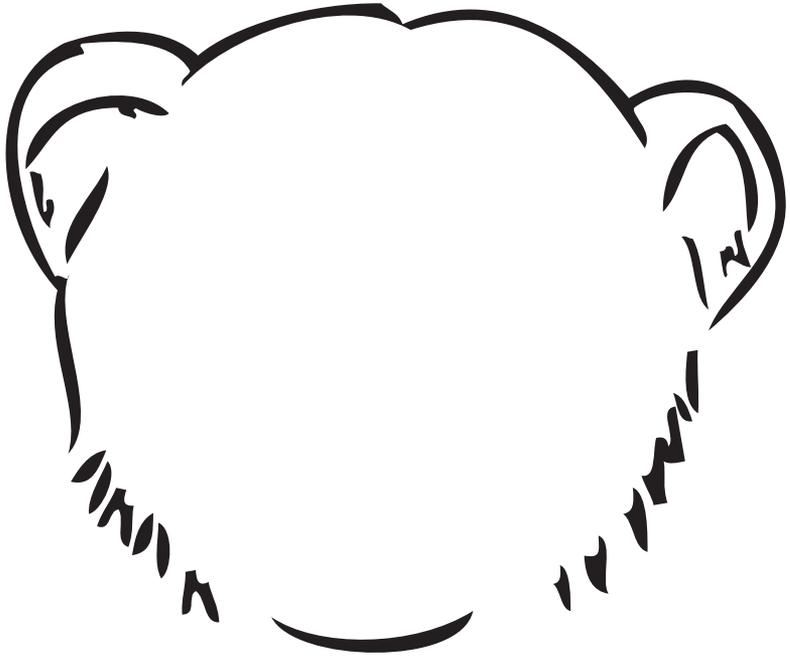
How many times can you find the words "EARTH" and "HEART"?



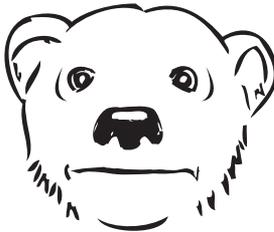
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E | T | E | A | R | T | H | E | A | R | T | E |
| H | A | A | E | A | H | E | A | R | T | H | A |
| E | A | R | T | H | E | A | R | T | H | E | R |
| A | T | T | T | E | A | R | T | H | E | A | T |
| R | R | H | A | H | R | T | H | T | A | R | H |
| T | H | E | A | R | T | H | E | A | R | T | H |
| H | E | A | R | T | H | E | A | R | T | H | A |
| H | T | R | A | E | A | R | T | H | H | E | R |

DRAW A FACE ON NPPY

Make him sad, mad, or glad!



SAD



MAD



GLAD

TAKING A SPACE WALK

Find the line that gets the astronaut back to his spaceship



COLOR BY (RECYCLE) NUMBER

Find out what recycling numbers mean



1 - Green

2 - Blue

3 - Light Blue

4 - Brown

5 - Tan

6 - Purple

7 - Gray



Soda, water, and vinegar bottles



Laundry/dish detergent, bleach, milk, shampoo, conditioner, and motor oil containers



Pipes, shower curtains, meat wraps, cooking oil bottles, coffee containers, and shrink wrap



Wrapping films, grocery bags, and sandwich bags



Tupperware®, syrup bottles, yogurt tubs, diapers, and outdoor carpet



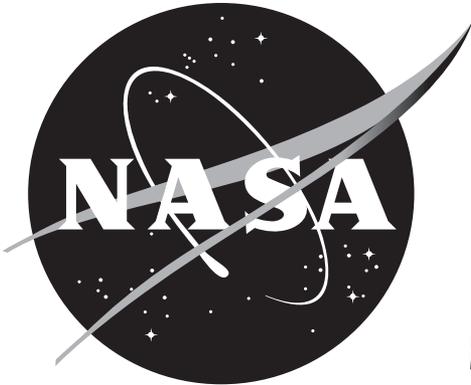
Coffee cups, disposable cutlery, bakery shells, meat trays, packing peanuts, and styrofoam insulation



Other: products that are made of any combination of 1-6 or another, less commonly used plastic

