

Appendix

Space Exploration Timeline

Inventions from Space Exploration

Books About Space

Space Words

Printables

(Name tags, journal covers, certificates,
Growing Readers tip sheets)

Space Exploration Timeline

Humans have been interested in space for centuries. Here are highlights from nearly 500 years of curiosity, innovation, and exploration. (Edited from a timeline by *Astronomy for Kids*.)

- 1543 Nicolaus Copernicus published *On the Revolutions of the Heavenly Spheres* claiming that the Earth and the planets orbited the Sun.
- 1609 Galileo first used the telescope to view the stars and planets.
- 1668 Isaac Newton invented the first reflecting telescope.
- 1686 Isaac Newton published the *Mathematical Principles of Natural Philosophy* where he described his theory of gravity and the motion of the Sun and the planets.
- 1801 The first asteroid, Ceres, is discovered by Giuseppe Piazzi.
- 1926 Robert Goddard invented and launched the first liquid-fueled rocket. Goddard's work on rocket technology would make spaceflight possible.
- 1942 The German V-2 rocket became the first vehicle to enter outer space. The rocket was designed by Wernher Von Braun, who later worked with NASA as the creator of the rockets that went to the moon.
- 1947 Fruit flies became the first animals to go to outer space aboard a V-2 rocket sent by the United States, to study the effects of space travel on animals.

The Space Age Begins!

- 1957 Russia (USSR) launched Sputnik 1 which became the first satellite into orbit around Earth. This started Space Race between the Russians and the United States. Today there are more than 500 working satellites in space. Sputnik means "Satellite" in Russian.
- 1957 The Russian dog Laika ("barker" in Russian) became the first animal in orbit.
- 1959 First creatures to return alive from space (two monkeys).
- 1961 Russian cosmonaut Yuri Gagarin became the first human in space and the first human to orbit the Earth.

Space Exploration Timeline

- 1961 Alan Shepherd became the first American in space just three weeks after Yuri Gagarin. President Kennedy declares the American space objective to put a man on the moon and return him safely by the end of the decade.
- 1962 John Glenn became the first American to orbit the Earth.
- 1963 Russian Cosmonaut Valentina Tereshkova became the first woman in space.
- 1965 Russian cosmonaut Alexei Leonov was the first man to walk in space.
- 1969 The Apollo 11 spacecraft landed on the Moon and Neil Armstrong became the first man to walk on the Moon. Armstrong and Edwin "Buzz" Aldrin spent two hours on the lunar surface setting up observation equipment and collecting rock samples.
- 1970 On the third manned mission to the Moon, Apollo 13 suffered an explosion caused by a wiring fault. Using only whatever was on board, NASA scientists and the astronauts on board improvised repairs to bring the crippled spaceship home.
- 1971 The USSR launched the first space station called Salyut 1.
- 1973 The United States launched its first space station called Skylab.
- 1976 Viking 1 successfully landed on Mars. It sent back pictures and scientific data for the next six years.
- 1981 The United States launched the first Space Shuttle, Columbia. The program eventually launched 135 space missions over the next thirty years.
- 1983 Sally Ride became the first American woman in space.
- 1986 Tragedy struck. Space Shuttle Challenger exploded shortly after launch, because of a fuel system failure. All seven astronauts on board were killed, and all shuttles were grounded for nearly three years.
- 1990 The Hubble Space Telescope was carried into orbit by a Space Shuttle. The Hubble Space Telescope is acclaimed as one of the most significant astronomical instruments in history. It is still in orbit after servicing by Space Shuttle astronauts.
- 1997 First operational rover landed on another planet (Mars).
- 1998 The International Space Station (ISS) was launched into space.

