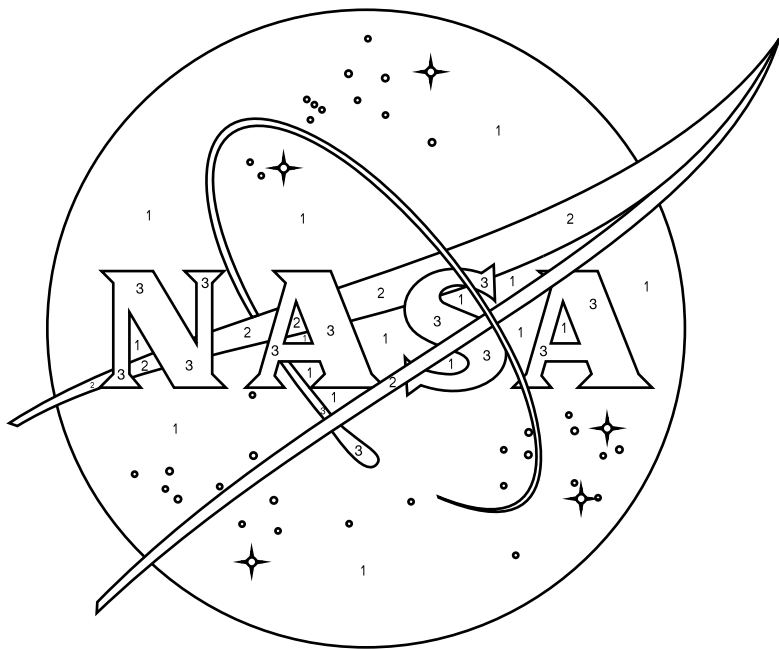


**LAUNCH  
SERVICES  
PROGRAM**

# Coloring Space

Select your favorite red and blue crayons or markers and use the numbers as a guide to help you re-create the official NASA logo below.



Color  
Palette



blue



red



white

**SPACE!  
ROCKS!**

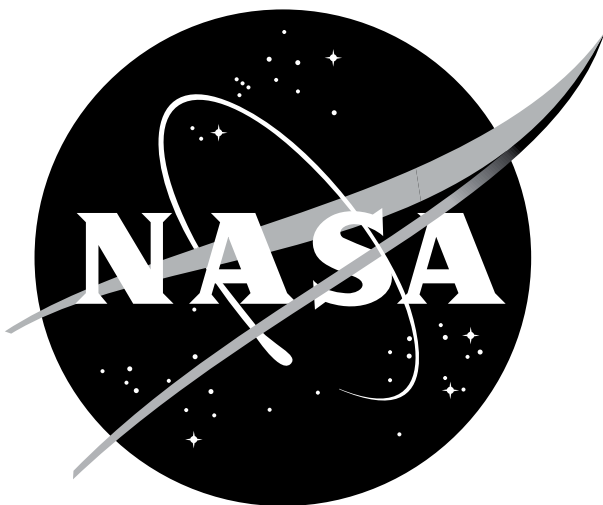
The NASA logo has hidden meanings in its design. The blue sphere represents a planet; the stars represent space; the red chevron stands for aeronautics and a spacecraft orbits the NASA acronym.

# AGENCY ACRONYM

An acronym is a word that is made up of the initials of other words.

Fill in the blank spaces to correctly identify the words in the NASA acronym.

Use each of the missing letters below only once.



N \_ \_ I O \_ A L

A E \_ \_ N A \_ T \_ C S    A N D

S \_ \_ C \_

A D \_ I \_ \_ S T \_ A T \_ O N

[Missing Letters: R, I, N, P, E, M, I, A, T, N, I, U, A, R, E, O]

**SPACE!  
ROCKS!**

President Dwight D. Eisenhower formed NASA on October 1, 1958 to give the United States a civilian air and space program. **How old does that make NASA?**

# CRACK THE

# CODE

The Launch Services Program is missing its mission motto!  
Using the alphanumeric chart below, write the letter that corresponds to the number in the appropriate space and decode the LSP motto for yourself.

A = 1	H = 8	O = 15	V = 22
B = 2	I = 9	P = 16	W = 23
C = 3	J = 10	Q = 17	X = 24
D = 4	K = 11	R = 18	Y = 25
E = 5	L = 12	S = 19	Z = 26
F = 6	M = 13	T = 20	
G = 7	N = 14	U = 21	

5	1	18	20	8		19		2	18	9	4	7	5
					,								

20	15		19	16	1	3	5

**SPACE!  
ROCKS!**

The Launch Services Program held a contest for the employees at the Kennedy Space Center to design a new logo. This winning design also has hidden meanings, just like the NASA logo.

# Stellar Scramble

Unscramble the words below to discover the name of the program indentified by the acronym LSP.

**NUHALC** = \_\_\_\_\_

**VISECRSE** = \_\_\_\_\_

**GPORMAR** = \_\_\_\_\_

# LSP

**SPACE!  
ROCKS!**

Formed in 1998, LSP launches unmanned rockets carrying spacecraft, satellites, rovers and landers for NASA. **How many years has LSP been launching rockets?**

# Launch Labels

Use your knowledge of rocket construction to correctly name the four sections shown in column B with the words listed in column A.

**A**

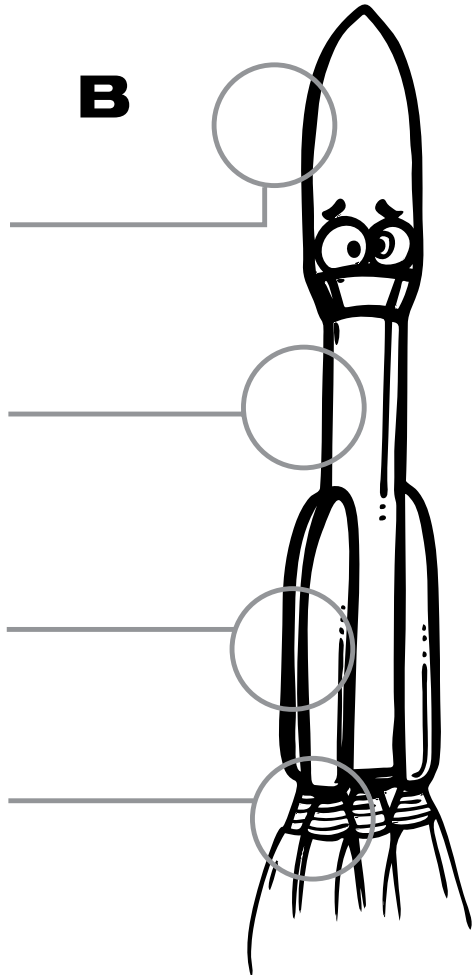
BODY

BOOSTER

ENGINE

FAIRING

**B**



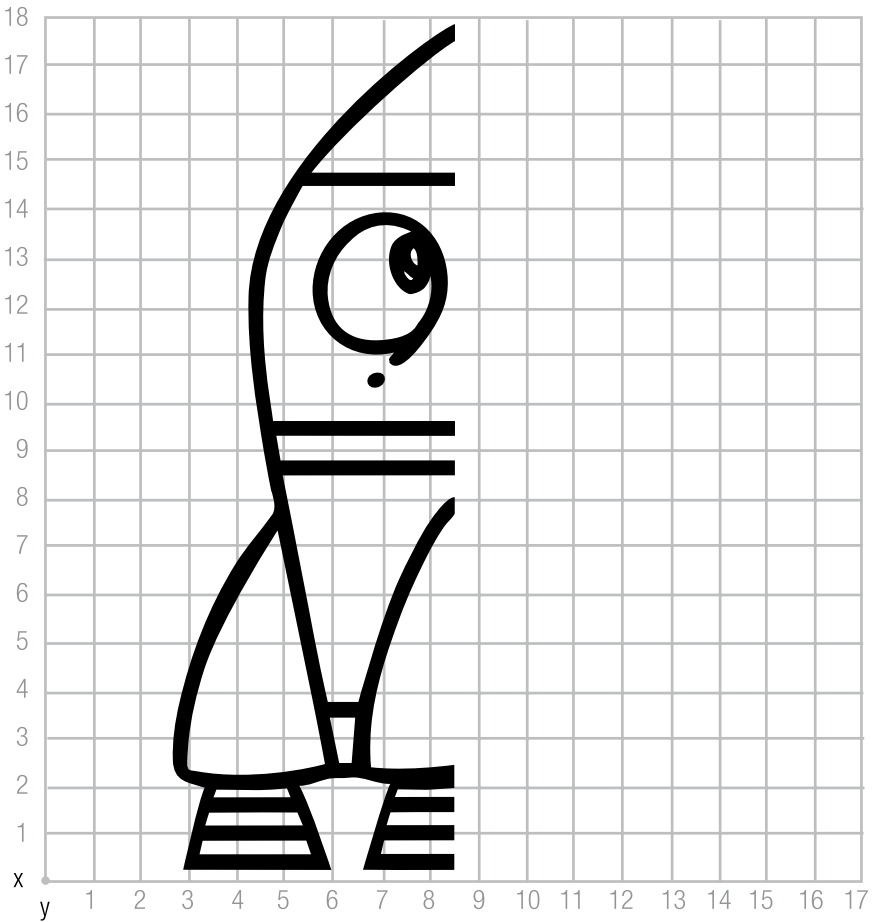
**SPACE!  
ROCKS!**

A payload is the item a rocket carries to space or other planets, like a spacecraft or a satellite. Payloads go at the top of a rocket inside the fairing.