NASA THINK TANK

*Unscramble the words to spell out
NASA's name*



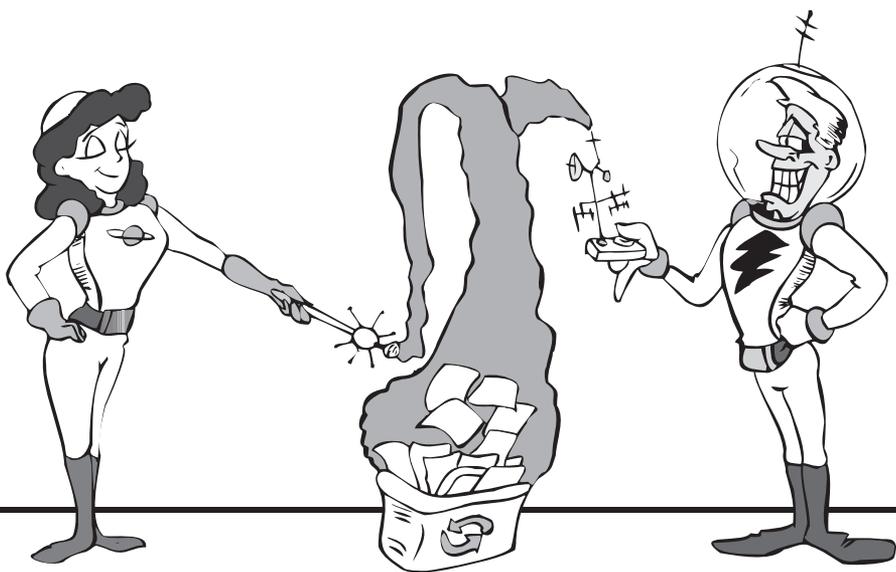
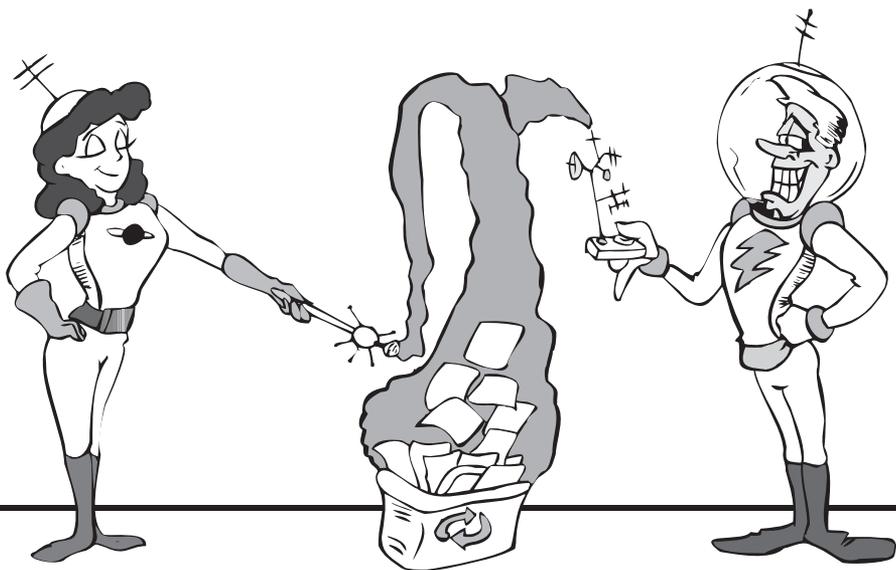
**ALONTIAN
CTERATIONUA
DNA
CEPSA
MTISANODINATIR**





SPACE JUNK

Find and circle 10 differences



TO THE LETTER

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

| | |
|--|---|
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |
| |  |

What is climate? Is it weather? Is it the rain? Is it a hot day in August? Yes, yes and yes, but only in one place at a time. Climate is the atmospheric condition in a certain location near the surface of the Earth.