Space Exploration Timeline

- 2001 American millionaire Dennis Tito became the first space tourist when he paid around 20 million dollars for a ride in a Russian Soyuz spacecraft. He spent a week in orbit, most of the time visiting the International Space Station. He had to train for 900 hours just to be a passenger!
- 2004 The Cassini spacecraft sent back photographs of Saturn's shimmering rings.
- 2004 "Spirit" rover landed on Mars.
- 2008 As NASA began to plan retirement for the Space Shuttle, private companies began work on spacecraft to replace it. One of these companies, SpaceX, became the first to launch a privately funded liquid-fueled rocket into Orbit, the Falcon 1. SpaceX now uses its Falcon rockets to launch their Dragon capsule — an unmanned vehicle that takes supplies to the ISS.
- 2011 Final space shuttle mission ends when Atlantis arrives at Kennedy Space Center.
- 2015 First food grown in space eaten (lettuce).
- 2019 A Chinese lander made the first successful soft landing on the far side of the Moon.

Inventions from Space Exploration

NASA research has led to these innovations:

- Satellite GPS
- Camera phones
- Scratch-resistant glasses
- Better firefighter gear
- Roadway safety grooves
- LEDs for growing plants and healing people
- CAT scans
- Artificial limbs
- Invisible braces
- Ear thermometers
- Better radial tires
- Memory foam
- Baby formula nutrients (from algae!)
- Freeze dried food
- Solar power cells
- Oil spill clean up technology
- Water purification systems
- Home insulation
- Wireless headsets
- The computer mouse!
- Portable computers



Books About Space

Fiction

- *A Big Mooncake for Little Star* by Grace Lin (Ages 4-7)
- *Blackout* by John Rocco (Ages 6-9)
- *The Boy Who Went to Mars* by Simon James (Ages 4-8)
- *Bright Sky, Starry City* by Uma Krishnaswami (Ages 6-9)
- *CatStronauts: Space Station Situation* by Drew Brockington (Ages 6-9)
- *City Moon* by Rachael Cole (Ages 4-8)
- *Commander Toad* series by Jane Yolen (Ages 6-9)
- *The Countdown Conspiracy* by Katie Slivensky (Ages 9-12)
- *Coyote Places the Stars* by Harriet Peck-Taylor (Ages 4-8)
- *El Mundo de Copocuqu: La Reina Gravedad y el Rey Masa (The World of Copocuqu: Queen Gravity and King Mass)* by Adriana C. Ocampo Uria (Ages 6-9)
- *Her Seven Brothers* by Paul Goble (Ages 6-9)
- *How the Stars Fell into the Sky* by Jerrie Oughton (Ages 6-9)
- *I Love You, Michael Collins* by Lauren Baratz-Logsted (Ages 9-12)
- *Imani's Moon* by JaNay Brown-Wood (Ages 6-9)
- *Just Right: Searching for the Goldilocks Planet* by Curtis Manley (Ages 6-9)
- *Life on Mars* by Jon Agee (Ages 4-8)
- *The Lizard and the Sun / La Lagartija y el Sol* by Alma Flor Ada (Ages 4-8)
- *Luciana: Out of This World* by Erin Teagan (Ages 9-12)
- *The Man in the Moon* by William Joyce (Ages 6-9)
- *Maria's Comet* by Deborah Hopkinson (Ages 6-9)
- *Max Goes to Jupiter: A Science Adventure with Max the Dog* by Jeffrey Bennett (Ages 6-9)
- *Max Goes to the Space Station* by Jeffrey Bennett (Ages 6-9)
- *Max Goes to Mars* by Jeffrey Bennett (Ages 6-9)
- *Miss Tracy Is Spacey!* by Dan Gutman (Ages 6-9)
- *A Moon of My Own* by Jennifer Rustigi (Ages 6-9)
- *The Moon Over Star* by Dianna Hutts Aston (Ages 6-9)