# Booster Blueprint

Here is your chance to be a NASA engineer. Below is a half completed blueprint for a rocket. Your mission is to complete the other half of the drawing by mirroring the image that is present on the grid.

*Here's a hint: Count the blocks in the grid to make sure that your dimensions are accurate.*

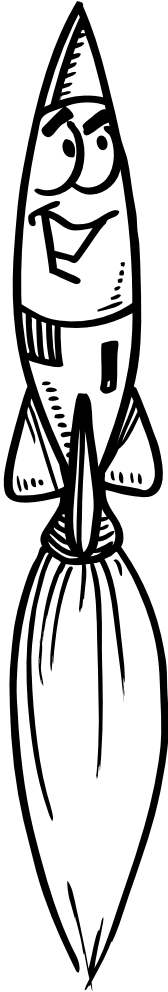


**SPACE!  
ROCKS!**

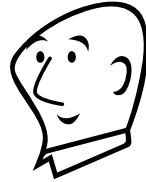
Rockets can use a solid fuel, a liquid fuel, or a combination of both to launch payloads into space.

# Rocket Rhyme Time

Can you figure out what words rhyme with "Space"?



— — — —



— — — —



— — — —



— — — —



— — —

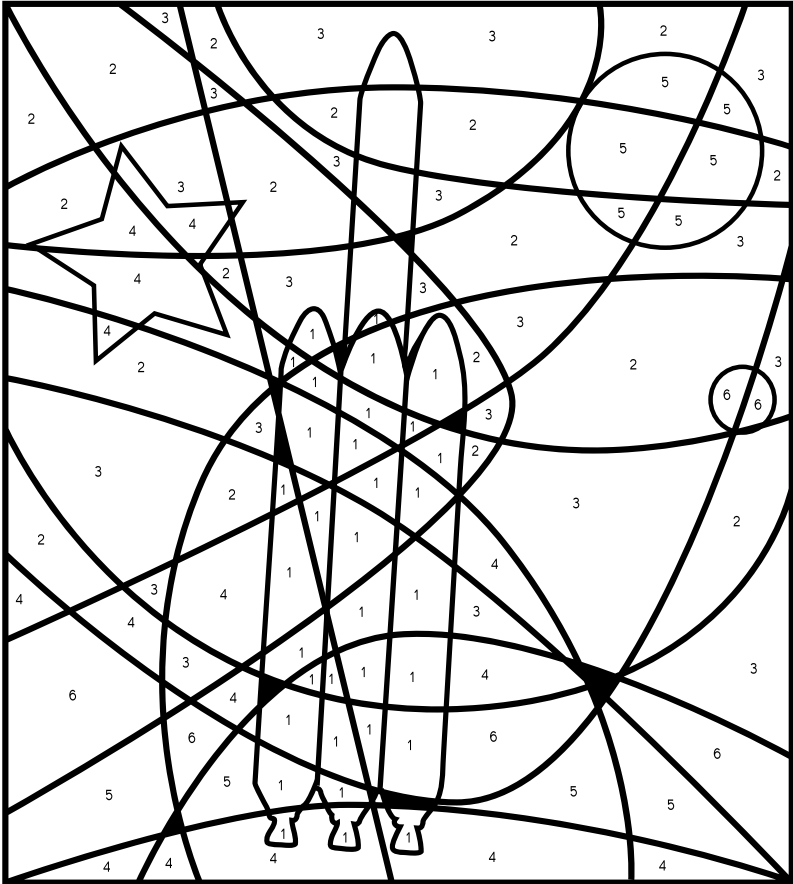


## SPACE! ROCKS!

After launch, the nozzle of an engine can sometimes be moved or controlled so LSP engineers can steer the rocket. This type of engine is called a gimbaling engine.

**LAUNCH  
SERVICES  
PROGRAM**

# Coloring Space



Color  
Palette



orange



purple



blue



yellow



red



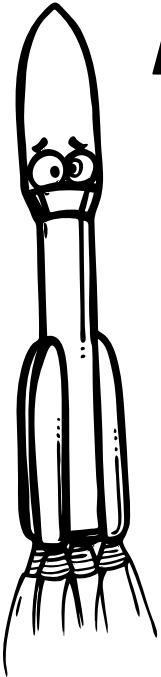
green

**SPACE!  
ROCKS!**

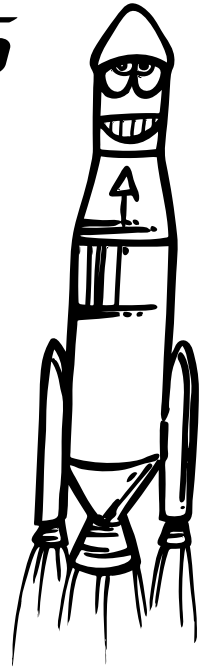
A rocket must go 25,000 miles per hour to launch spacecraft to other planets.



# ROMAN NUMERAL *ROCKETS*



$I = 1$	$IV = 4$	$V = 5$	$X = 10$	$L = 50$
$C = 100$	$D = 500$	$M = 1000$		
<i>Examples:</i>				
$11 = XI$				
$22 = XXII$				
$41 = XLI$				
$65 = LXV$				
$88 = LXXXVIII$				
$200 = CC$				



Using the chart as a reference, rewrite the numbers in Roman Numerals below:

Atlas 5 = Atlas \_\_\_\_

Delta 4 = Delta \_\_\_\_

12 = \_\_\_\_

365 = \_\_\_\_

52 = \_\_\_\_

2 = \_\_\_\_

72 = \_\_\_\_

535 = \_\_\_\_

14 = \_\_\_\_

150 = \_\_\_\_

**SPACE!  
ROCKS!**

LSP must choose the right type and size of rocket for each mission because spacecraft travel to different places.

# Amnesia Anomaly

Upon reaching the edge of the Earth's atmosphere, a strange event occurred which caused these rockets to forget their names. Each rocket created a list of four names. One of the names is correct. Use your reasoning skills and circle the correct name for each rocket.

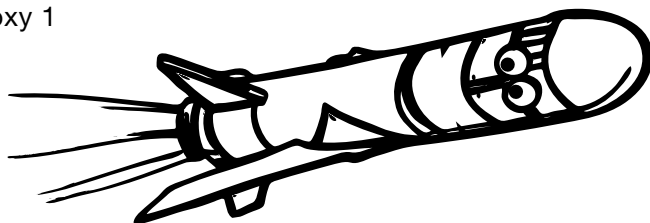
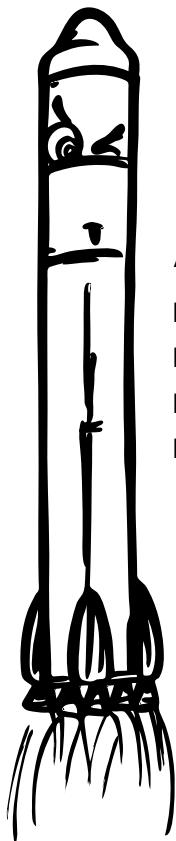
**A.**

Flugelhorn 15

Flapjack 40

Falcon 9

Foxy 1



**B.**

Peas and Carrots 2

Pegasus XL

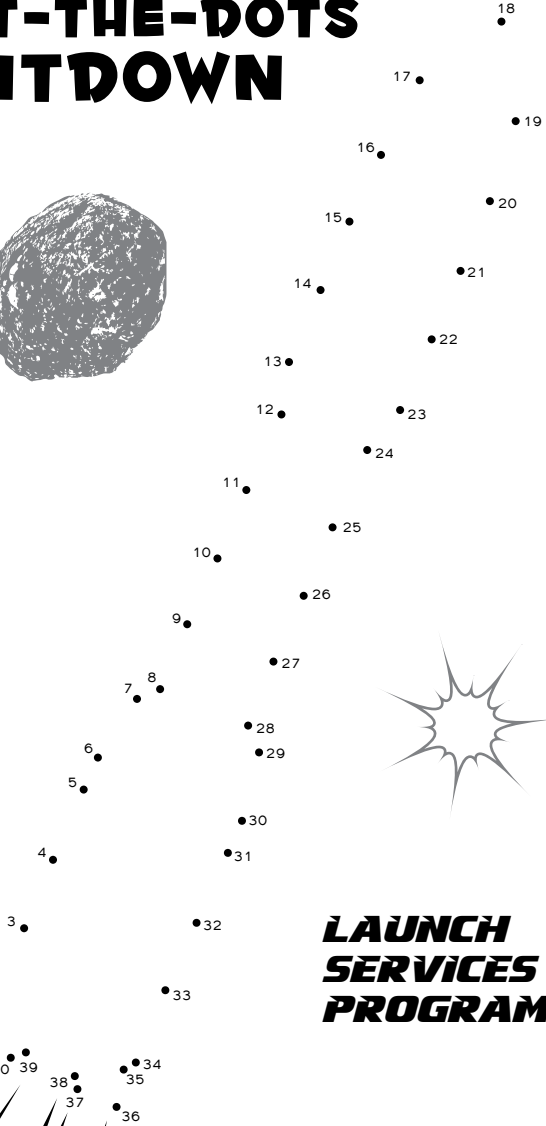
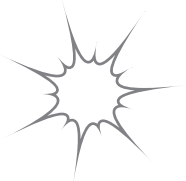
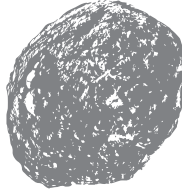
Pegboard 12

Periscope

**SPACE!  
ROCKS!**

The Pegasus rocket is launched from the belly of an airplane and not a launch pad. The name of the airplane is Stargazer.