LEARN ABOUT NPP

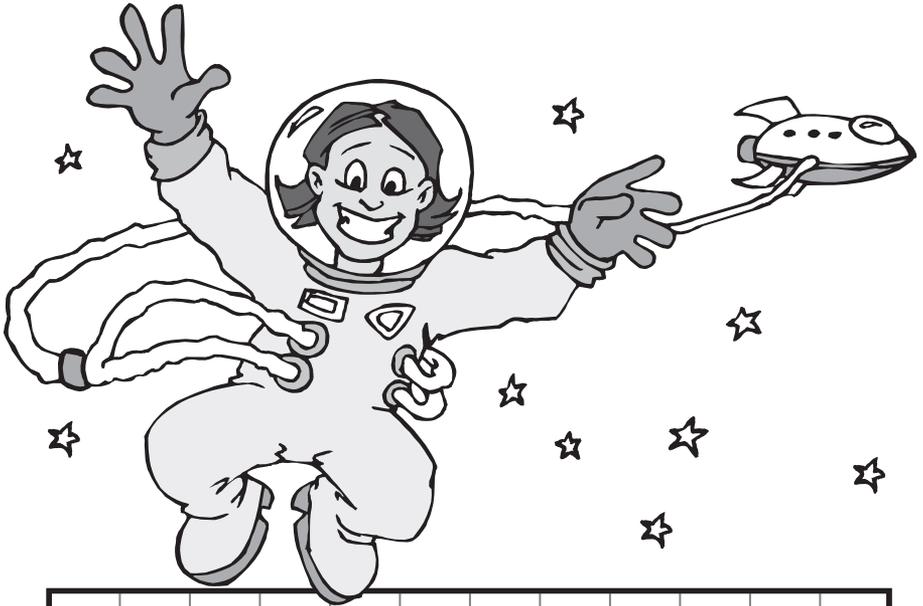
A new Earth satellite



The National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) will be placed in an orbit that passes over the North and South Poles. The satellite will fly about 512 miles (824 kilometers) above the surface and complete about 14 orbits per day. A polar orbit makes it possible for NPP sensors to monitor all parts of the surface at least once per day.

SPACE FUN

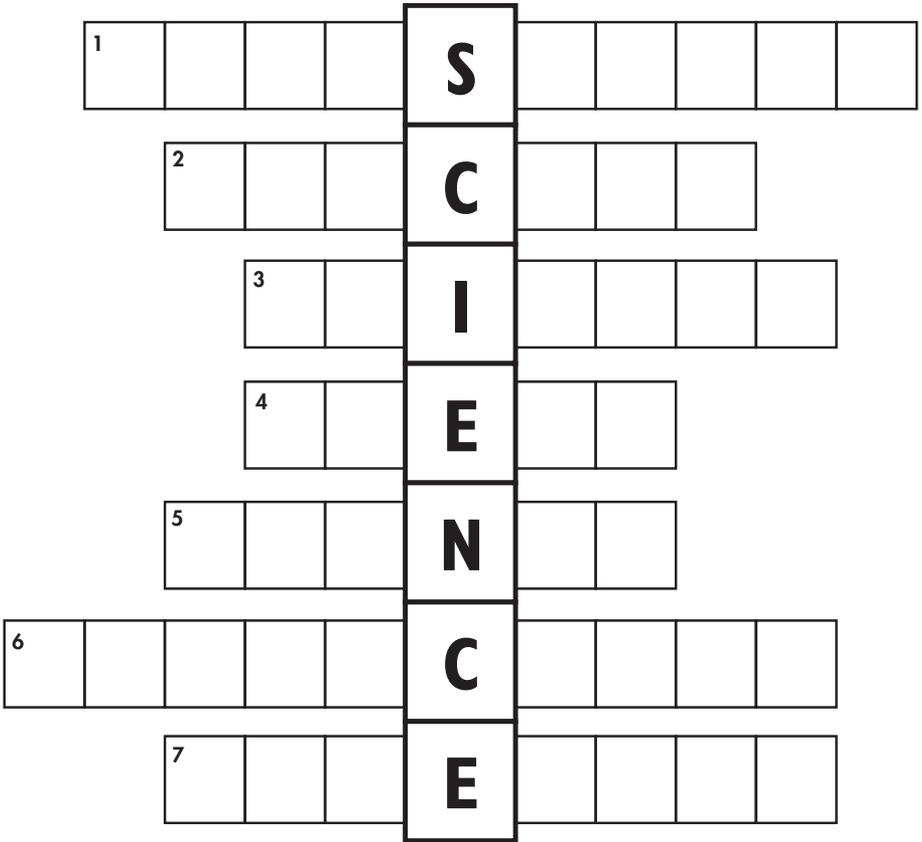
How many times can you find the word "SPACE"?



| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | S | P | A | C | E | A | E | C | A | P | S |
| S | P | A | C | E | S | P | E | S | C | A | P |
| P | A | S | P | C | E | C | A | P | S | C | A |
| A | C | E | C | A | A | S | E | A | P | E | C |
| C | E | C | S | P | A | C | E | C | S | C | E |
| E | P | A | S | S | P | A | C | E | A | A | C |
| A | S | P | A | C | E | S | E | C | A | P | S |
| E | C | S | P | A | C | E | C | A | P | S | S |