Books About Space

Fiction

- *Mousetronaut* by Mark Kelly (Ages 4-8)
- *Mousetronaut Goes to Mars* by Mark Kelly (Ages 4-8)
- *Mr. Wuffles* by David Wiesner (Ages 4-8)
- *Music for Mister Moon* by Philip C. Stead (Ages 4-8)
- *Owl Moon* by Jane Yolen (Ages 4-8)
- *The Story of the Milky Way* by Joseph Bruchac (Ages 6-9)
- *Pluto Is Peeved: An Ex-Planet Searches for Answers* by Jacqueline Jules (Ages 6-9)
- *Starry River of the Sky* by Grace Lin (Ages 9-12)
- *Stink: Solar System Superhero* by Megan McDonald (Ages 4-8)
- *Thanking the Moon* by Grace Lin (Ages 4-8)
- *There Was an Old Martian Who Swallowed the Moon* by Jennifer Ward (Ages 4-8)
- *Tiny Little Rocket* by Richard Collingridge (Ages 4-8)
- *The Truth About Martians* by Melissa Savage (Ages 9-12)
- *The Way Back Home* by Oliver Jeffers (Ages 4-8)
- *Where the Mountain Meets the Moon* by Grace Lin (Ages 9-12)
- *Zathura* by Chris Van Allsburg (Ages 4-8)

Poetry

- *Comets, Stars, the Moon, and Mars: Space Poems and Paintings* by Douglas Florian (Ages 6-9)
- *The Day the Universe Exploded My Head* by Allan Wolf (Ages 9-12)
- *Eight Days Gone* by Linda McReynolds (Ages 4-8)
- *Faces of the Moon* by Bob Crelin (Ages 6-9)
- *A Full Moon Is Rising* by Marilyn Singer (Ages 6-9)
- *Galileo's Universe* by J. Patrick Lewis (Ages 9-12)
- *Once Upon a Star: A Poetic Journey Through Space* by James Carter (Ages 6-9)
- *Out of This World: Poems and Facts About Space* by Amy Sklansky (Ages 6-9)
- *Stuff of Stars* by Marion Bauer (Ages 6-9)
- *Thirteen Moons on Turtle's Back: A Native American Year of Moons* by Joseph Bruchac (Ages 4-8)
- *When the Moon Is Full: A Lunar Year* by Mary Azarian (Ages 6-9)



Books About Space

Biography

- *Almost Astronauts: 13 Women Who Dared to Dream* by Tanya Lee Stone (Ages 9-12)
- *A Computer Called Katherine: How Katherine Johnson Helped Put America on the Moon* by Suzanne Slade (Ages 6-9)
- *Caroline's Comets: A True Story* by Emily Arnold McCully (Ages 6-9)
- *Chasing Space* by Leland Melvin (Ages 9-12)
- *Counting on Katherine: How Catherine Johnson Saved Apollo 13* by Helaine Becker (Ages 6-9)
- *Galileo's Universe* by J. Patrick Lewis (Ages 9-12)
- *Hidden Figures* by Margot Lee Shetterley (Ages 6-9)
- *I, Galileo* by Bonnie Christensen (Ages 6-9)
- *The Librarian Who Measured the Earth* by Kathryn Lasky (Ages 9-12)
- *Look Up! Henrietta Leavitt, Pioneering Woman Astronomer* by Robert Burleigh (Ages 6-9)
- *Mae Among the Stars* by Roda Ahmed (Ages 4-8)
- *Margaret and the Moon: How Margaret Hamilton Saved the First Lunar Landing* by Dean Robbins (Ages 4-8)
- *Nicolaus Copernicus: The Earth Is a Planet* by Dennis Fradin (Ages 9-12)
- *Path to the Stars: My Journey from Girl Scout to Rocket Scientist* by Sylvia Acevedo (Ages 9-12)
- *The Planet Hunter: The Story Behind What Happened to Pluto* by Elizabeth Rusch (Ages 4-8)
- *To Space and Back* by Sally Ride (Ages 9-12)
- *Starry Messenger: Galileo Galilei* by Peter Sis (Ages 6-9)
- *What Miss Mitchell Saw* by Hayley Barrett (Ages 4-8)
- *Who Was Neil Armstrong?* by Roberta Edwards (Ages 9-12)