# CONNECT-THE-DOTS COUNTDOWN



**LAUNCH  
SERVICES  
PROGRAM**

**SPACE!  
ROCKS!**

LSP has launched more than 90 rockets and missions from 1998 to 2020.

# MISSING LETTER MISSION

Fill in the missing letters in the names of the planets and dwarf planet below. Match the letters to the numbered spaces below to discover the answer to the riddle.

○<sub>3</sub> E R C U R Y

V ○<sub>8</sub> N U S

E A R T ○<sub>7</sub>

M A R ○<sub>5</sub>

J U P I T E ○<sub>9</sub>

S A ○<sub>2</sub> U R N

U R ○<sub>1</sub> N U S

N E P T U N ○<sub>10</sub>

○<sub>6</sub> L U T ○<sub>4</sub>

SOLVE THIS RIDDLE: THE EARTH HAS THIS BUT OUR MOON DOES NOT.

1

2

3

4

5

6

7

8

9

10

**SPACE!  
ROCKS!**

LSP launches satellites that improve GPS, weather prediction, astronomy and so much more.

# Planetary Order

The planets shown are numbered by how close they are to the sun. Can you spell out the name of each of the eight planets in order? A bonus dwarf planet was included to further test your knowledge of the solar system.

[Hint: Here are the first initials of each planet in order... you have to write out the correct name]

**M, V, E, M, J, S, U, N, Bonus: P**

3

1

2

4

5

6

7

8

9

**Dwarf Planet Bonus**

**SPACE!  
ROCKS!**

The first four planets in our solar system are made of rock and metals while the last four are primarily made up of gases.

# WEIGHT ON A PLANETARY SCALE

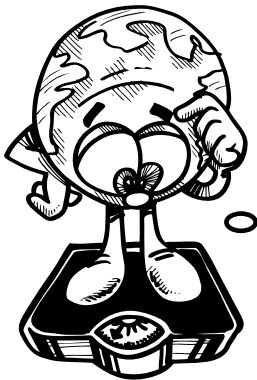
How much do you weigh? Your weight depends on the force of gravity, and gravity changes from planet to planet. First, step on a scale, record that number and then multiply it by the force of gravity listed for the other planets.

*Example: Earth = 1.0 x 100 lbs = 100 lbs*

$$\text{JUPITER} = 2.6 \times \frac{\text{_____}}{\text{(Weight on Earth)}} = \frac{\text{_____}}{\text{(New Weight on Jupiter)}} \text{ lbs.}$$

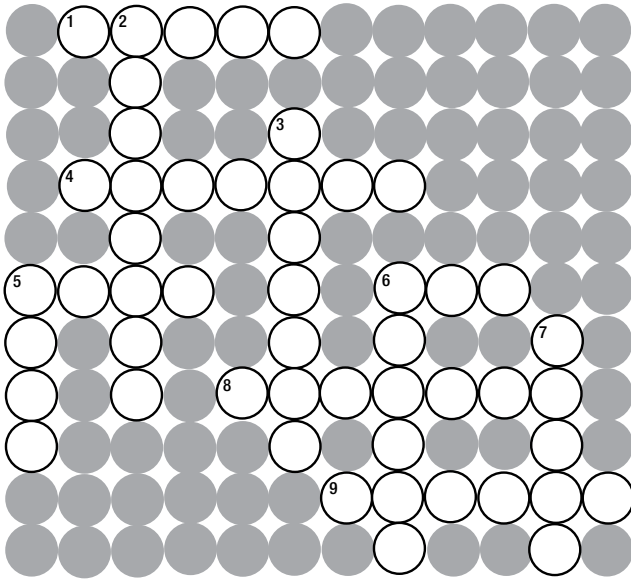
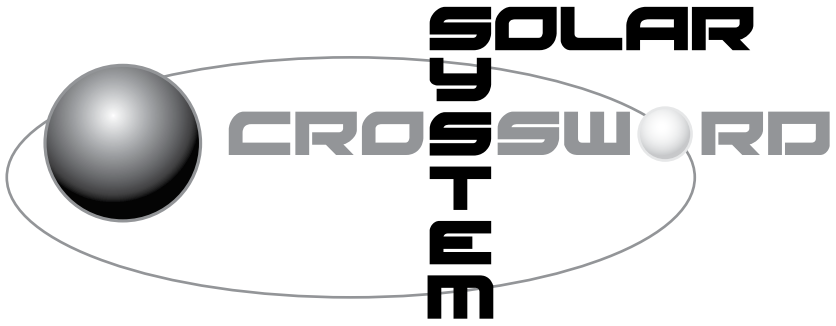
$$\text{MARS} = .38 \times \frac{\text{_____}}{\text{(Weight on Earth)}} = \frac{\text{_____}}{\text{(New Weight on Mars)}} \text{ lbs.}$$

$$\text{MOON} = .60 \times \frac{\text{_____}}{\text{(Weight on Earth)}} = \frac{\text{_____}}{\text{(New Weight on Moon)}} \text{ lbs.}$$



**SPACE!  
ROCKS!**

On Earth, the heavier a rocket is the more fuel it will require.



**ACROSS**

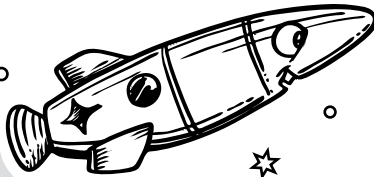
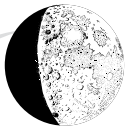
1. The only planet not named after a Greek or Roman God.
4. The fastest planet with a yearly orbit of 88 days.
5. Earth's natural satellite and nearest neighbor in space.
6. A giant star of hydrogen and helium gas in our solar system.
8. Named after the Roman sea god, it has the strongest storms.
9. Because it rotates on its side, the poles point toward the sun.

**DOWN**

2. A body of rock or ice that orbits in a "belt."
3. The largest planet in our solar system and home to the "red storm."
5. Nicknamed the "Red Planet."
6. A gas giant known for its rings of rock and ice.
7. The hottest planet because of its intense greenhouse gas effect.

**SPACE!  
ROCKS!**

In the year 2015, NASA's New Horizons spacecraft reached Pluto, making it the first spacecraft to ever visit the dwarf planet. New Horizons was launched in 2006.



# FROM THE MOON TO MARS

This mission involves using brain power to alter the word, “moon” by changing only one letter on each row. Note the example below where the “m” was changed to a “t” to create the word “toon.” Use your deductive skills to read the hint and change one letter in the word “toon” to progress toward your goal of arriving at “mars.” Remember, you can only change one letter per row.

<b>M</b>	<b>O</b>	<b>O</b>	<b>N</b>
<b>T</b>	<b>O</b>	<b>O</b>	<b>N</b>
<b>M</b>	<b>A</b>	<b>R</b>	<b>S</b>

## HINTS

(ex. Lunar satellite)

(ex. Animated character)

To be ripped

New to the world

Animals sleep here

Chocolate covered Candy

(ex. the Red Planet)

**SPACE!  
ROCKS!**

Since 1998, LSP has launched more than 10 missions to study the moon and Mars.