SCIENCE CROSS WORDS

Answer the clues to find the words

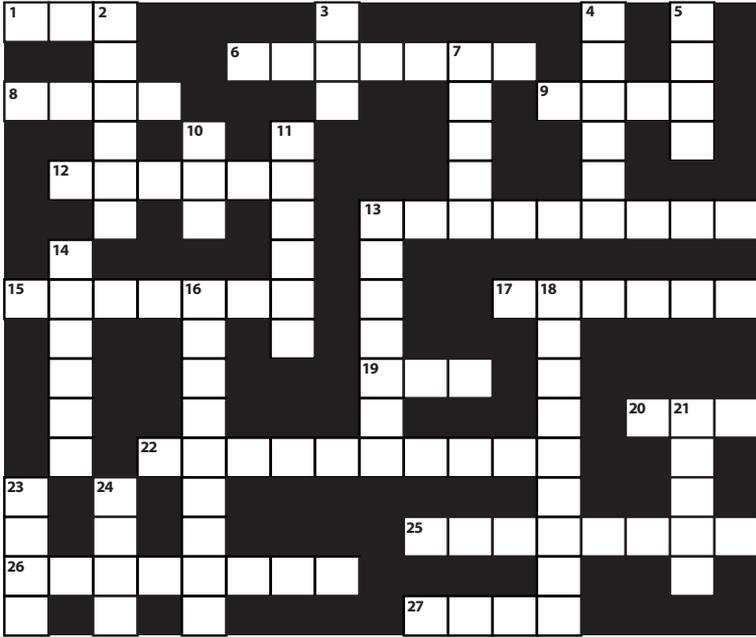


CLUES:

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

NPP CROSSWORD

Answer the questions to complete the puzzle



ACROSS

1. NPOESS Preparatory Project acronym
6. NPP will study Earth _____
8. A condition of being hot
9. Satellite information that scientists use every day
12. A large cloud of interstellar dust and gas
13. A sand- to boulder-size particle of debris in space
15. Our largest planet and fifth from the Sun
17. A collection of star systems
19. Frozen water
20. A large body of salt water; Mediterranean _____
22. A scientist who studies celestial bodies such as stars, planets, and galaxies
25. The amount of moisture in the air
26. Magnetic disturbances on the surface of the Sun and appears as dark blotches on its surface
27. An object, usually made of glass, that focuses or defocuses the light that passes through it