Books About Space

Nonfiction

- *Apollo 13 (Totally True Adventures)* by Kathleen Weidner Zoehfeld (Ages 6-9)
- *Astronaut Academy* by Steve Martin (Ages 6-9)
- *Astronaut Handbook* by Meghan McCarthy (Ages 6-9)
- *Astronaut in Training* by Catherine Ard (Ages 6-9)
- *To Burp or Not to Burp: A Guide to Your Body in Space* by Dave Williams (Ages 6-9)
- *Comets, Meteors, and Asteroids: Voyagers of the Solar System* by Ellen Lawrence (Ages 6-9)
- *Countdown: 2979 Days to the Moon* by Suzanne Slade (Ages 9-12)
- *Curiosity: The Story of the Mars Rover* by Markus Motum (Ages 9-12)
- *Destination Mars* by Seymour Simon (Ages 6-9)
- *Exploring Our Solar System* by Sally Ride and Tam O'Shaughnessy (Ages 9-12)
- *Exploring Space: From Galileo to the Mars Rover and Beyond* by Martin Jenkins (Ages 9-12)
- *Floating Home* by David Getz (Ages 6-9)
- *Floating in Space* by Franklyn Branley (Ages 4-8)
- *Footprints on the Moon* by Alexandra Siy (Ages 6-9)
- *Go for the Moon: A Rocket, a Boy, and the First Moon Landing* by Chris Gall (Ages 6-9)
- *Gravity* by Jason Chin (Ages 9-12)
- *Gravity Is a Mystery* by Franklyn Branley (Ages 4-8)
- *How to Be a Space Explorer* by Lonely Planet (Ages 9-12)
- *I Fall Down* by Vicki Cobb (Ages 4-8)
- *I Want to Be an Astronaut* by Byron Barton (Ages 4-8)
- *If You Decide to Go to the Moon* by Faith McNulty (Ages 4-8)
- *If You Had Your Birthday on the Moon* by Joyce Lapin (Ages 6-9)
- *The International Space Station* by Franklyn Branley (Ages 4-8)
- *Just Right: Searching for the Goldilocks Planet* by Curtis Manley (Ages 6-9)
- *Little Kids' First Big Book of Space* by National Geographic Kids (Ages 4-8)
- *Lost in Outer Space: The Incredible Journey of Apollo 13* by Tod Olson (Ages 9-12)
- *The Magic School Bus Lost in the Solar System* by Joanna Cole (Ages 6-9)
- *Magic School Bus Presents: Our Solar System* by Tom Jackson (Ages 6-9)
- *Mars: Our Future on the Red Planet* by Leonard David (Ages 9-12)
- *Me and My Place in Space* by Joan Sweeney (Ages 4-8)
- *The Mighty Mars Rovers* by Elizabeth Rusch (Ages 9-12)
- *Mighty Mission Machines* by Dr. Dave Williams and Loredana Cunti (Ages 9-12)