# OUT OF THIS WORLD WORD JUMBLES

rornstamoe = \_\_\_\_\_

*hint: someone who studies the stars*

lanscotetinol = \_\_\_\_\_

*hint: a group of stars that form a pattern*

nepatl = \_\_\_\_\_

*hint: a celestial body that orbits a star*

ceelepost = \_\_\_\_\_

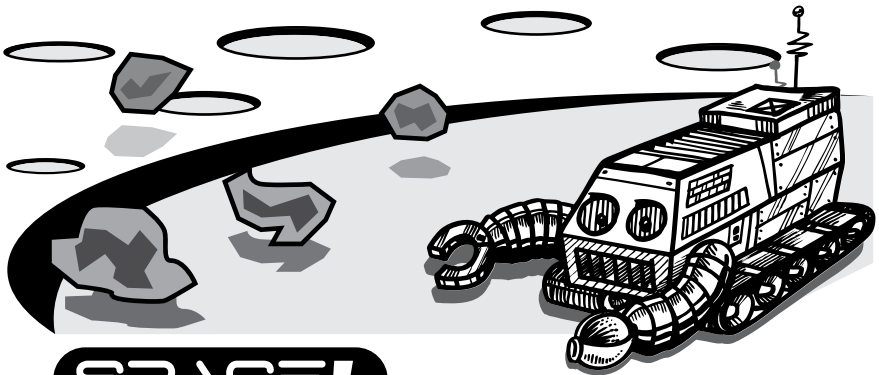
*hint: a device used to look into space*

latislete = \_\_\_\_\_

*hint: a machine that orbits earth and sends data*

kymli yaw = \_\_\_\_\_

*hint: the name given to OUR galaxy*



## SPACE! ROCKS!

Satellites go out of communication range while orbiting Earth, so NASA uses a network of satellites called Tracking Data and Relay Satellites (TDRS) to always stay in touch, even from the other side of the planet.

# BRAIN *BLAST OFF* TEASERS

Each brain teaser is a “play on words” with a space-related theme. Use your deductive reasoning skills to solve them all.

1. C  
O  
U  
N  
T

(answer)

---

2. **MAN**  
**moon**

(answer)

---

3. MILES  
  
the Earth

(answer)

---

4. **S L P O a S C T E**

(answer)

---

5. **O R**  
**SUN**  
**T I**

(answer)

---

6. c clips  
l  
i clips  
p  
s clips

(answer)

---

**SPACE!**  
**ROCKS!**

Black holes are invisible, so LSP launches satellites with X-ray telescopes, like the NuSTAR satellite, so scientists can find and study them.

# Radiant Riddles

These riddles require you to figure out the word represented by the bold letters. Space is provided on the right for you to write out your answers.

*All answers relate to Earth and space.*

**EXAMPLE:** 88K on a P = 88 **K**eyS on a **P**iano

1**M** orbits our **E** =     **M**    orbits our **E**

1**S** in our **SS** =     **S**    in our **S**    **S**

8**P** in the **SS** =     **P**    in the **S**    **S**

50**S** in the **US** =     **S**    in the **U**    **S**

7**C** on the **E** =     **C**    on the **E**

7**R** around **S** =     **R**    around **S**

5**DP** in our **SS** =     **D**  **P**    in our **S**    **S**

**BONUS**

4**GG** in our **SS** =     **G**  **G**    in our **S**    **S**

2**H** on our **P** =     **H**    on our **P**

**SPACE!**  
**ROCKS!**

The next total solar eclipse over the United States will be seen on April 8, 2024.

# Spacecraft

## *seek and find*

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

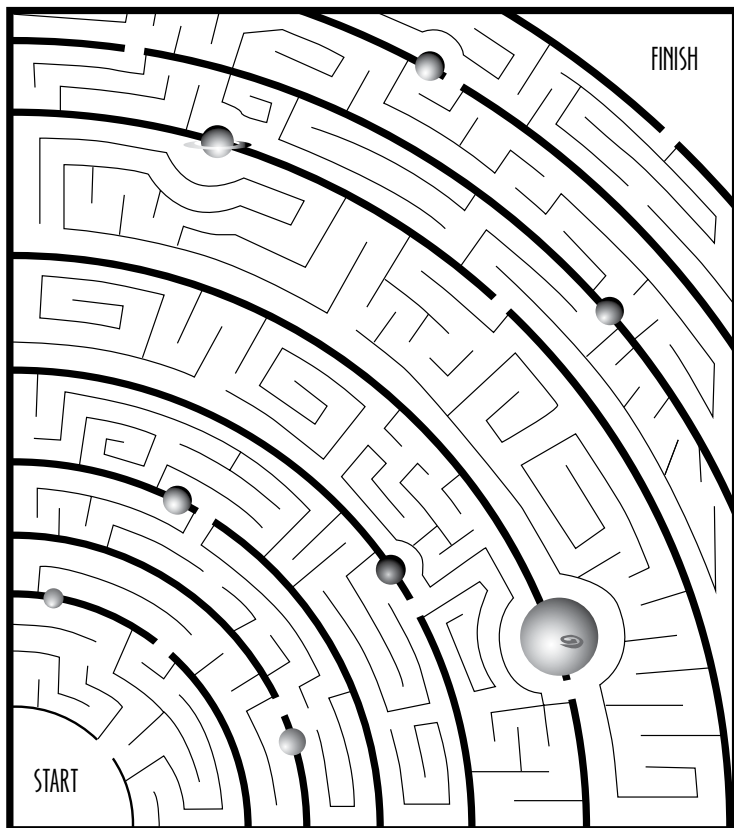
CURIOSITY  
ICON  
INSIGHT  
LANDSAT  
MARS ROVERS

NASA  
OPPORTUNITY  
PERSEVERANCE  
SENTINEL  
SPIRIT

**SPACE!**  
**ROCKS!**

A shooting star is really just a small space rock, called a meteoroid, which burns up as it enters Earth's atmosphere.

# Comet Craze MAZE



AFTER COMPLETING AN ORBIT OF THE SUN, THE COMET WILL PASS ALL EIGHT PLANETS ON ITS WAY TO THE EDGE OF THE SOLAR SYSTEM.

CAN YOU DISCOVER THE PATH IT HAS TO FOLLOW?

**SPACE!  
ROCKS!**

The Stardust mission was the first mission to ever visit a comet and return materials back to Earth for scientists to study.

# YOUR SPACE STORY

## RETURN OF THE MADLIB

LSP launched a new spacecraft nicknamed \_\_\_\_\_ to a newly discovered  
(name of spacecraft)

planet called \_\_\_\_\_ in the \_\_\_\_\_ System.  
(name of planet) (name of solar system)

LSP used the best rocket they had, for the \_\_\_\_\_ spacecraft to put  
(name of rocket)

the \_\_\_\_\_ into space.  
(name of spacecraft)

The \_\_\_\_\_ was built by \_\_\_\_\_ and is designed to  
(name of spacecraft) (who built the spacecraft)

search for \_\_\_\_\_ and \_\_\_\_\_.  
(what are you looking for) (what are you looking for)

The \_\_\_\_\_ 's engines run on \_\_\_\_\_.  
(name of spacecraft) (name of fuel source)

If successful, the \_\_\_\_\_ is designed to turn on the \_\_\_\_\_  
(name of spacecraft) (part of the spacecraft)

and send a message to \_\_\_\_\_ immediately.  
(hometown)

**SPACE!  
ROCKS!**

LSP provides on time, on orbit and on cost launch services for NASA unmanned missions.

# WORD MINING

Dig through the word "EARTH" to discover how many words with three or more letters you can create.

(Example: "HEAR" or "EAT")

1. \_\_\_\_\_

9. \_\_\_\_\_

2. \_\_\_\_\_

10. \_\_\_\_\_

3. \_\_\_\_\_

11. \_\_\_\_\_

4. \_\_\_\_\_

12. \_\_\_\_\_

5. \_\_\_\_\_

13. \_\_\_\_\_

6. \_\_\_\_\_

14. \_\_\_\_\_

7. \_\_\_\_\_

15. \_\_\_\_\_

8. \_\_\_\_\_

16. \_\_\_\_\_

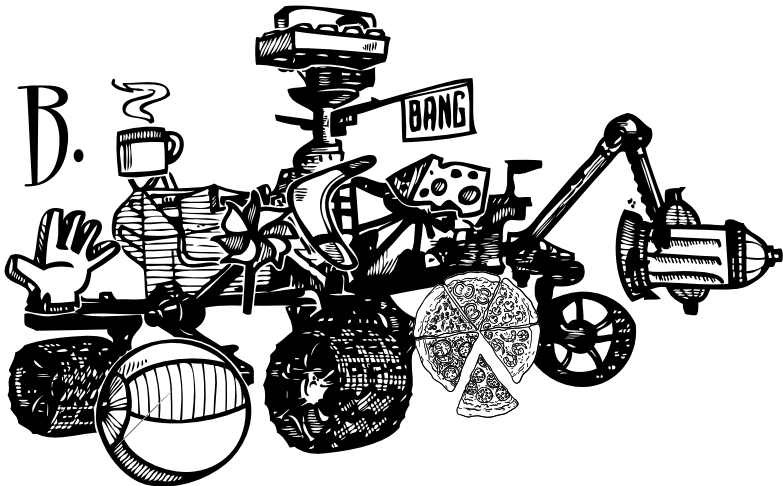
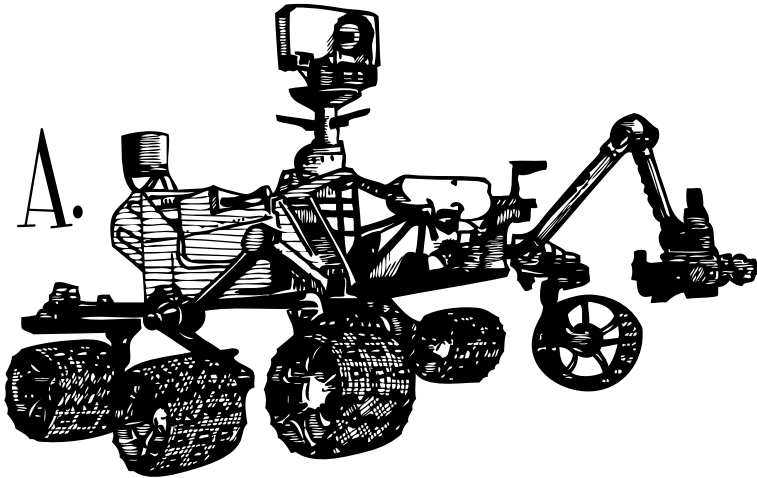


**SPACE!  
ROCKS!**

Satellites use remote sensing to study objects without touching them, such as wildfires, vegetation changes, droughts, floods, volcanoes and even human urbanization.