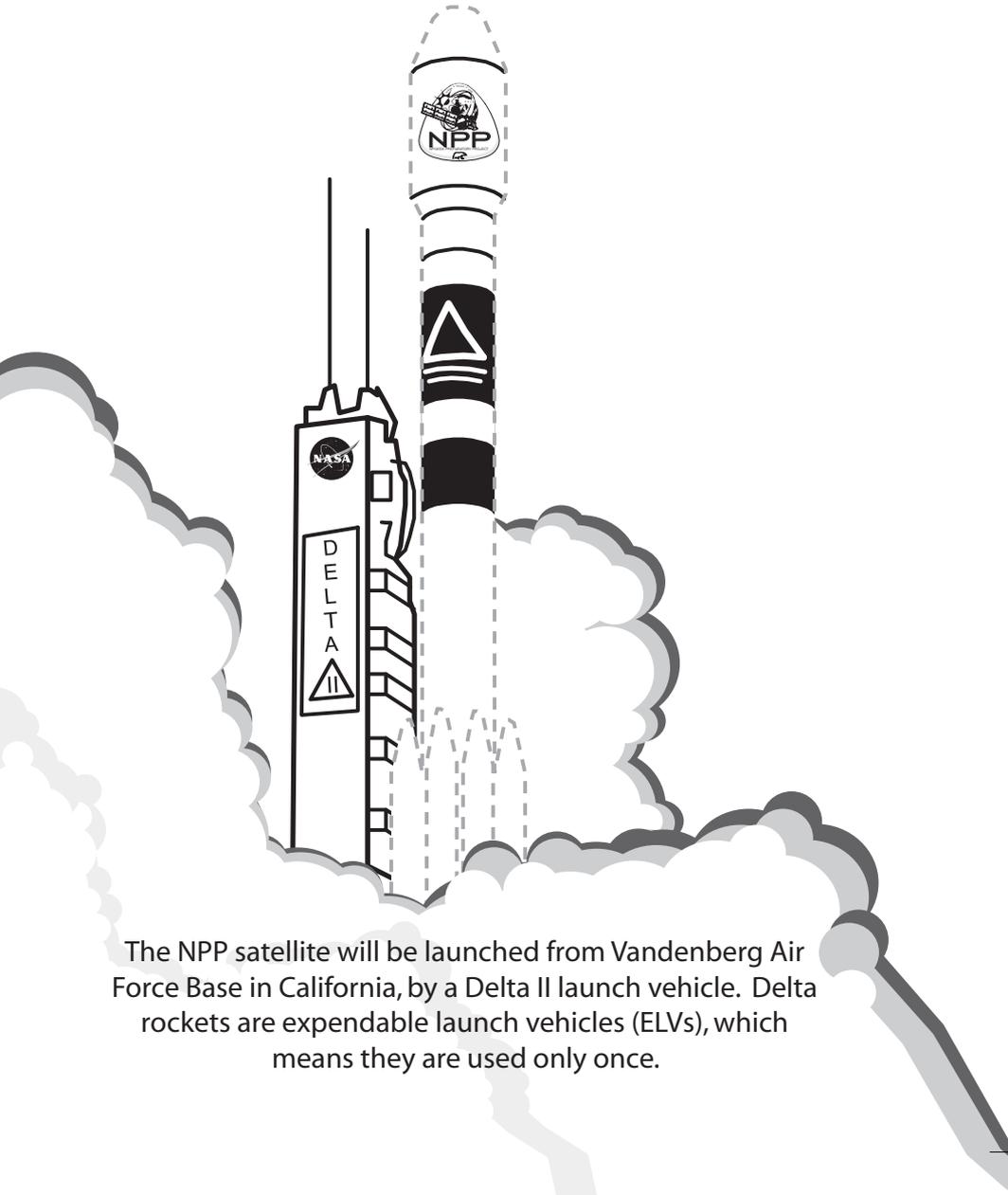
DOWN

2. Any of the eight celestial bodies in our Solar System that revolve around the Sun
3. The mixture of invisible gas that surround the Earth
4. A large, bright object at the edge of very distant Universe which emits huge amounts of energy
5. Any celestial body that is seen as a point of light in the night sky
7. A small, frozen extraterrestrial body that travels around the Sun and sometimes has a long tail
10. The Earth and other planets revolve around the _____
11. Equipment for taking photographs
13. A journey, by a manned or unmanned vehicle, into space for a specific reason (to gather scientific data)
14. First space telescope that was carried into orbit by the Space Shuttle in April 1990
16. An instrument that magnifies images of distant objects
18. Rocky or metallic objects that orbit the Sun in a belt between Mars and Jupiter; also known as planetoids or minor planets
21. Our home planet
23. James Webb Space Telescope acronym
24. The solid part of the Earth's surface; ground or soil

| | | | | | |
|------------|---------------|----------------|-----------|---------------|---------------|
| 1. NPP | 13. Meteorite | 22. Astronomer | 2. Planet | 10. Sun | 18. Asteroids |
| 6. Science | 15. Jupiter | 25. Humidity | 3. Air | 11. Camera | 21. Earth |
| 8. Heat | 17. Galaxy | 26. Sunspots | 4. Quasar | 13. Mission | 23. JWST |
| 9. Data | 19. Ice | 27. Lens | 5. Star | 14. Telescope | 24. Land |
| 12. Nebula | 20. Sea | | 7. Comet | 16. Telescope | |
| Down: | | | | | |

LIFTOFF!

Trace over the dotted line to complete the rocket launch



The NPP satellite will be launched from Vandenberg Air Force Base in California, by a Delta II launch vehicle. Delta rockets are expendable launch vehicles (ELVs), which means they are used only once.

WRITE OR WRONG?