Books About Space

Nonfiction

- *Mission: Mars* by Pascal Lee (Ages 9-12)
- *Mission to Mars* by Franklyn Branley (Ages 4-8)
- *The Moon Book* by Gail Gibbons (Ages 6-9)
- *Moon! Earth's Best Friend (Our Universe)* by Stacy McAnulty (Ages 4-8)
- *The Moon Seems to Change* by Franklyn Branley (Ages 4-8)
- *Moonshot* by Brian Floca (Ages 6-9)
- *National Geographic Kids: Mars* by Elizabeth Carney (Ages 6-9)
- *One Giant Leap* by Robert Burleigh (Ages 6-9)
- *Our Solar System* by Seymour Simon (Ages 6-9)
- *The Planets* by Gail Gibbons (Ages 6-9)
- *The Planets in Our Solar System* by Franklyn Branley (Ages 4-8)
- *Professor Astro Cat's Solar System* by Dr. Dominic Walliman (Ages 6-9)
- *The Rocket that Flew to Mars* by Audrey Sauble (Ages 4-8)
- *Rockets and Spaceships* (DK Readers) by Dr. Karen Wallace (Ages 6-9)
- *Rocketry* by Carla Mooney (Ages 9-12)
- *Space Exploration* by Dan Green and Simon Basher (Ages 9-12)
- *Spacewalk: The Astounding Gemini 4 Mission* by Carl R. Green (Ages 9-12)
- *Star Spotters: Telescopes and Observatories* by David Jefferis (Ages 9-12)
- *Science Comics: Rockets: Defying Gravity* by Anne Drozd (Ages 9-12)
- *Science Comics: Solar System: Our Place in Space* by Rosemary Mosco (Ages 9-12)
- *Space: A Visual Encyclopedia* (DK Readers) (Ages 6-9)
- *The Sun Is Kind of a Big Deal* by Nick Seluk (Ages 4-8)
- *The Sun: Our Nearest Star* by Franklyn Branley (Ages 4-8)
- *Team Moon* by Catherine Thimmesh (Ages 9-12)
- *Welcome to Mars: Making a Home on the Red Planet* by Buzz Aldrin (Ages 9-12)
- *What Makes Day and Night?* by Franklyn Branley (Ages 4-8)
- *What the Moon Is Like* by Franklyn Branley (Ages 4-8)
- *What's Out There? A Book About Space* by Lynn Wilson (Ages 4-8)
- *You Are the First Kid on Mars* by Patrick O'Brien (Ages 6-9)
- *You Can't Ride a Bicycle on the Moon* by Harriet Ziefert (Ages 6-9)



Space Words

Accelerate

To increase the speed or rate of something.

Apollo 11

The historic mission where humans first walked on the Moon.

Asteroid

A rocky space object that can be a few feet wide to several hundred miles wide. Most asteroids in our solar system orbit in a belt between Mars and Jupiter.

Astronaut

A person trained to participate in space flights.

Astronomer / Astronomy

A scientist who studies space and the Universe beyond Earth. Astronomy is the branch of science that studies space.

Atmosphere

The layer of gases surrounding Earth and other planets, held in place by gravity.

Axis

An imaginary line that goes through a planet's center from top to bottom. A planet spins (rotates) around its own axis.

Big Dipper

Part of the constellation Ursa Major (Big Bear), made up of this constellation's seven brightest stars. These stars form a shape that looks like a ladle, or dipper.

Canyon

A deep valley with steep sides.

Comet

A frozen mass of gas and dust that orbits the Sun and may form a long, bright tail when it is flying close to the Sun.

Command Module (Columbia)

The Apollo 11 spacecraft that orbited the Moon while the Lunar Module was on the lunar surface. "Columbia" was piloted by astronaut Michael Collins.



Space Words

Constellation

A group of stars in the night sky forming patterns that look like animals, objects, or characters. There are 88 official constellations. At different times of the year and in different hemispheres, different constellations can be seen in the sky.

Crater

Large round holes in the ground. A bowl-shaped cavity caused by an asteroid impact.

Crescent Moon

The Moon as it appears early in its first quarter or late in its last quarter, when only a small arc-shaped section is lit up by the Sun.

Curiosity, Spirit, and Opportunity

Three car-sized Mars rovers designed to collect information about the Red Planet. Curiosity was launched November 26, 2011 and is still active.

Desert

A very dry, area with little or no rainfall to support plant life.

Dwarf planet

A non-satellite body that is in orbit around the Sun, has sufficient mass to have a nearly round shape, but is not the dominant body in its orbit.

Elliptical orbit

The oval (not round) pattern that describes how the planets in our solar system move around the Sun.

Eyepiece

The lens closer to your eye in a telescope, through which you view objects in the sky.

Erosion

The wearing away of a planet's surface by wind or water.

Exosphere

The outermost part of the atmosphere of a planet.

Far Side of the Moon

The side of the Moon that always faces *away* from Earth.