# Spot the Difference

There are 10 things different between pictures A and B. Study picture B carefully and circle the different items.



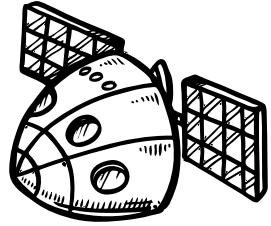
**SPACE!  
ROCKS!**

NASA chose a seventh-grader from Virginia as winner of the agency's "Name the Rover" essay contest for the Mars 2020 mission. Alexander Mather's entry for "Perseverance" was voted tops among 28,000 entries.



# MARTIAN

# Mix Up



Unscramble the mixed up words below to identify the names of the spacecraft that have explored Mars. Some of the letters have been filled in to help you get started.

Example: O V Y R E G A = V O Y A G E R

T P O U Y I P R I N T

O \_ \_ \_ \_ U \_ \_ \_ Y

R I S C U T Y O I

C R \_ \_ \_ \_ T

H A F D R E N P T I

P \_ \_ H \_ \_ \_ D \_ \_

G I T S N I H

I S \_ \_ \_ T

X H E N P I O

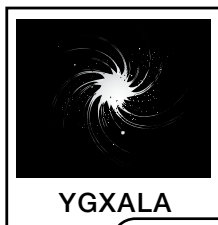
P \_ \_ E \_ \_ X

**SPACE!  
ROCKS!**

The Mars rovers get their energy from solar panels because a day on Mars is 24 ½ hours long, just slightly longer than on Earth.

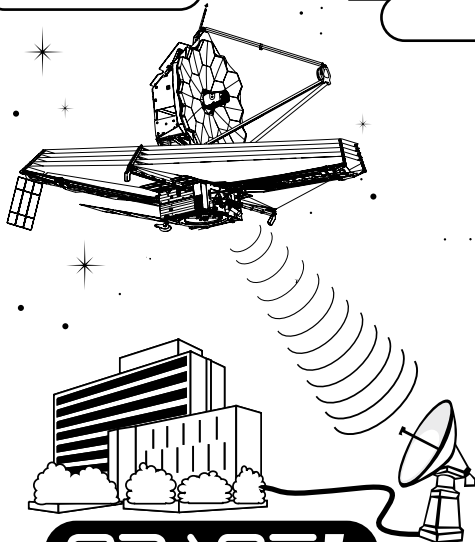
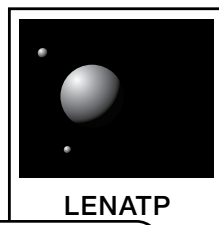
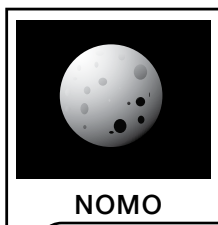
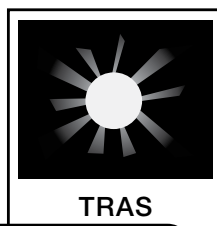
# LOOKING BACK IN TIME

## JAMES WEBB SPACE TELESCOPE



The James Webb Space Telescope will record images of distant space objects and transmit them back to Earth.

Can you unscramble the letters to name each object pictured in the space provided?



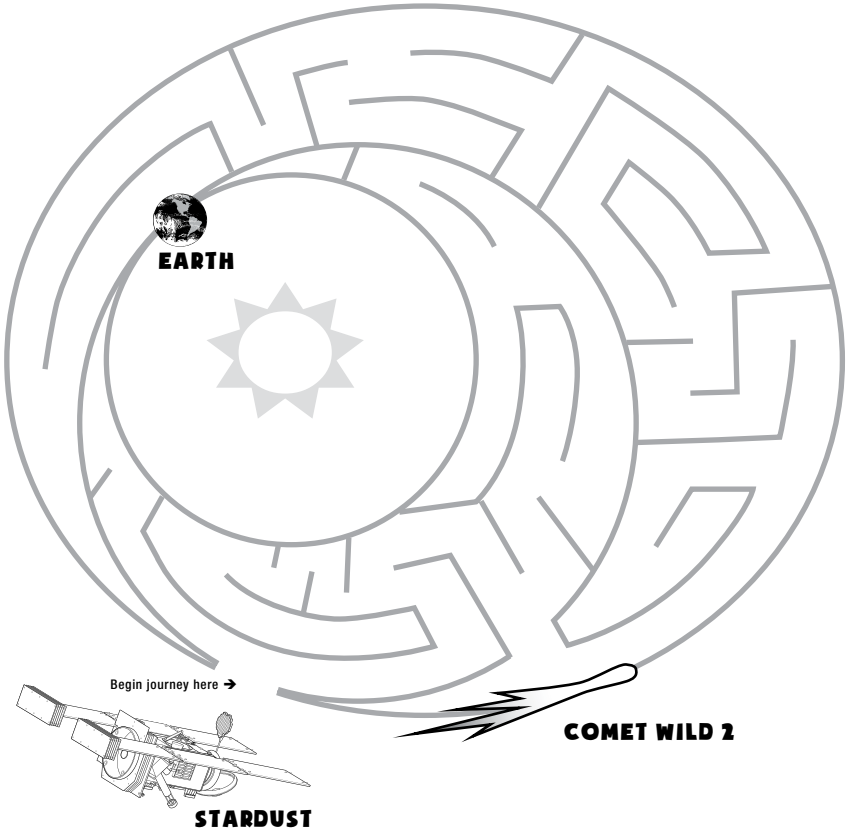
### SPACE! ROCKS!

Because objects in the universe are thousands of light years away, it takes a long time for the light to get to Earth. That means astronomers are seeing events that happened a very long time ago.

# MISSION: STARDUST

## A-MAZING RETURN TO EARTH

Can you find the path Stardust must take to return to Earth?



**SPACE!**  
**ROCKS!**

The Stardust mission returned over 1 million microscopic particles from Comet Wild 2 for scientists to study.

**LAUNCH  
SERVICES  
PROGRAM**



C X I O C E A N D E  
W T X C R A I N Q S  
A L H S E F I R D H  
T A E P E W F U T R  
E N A N R A O R E H  
R D T I D L A S K Y  
S A L T C E A I R J  
C S N O W R I V E R  
S U N N S L E E T Y

**Word List**

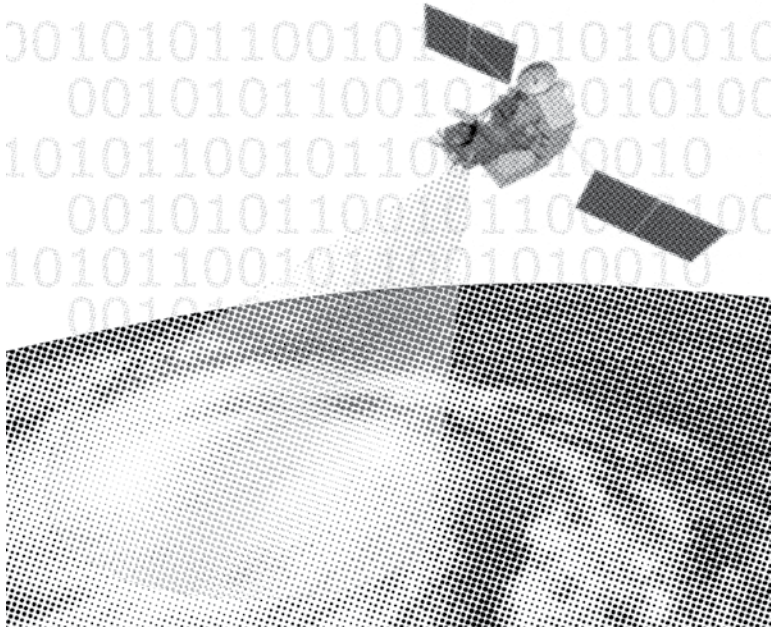
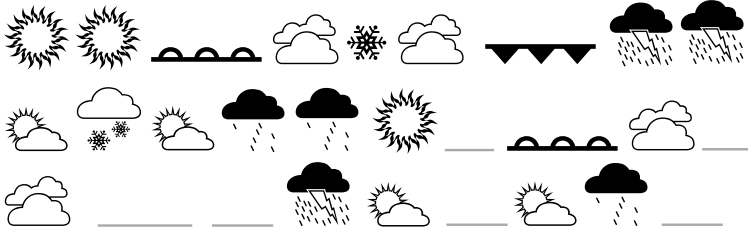
<i>Sky</i>	<i>Air</i>	<i>Earth</i>
<i>Sleet</i>	<i>Salt</i>	<i>Snow</i>
<i>Heat</i>	<i>Ocean</i>	<i>Sun</i>
<i>Rain</i>	<i>Sea</i>	<i>River</i>
<i>Ice</i>	<i>Land</i>	<i>Water</i>
<i>Wind</i>	<i>Clouds</i>	

**SPACE!  
ROCKS!**

LSP launches satellites that study climate change, weather patterns, polar ice caps, ocean temperatures, rainfall, snow cover and the atmosphere.