Fill in the blank with the correct word

forecasting

orbit

data

weather

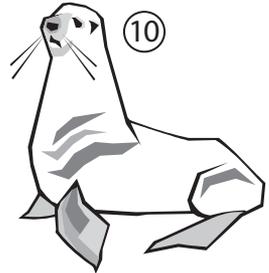
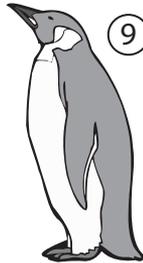
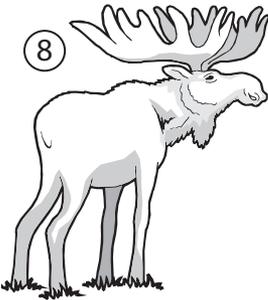
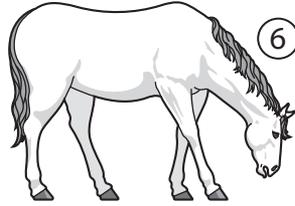
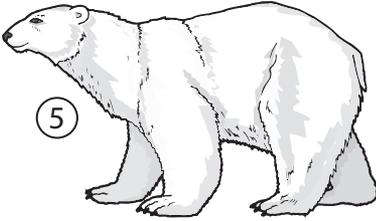
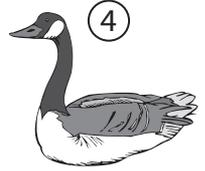
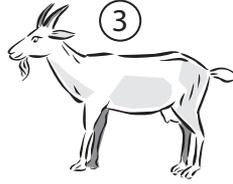
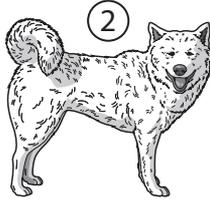
satellite

1. NPP is a new _____ that will orbit the Earth.
2. The NPP mission will measure _____ and climate.
3. NPP will provide _____ for weather forecasting and climate research.
4. NPP will be placed in _____ around the North and South Poles.
5. Meteorologists will use NPP's data for weather _____.



BEAST IN SHOW

Name these animals



1. _____

6. _____

2. _____

7. _____

3. _____

8. _____

4. _____

9. _____

5. _____

10. _____

TRAVEL WITH NPPy

Color NPPy's postcard



Dear Friend,
The weather is wonderful. I wish you could meet all my friends at NASA. Wish you were here!