Space Words

Force

Power, energy, or physical strength. The strength or power applied to an object.

Full Moon

When Earth is located between the Sun and the Moon, the Moon appears fully lit up and appears like a bright, full circle.

Galaxy

A collection of billions of stars and other matter held together by gravity. Our planet Earth and the Sun belong to the Milky Way galaxy. A telescope helps us see other galaxies from Earth.

Gibbous Moon

The appearance of the Moon between a Half Moon and a Full Moon.

Gravity

A force that pulls matter together; a force that pulls people and objects toward the ground.

Half Moon

The phase when one-half of the Moon appears lit up.

Helium

A gas that is lighter than air. Balloons filled with helium will float high in the sky.

Hubble Telescope

A space telescope launched into low Earth orbit in 1990 and is still out there. The Hubble has taken thousands of images that have helped scientists and the public to understand our Universe better.

Hydrogen

A very light gas and one of the most abundant gases in the Universe.

Interstellar

The space located between stars.

International Space Station

A large spacecraft in low orbit around Earth. It serves as a home and science laboratory for crews of astronauts from around the world. It orbits Earth every 90 minutes.



Space Words

Iron Oxide

A substance formed when iron mixes with oxygen and water. Also called rust, it is red in color.

Lander

A type of spacecraft that is designed to land on the surface of a planet, comet, or moon, to retrieve or send scientific information.

Lens

A piece of clear material such as glass that bends light rays passing through it. The surface of a lens is curved to bend light rays toward or away from a central point.

Light year

The distance that light travels in one year, about 6 billion miles.

Little Dipper

The constellation Ursa Minor (Little Bear). The stars that make up this constellation also form a pattern that looks like a dipper.

Lunar

Having to do with the Moon, for example, the lunar landscape.

Lunar cycle

The Moon's continuous orbit around the Earth. It takes 27 days, 7 hours, and 43 minutes for our Moon to complete one full orbit around Earth.

Lunar eclipse

When the Moon's reflected light is hidden by the Earth's shadow when the Earth passes between the Moon and the sun.

Magnify

To make something appear larger.

Mars

The fourth planet from the Sun. It is the second smallest planet in the solar system, and is about half the size of Earth. Often called the Red Planet.

Mars Rover

A space vehicle designed to travel on the surface of Mars to retrieve or send scientific information.



Space Words

Martian

A fictional creature from the planet Mars. Also, something from the planet Mars, such as Martian soil.

Microbe

A life form that can only be seen with a microscope. Bacteria and viruses are microbes.

Milky Way

The galaxy that contains the Earth, the Sun, and the solar system. It can be seen in the night sky as a long, cloudy group of stars.

Mission

An important task that one is sent out to do. A space mission is a journey into space (unmanned or with a crew) for a specific reason - usually to gather scientific information.

Moon

A natural satellite that orbits a larger object. Earth has one Moon, the one we see in the night sky.

Olympus Mons

The largest volcano in the solar system and located on Mars. It is almost 3 times taller than Mt. Everest!

Orbiter

A spacecraft designed to move around (orbit) a planet or moon.

Phobos and Deimos

The two small, rocky moons orbiting around Mars; they look like asteroids.

Polar ice cap

Dome-shaped sheets of ice found at the north and south areas (polar regions) of a planet.

Nebula

A cloud of dust and gas found in interstellar space. They are sometimes called "star nurseries" because stars are created there.



Space Words

Objective lens

The lens that gathers light from the object being looked at and focuses the light rays to produce an image.

Orbit

The curved path followed by an object in space as it goes around another object; to travel around another object in a single path.

Orion

A large winter constellation in the northern sky. In Greek mythology, a hunter.

Planet

A celestial body that (1) is in orbit around the Sun, (2) has sufficient mass to have a nearly round shape, and (3) it is the dominant body in its orbit.

Polaris (North Star)

A bright star in the constellation Ursa Minor (Little Dipper). It seems to remain in a constant position in the sky; for this reason, Polaris is used for navigation.