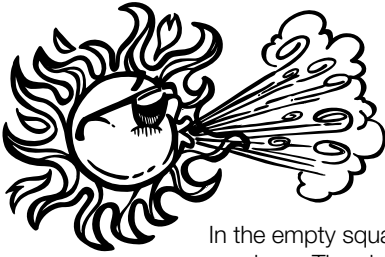
# Weather Forecast

The orbiting GOES weather satellite is transmitting information back to Earth. However, the transmission was damaged due to solar flare activity. Look at the encoded message below and with your deductive reasoning, draw in the missing symbols to fill in the pattern.



**SPACE!  
ROCKS!**

The GOES satellites, or Geostationary Operational Environment Satellites, are weather satellites monitoring North and South America.



# **Solar Wind Sudoku**

In the empty squares below, you must determine the missing numbers. The challenge is to make sure the numbers 1, 2, 3 and 4 only appear once in a row and once inside the boxes.

4	3

2	1
	3

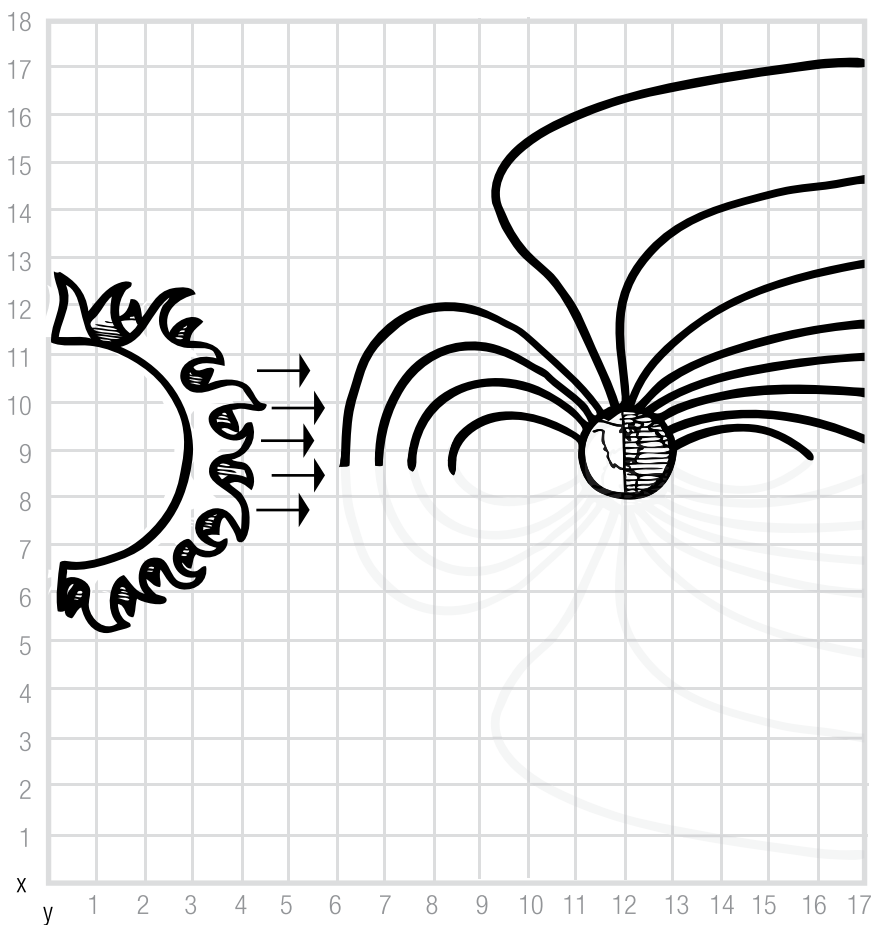
3	

3	
1	

**SPACE!  
ROCKS!**

Solar Wind is a stream of charged particles that flows away from the sun.

# Mapping the Magnetosphere



Use the grid to draw the bottom half of the magnetosphere so that it matches the top. Notice that gray lines have been included to help guide you.

**SPACE!  
ROCKS!**

Earth has the strongest magnetosphere of all the rocky, terrestrial planets in our solar system.

# ANTI-GRAVITY ACRONYMS

NASA and LSP both use acronyms when naming spacecraft and satellites.

An acronym is when a word is made using the initials from other words.

NASA is an acronym that stands for National Aeronautics and Space Administration.

*Can you match the acronyms with their correct names?*

Draw a line from each acronym in column A  
to the correct mission name in column B

A

IRIS

GRAIL

SORCE

GALEX

STEREO

GLAST

IBEX

B

Gravity Recovery and Interior Laboratory

Interface Region Imaging Spectrograph

Interstellar Boundary Explorer

Solar Terrestrial Relations Observatory

Gamma-Ray Large Area Space Telescope

Galaxy Evolution Explorer

Solar Radiation and Climate Experiment

**SPACE!  
ROCKS!**

The GRAIL spacecraft has a camera, nicknamed MoonKam, that lets middle school students take pictures of the moon and study them in class.



# ORBITAL OBJECTIVES

Below is a list of LSP missions. Can you match each hint with a destination from the numbered photos at the bottom of the page? Some destinations may be used more than once.

M  
-  
S  
-  
S  
-  
O  
Z  
S

**Stardust** (Hint: Returned comet materials to scientists) \_\_\_\_\_

**TERRA** (Hint: Studies climate and is on the third planet from the sun) \_\_\_\_\_

**JUNO** (Hint: Studies this gas giant's atmosphere) \_\_\_\_\_

**JASON-3** (Hint: Improves our daily weather forecasts) \_\_\_\_\_

**Perseverance** (Hint: The newest rover, will land in 2021) \_\_\_\_\_

**STEREO** (Hint: Twin satellites taking 3-D images of our star) \_\_\_\_\_

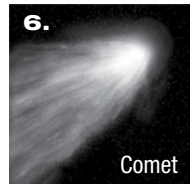
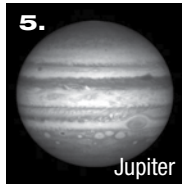
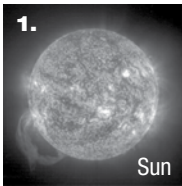
**LRO** (Hint: Maps Earth's nearest celestial neighbor) \_\_\_\_\_

**SDO** (Hint: Improves our solar understanding) \_\_\_\_\_

**InSIGHT** (Hint: A lander studying the red planet) \_\_\_\_\_

**Aquarius** (Hint: Monitors oceanic salt content for climate studies) \_\_\_\_\_

D  
W  
H  
-  
N  
-  
Z  
-  
K  
-  
T  
-  
O  
Z  
S

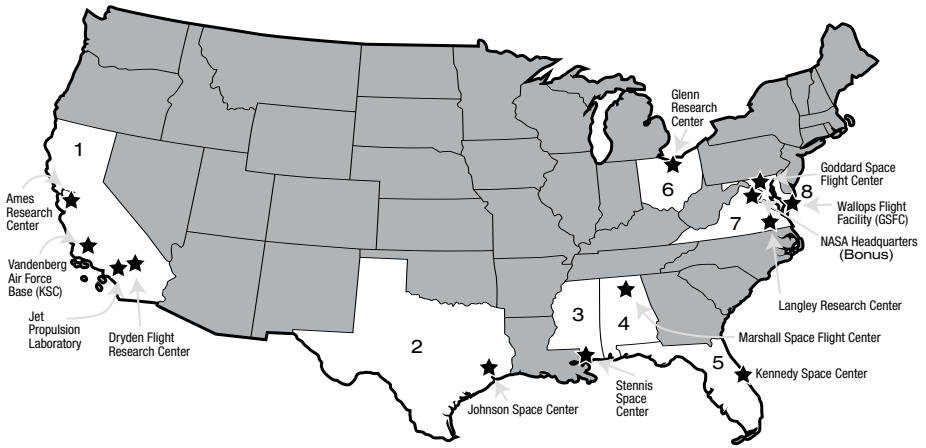


**SPACE!  
ROCKS!**

The comet chaser, named Stardust, operated for 12 years and traveled 3.54 billion miles as it studied comet Wild 2 and comet Temple 1.