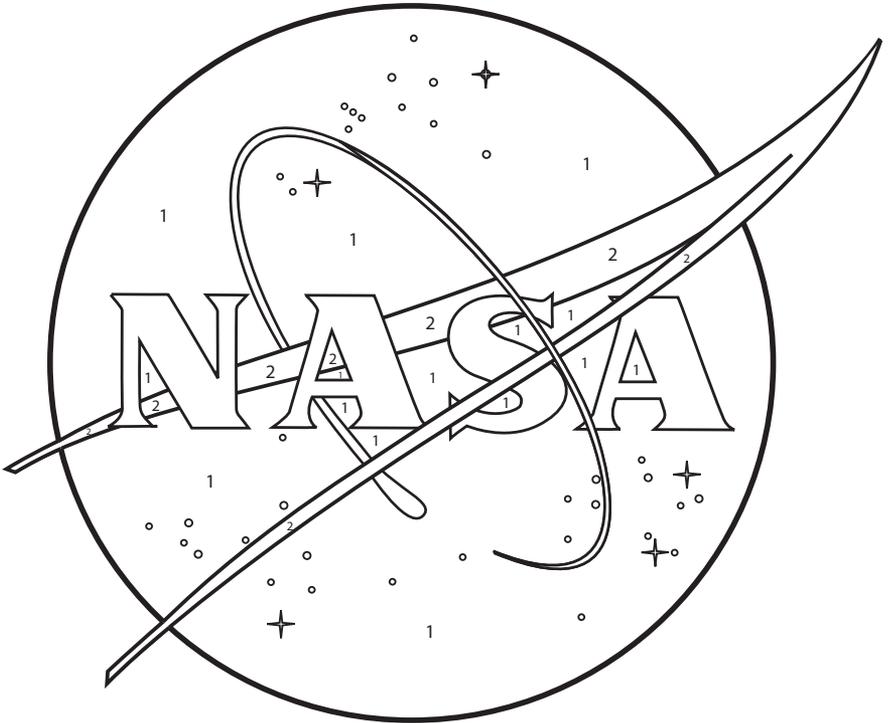
Love,
NPPy

To:
My Activity Book Friend
Anywhere, USA



NASA COLORING

Color-by-number the NASA logo



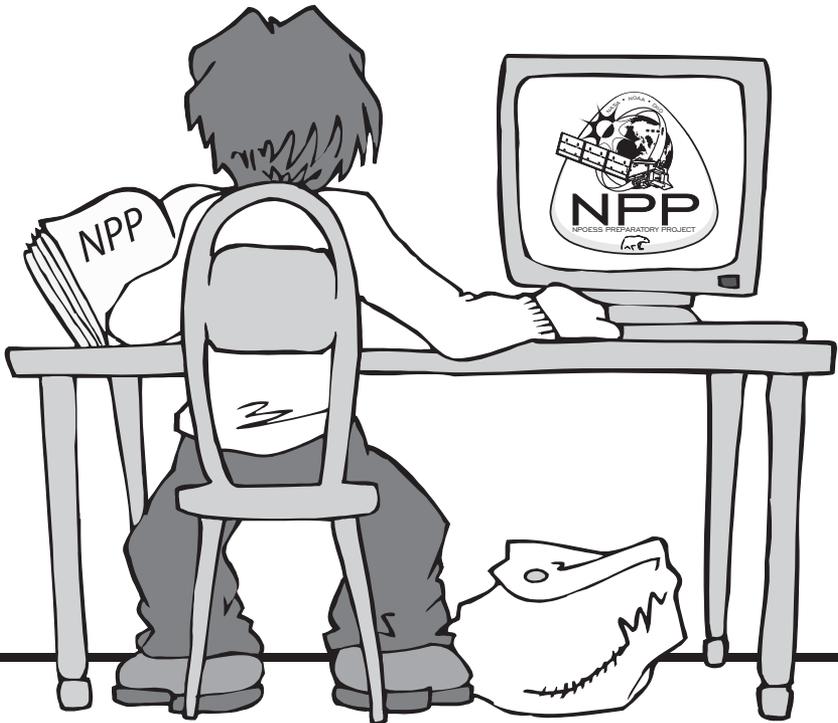
1 = Blue 2 = Red

The NASA Insignia (more commonly referred to as the “meatball”) reflects the history and tradition of the Agency and is used in all of the Agency’s day-to-day communications materials. Designed in 1959 by former NASA employee James Modarelli, of NASA Glenn Research Center, the NASA Insignia contains the following elements: the sphere represents a planet, the stars represent space, the vector represents aeronautics, and the orbit represents space travel.

STUDYING NPP

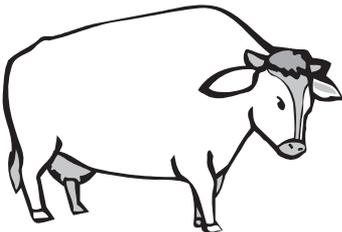
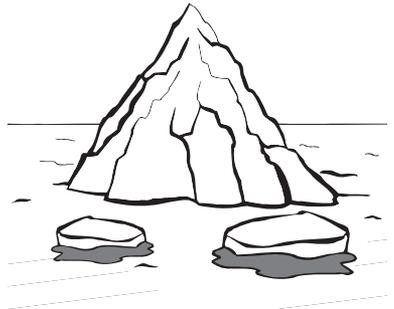
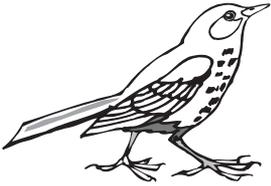
How many words can you spell using the letters in RESEARCH?

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



WHERE DO I BELONG?

Draw a line to the matching home



AROUND THE WORLD

Where's NPPy? Write the country in the blank.



Eiffel Tower in Paris,



Statue of Liberty in New York,



Leaning Tower of Pisa,



Big Ben in London,

SPACE FACE

Draw an astronaut face in each helmet



KEEPING THE EARTH SAFE

For all of us...



NPP will help us understand how the world around us works and help us learn more about our environment and its various habitats and weather systems.

Let's all take responsibility for caring for our fragile world.



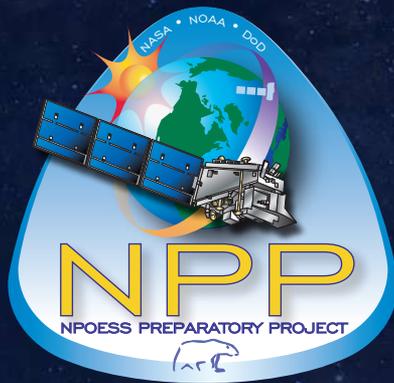
For more information on NASA
and the NPP mission, visit these
web sites:

<http://education.nasa.gov>

<http://nasascience.nasa.gov/>

<http://npp.gsfc.nasa.gov/>

<http://www.nasa.gov>



*For more information,
please visit our web site: <http://npp.gsfc.nasa.gov/>*