Refract

To bend as you move from one medium to another. Example: The movement of air and dust in the atmosphere bends, or *refracts*, a star's light in different directions.

Rocket

A flying device, shaped like a tube, that is pushed by hot gases released from engines in its rear. Rockets are used to launch spacecraft.

Revolve

To move in an orbit or circle around a fixed point. The Earth revolves around the Sun.

Rotate

To turn around a center point — or axis, like a wheel turns on a bicycle. The Earth rotates from day to night.

Satellite

An object that orbits another object. A moon is a natural satellite.



Space Words

Scale

Scale is the implied relationship (or ratio) between a model and the actual object. A scale model is a representation of an object that is larger or smaller than the actual size of the object being represented.

Scintillation

A spark, flash, or twinkle of light.

Solar system

The Sun and all of the planets, comets, asteroids, and other space bodies that revolve around it.

Star

A giant ball of hot gas that emits light and energy created through nuclear fusion at its core.

Sun

The star in the center of our solar system. Like all stars, the Sun is composed of a great burning ball of gases. It is made of 92.1% hydrogen and 7.8% helium.

Telescope

An instrument that uses lenses and mirrors to make far away objects look larger and closer to us.

Terrestrial

Earth-like. A terrestrial planet has a solid rocky surface, with metals deep in its core.

Thrust

To push or drive something with force.

Velocity

The rate of speed or motion.

Volcano

A hole (vent) in a planet's surface that releases lava (melted rock) and gases to the surface.

Space Rangers Name Cards

Make copies of these name tags and let child each choose their own Space Ranger name. They can select from the Space Words list (Orion, Asteroid, Comet, Curiosity?) or adopt the name of an astronomer or astronaut.

My Space Ranger name is:



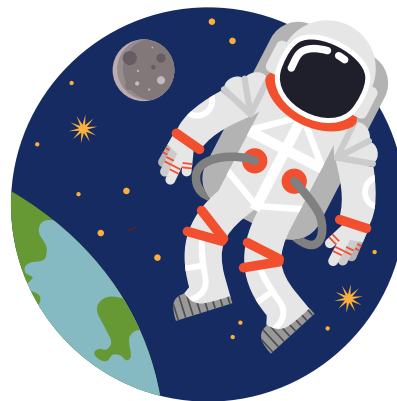
My Space Ranger name is:



My Space Ranger name is:



My Space Ranger name is:



Space Rangers Space Journal

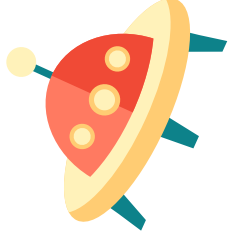


Your name here

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Fold cover along dotted lines



Space Rangers

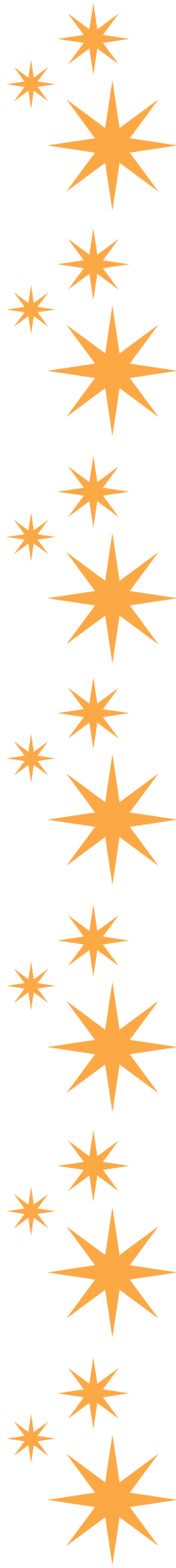


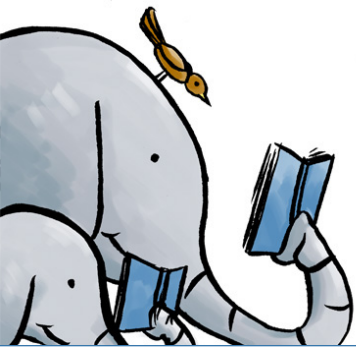
This certificate is presented to:

To celebrate your participation in the Space Rangers program!