# NAME THE NASA STATES

The United States has eight states that are home to NASA Centers. After reviewing the map, write the name of the featured states in the spaces provided below. Bonus: NASA Headquarters is not located in a state but in the capitol and home to the White House.



1. \_\_\_\_\_

5. \_\_\_\_\_

2. \_\_\_\_\_

6. \_\_\_\_\_

3. \_\_\_\_\_

7. \_\_\_\_\_

4. \_\_\_\_\_

8. \_\_\_\_\_

BONUS \_\_\_\_\_

**SPACE!  
ROCKS!**

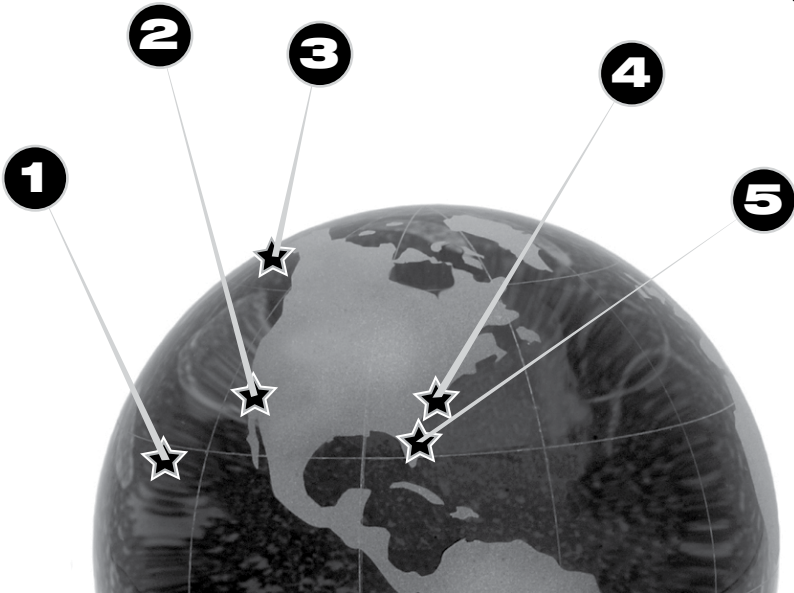
Blockbuster movies like The Avengers and Transformers III were filmed at NASA locations.

# LSP LAUNCH LOCATIONS

The graphic below shows a global view of the United States with stars marking four launch locations in the United States and one in a U.S. Territory.

In the white circles, write the number of the correct corresponding launch locations.

- Cape Canaveral Air Force Station, Florida
- Kodiak Island, Alaska
- Wallops Island, Virginia
- Vandenberg Air Force Base, California
- Kwajalein Atoll, Republic of the Marshall Islands (RMI)



**SPACE!  
ROCKS!**

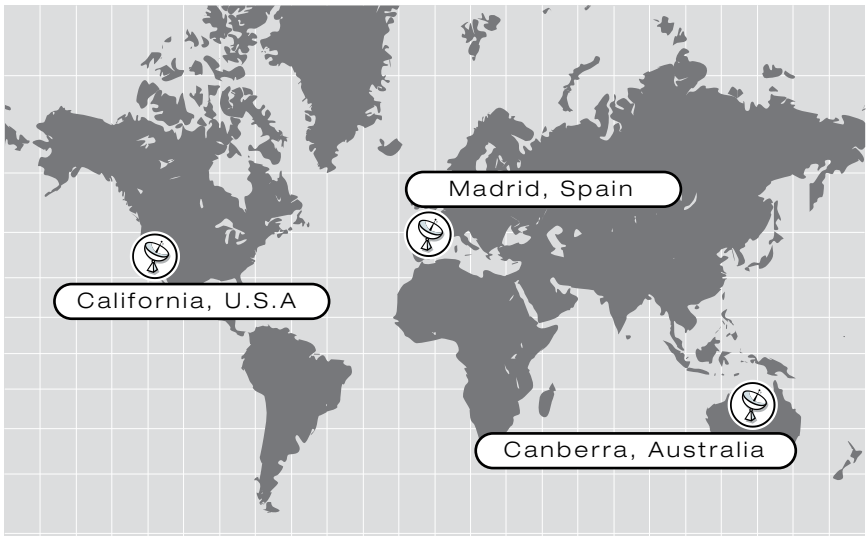
LSP chooses the best launch location to match where a spacecraft will go, what it will study and what type of orbit it must be in.

# dsn

## DEEP SPACE NETWORK

Satellites and spacecraft in space will lose contact as the Earth rotates on its axis. To maintain constant communications, three large antennae were built around the Earth to bridge any gaps in transmissions.

**Study the map and write the name of each continent that has a large antenna in the spaces provided below.**



**LOCATION**

**CONTINENT**

**Madrid, Spain**

\_\_\_\_\_

**California, USA**

\_\_\_\_\_

**Canberra, Australia**

\_\_\_\_\_

**SPACE!  
ROCKS!**

These three ground stations are built exactly 120 degrees apart in longitude around the Earth. That means there is always at least one station able to communicate with a spacecraft.

# WORKFORCE

## WORD SCRAMBLE



Unscramble the words below to identify occupations that can be found within the Launch Services Program.

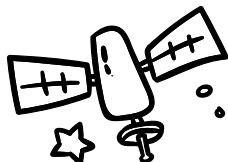
- A *ustcoinnrotc erkowr* = \_\_\_\_\_
- B *tupomcre latysan* = \_\_\_\_\_
- C *chalun ricerdot* = \_\_\_\_\_
- D *geneinre* = \_\_\_\_\_

### SPACE! ROCKS!

It can take 5-10 years to design, build, test, launch and operate a spacecraft. This is called the Mission Life Cycle.

# ASTRONOMICAL ACRONYM

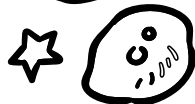
In the spaces below, fill in the missing letters to form the name also known by the acronym LSP.



**L** \_\_\_\_\_

**S** \_\_\_\_\_

**P** \_\_\_\_\_

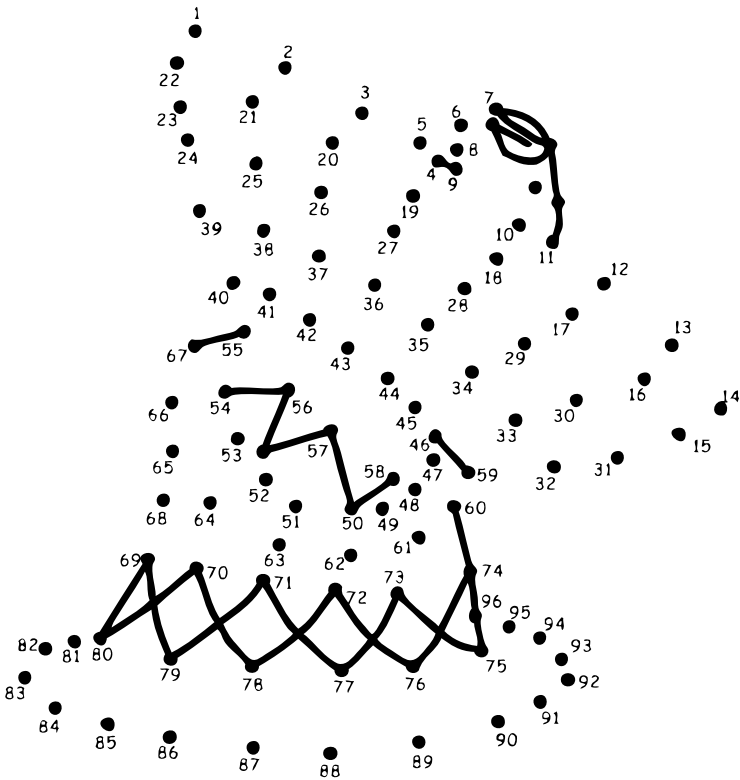


**SPACE!  
ROCKS!**

There are many ways to work with LSP. Ask your teacher about internships, co-ops, aerospace scholars, online communities, fellowships and much more.

# COSMIC CONNECTION

To reveal the dotted illustration, start at number 1 and connect the dots in order through number 96. Once you finish, it should reveal an important part of communication between Earth and its orbiting satellites.



**SPACE!  
ROCKS!**

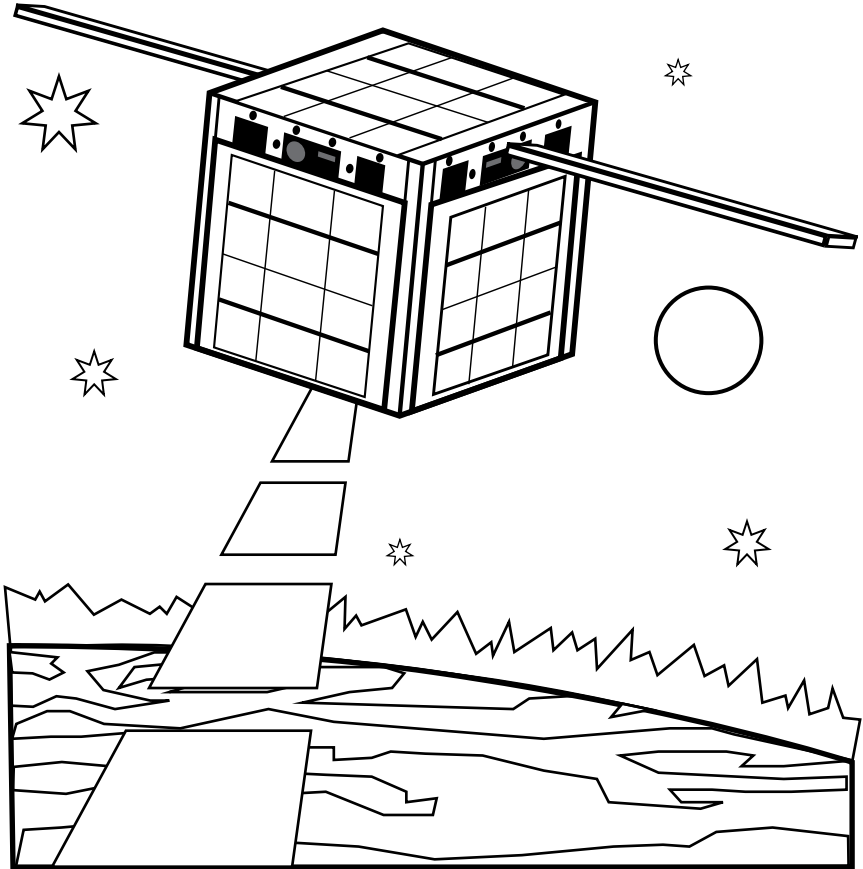
The world's first satellite, the Sputnik I, was launched by the Soviet Union in 1957.

**LAUNCH  
SERVICES  
PROGRAM**

# COLORING CUBESAT

CubeSats are small, tiny satellites. They are so small you can hold them in your hand. Even though they are small, CubeSats are very important for science research.

Color this orbiting CubeSat as it transmits its signal back to Earth.



**SPACE!  
ROCKS!**

CubeSats get their name because they are shaped like a cube. They are often called nanosatellites.



# CUBESAT COUNTERBALANCE



CubeSats are tiny, cube-shaped satellites, sometimes called nanosatellites, that piggyback on larger NASA missions already going to space. Because of weight restrictions, they cannot weigh more than 3 pounds.

*Circle all of the objects that meet the weight criteria for a NASA CubeSat mission.*



Bowling Ball



Soda Can



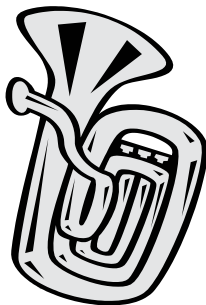
Laptop  
Computer



Baseball



Candy Bar



Tuba



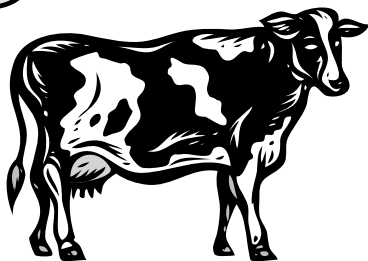
Cell Phone



Walkie  
Talkies



Bicycle



Dairy Cow

**SPACE!  
ROCKS!**

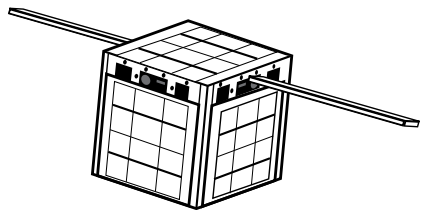
CubeSats are cheaper to build and launch than full scale satellites. They are small, lightweight and do not need a lot of fuel to get into space.

# NANO-ACRONYM

CubeSats are part of the ELaNa program, sponsored by NASA's Launch Services Program. ELaNa is an acronym; a word made using the initials from other words.

*Underline the correct group of words below that match the ELaNa acronym?*

1. Educational Launch of Nintendo's Airborne
2. Experimental Lunch and Nutrition Activity
3. Extreme Liftoff and Nighttime Accomplishment
4. Easily Laying And Napping Away
5. Educational Launch of Nanosatellites



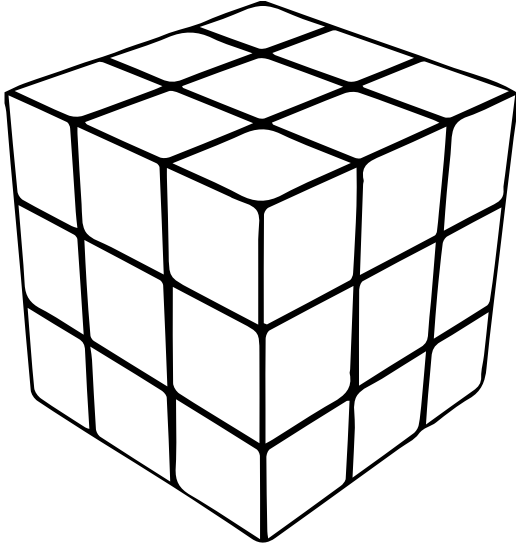
**SPACE!  
ROCKS!**

College, university and even high school students are building and launching CubeSats into space with NASA's help. That is why ELaNa is an educational program.

# CUBE-STATS

It takes a lot of math skills to build and launch a CubeSat, or nanosatellite in NASA's ELaNa Program.

This large CubeSat is made of smaller 1-inch cubes. Use your reasoning, geometry, and multiplication skills to answer the questions below.



1. How many sides are there on the large cube? \_\_\_\_\_
2. How many smaller, 1-inch cubes did it take to make the larger cube? \_\_\_\_\_
3. As each small cube is 1 inch, how tall is the larger cube? \_\_\_\_\_
4. If each small, 1-inch cube has a volume of 1, what is the volume of the larger cube?  
(Volume = Length x Width x Height) \_\_\_\_\_

**SPACE!  
ROCKS!**

NASA places restrictions on CubeSats, or nanosatellites, for each mission. Sometimes CubeSats must weigh less than 3 pounds or have a volume of more than 1 quart.

# MISSION SOLUTIONS

## PAGE 3

Coloring Sheet

## PAGE 4

NATIONAL  
AERONAUTICS AND  
SPACE  
ADMINISTRATION

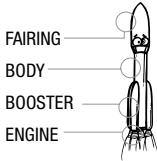
## PAGE 5

EARTH'S BRIDGE  
TO SPACE

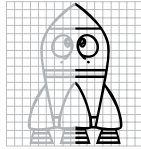
## PAGE 6

LAUNCH  
SERVICES  
PROGRAM

## PAGE 7



## PAGE 8



## PAGE 9

FACE  
RACE  
BASE  
CASE  
ACE

## PAGE 10

Coloring Sheet

## PAGE 11

Atlas V    Delta IV  
XII        CCCLV  
LII        II  
LXXII    DXXXV  
XIV       CL

## PAGE 12

A. FALCON 9  
B. PEGASUS XL

## PAGE 13



## PAGE 14

MERCURY  
VENUS  
EARTH  
MAFS  
JUPITER  
SATURN  
URANUS  
NEPTUNE  
PLUTO

Riddle Solution:  
ATMOSPHERE

## PAGE 15

- MERCURY
- VENUS
- EARTH
- MARS
- JUPITER
- SATURN
- URANUS
- NEPTUNE

Dwarf Planet Bonus:  
9. PLUTO

## PAGE 16

Answers vary depending  
on weight

## PAGE 17

- |            |             |
|------------|-------------|
| Across     | Down        |
| 1. Earth   | 2. Asteroid |
| 4. Mercury | 3. Jupiter  |
| 5. Moon    | 5. Mars     |
| 6. Sun     | 6. Saturn   |
| 8. Neptune | 7. Venus    |
| 9. Uranus  |             |

## PAGE 18

MOON  
TOON  
TORN  
BORN  
BARN  
BARS  
MARS

## PAGE 19

ASTRONOMER  
CONSTELLATION  
PLANET  
TELESCOPE  
SATELLITE  
MILKY WAY

## PAGE 20

- COUNTDOWN
- MAN ON THE MOON
- MILES ABOVE THE EARTH
- LOST IN SPACE
- ORBIT AROUND THE SUN
- ECLIPSE

## PAGE 21

Moon orbits our Earth  
Sun in our Solar System  
Planets in the Solar System  
States in the United States  
Continents on the Earth  
Rings around Saturn  
Dwarf Planets in our Solar System

BONUS  
Gas Giants in our Solar System  
Hemispheres on our Planet

## PAGE 22

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