Date

Signature





Growing readers!

Parent tips for raising strong readers and writers
from Reading Rockets



Reading Aloud: Fiction Books

The basics

- Take your time and talk about the story and pictures with your child.
- Ask your child questions and let your child ask questions.
- Read with expression to create excitement.
- You don't need to read every word. Keeping your child interested is the goal.

Try “think alouds”

When you share books with your children, they are learning to think and act like good readers — without even knowing it! You can help them get even more from reading time when you talk to them as you read.

Children learn when they can make connections between what they hear and what they know. One method you can use to help make these connections is called a think aloud, where you talk through your thoughts as you read. Here are three ways to use think alouds, with examples from some of our favorite kids' books.

Connect the book to your child's own life experience

Example: *A River Dream* by Allen Say

“This book reminds me of the time my father took me fishing. Do you remember the time we went fishing?”

Connect the book to other books they have read

Example: *Mufaro's Beautiful Daughters* by John Steptoe

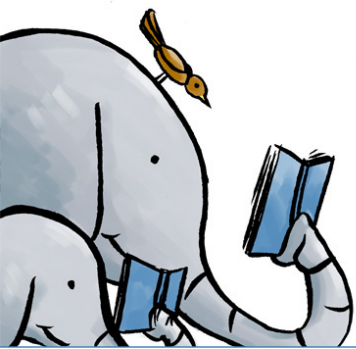
“This story reminds me of Cinderella. Both stories are about sisters. Do you know any other stories about nice and mean sisters? Let's keep reading to find out other ways the stories are similar.”

Connect the book to big ideas/lessons

Example: *Stellaluna* by Janell Cannon

“This story helps me understand that we are all the same in many ways, but it's our differences that make us special.”

Modeling these types of connections will help young readers know how to do it when they read alone!



Growing readers!

*Parent tips for raising strong readers and writers
from Reading Rockets*



Reading Aloud: Nonfiction Books

The basics

- Wonder out loud. As you are reading (or afterward), talk about facts you find interesting or questions you have.
- Explore the pictures and other graphics in the book, such as charts and diagrams.
- Don't be afraid to jump around, reading pages that especially interest your child. You don't have to read a nonfiction book straight through.

Getting the most out of nonfiction reading time

Nonfiction books give kids a chance to learn new concepts and vocabulary, as well as broaden their view of the world. Here's how to take a "book walk" with a new nonfiction book and how to model active reading.

Take a "book walk"

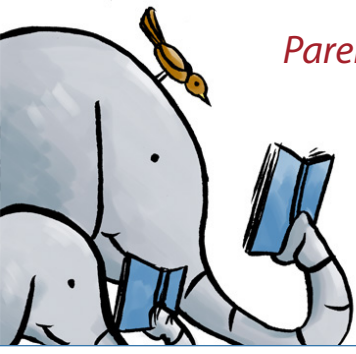
One great way to make predictions about an unfamiliar nonfiction text is to take a "walk" through the book before reading. By looking closely together at the front and back cover, the index, table of contents, the glossary, and the photographs or other images, readers can start to get a sense about the topic. This scanning and skimming helps set the expectation for the reading. Take the time to walk through the book before starting to read.

Encourage questions

A second way to develop more understanding with nonfiction books is to encourage your child to be an active reader who asks lots of questions. Parents can model these behaviors by talking or thinking out loud as you turn the pages of the book. This is a helpful way for your child to see and hear what a successful reader does when faced with difficult or unfamiliar topics.

For example, "When I looked at this photograph, I asked myself, "Where is Antarctica? Is that the same place as the South Pole?" Then talk together about how and what you would need to do to find the answer to the questions. This will reinforce that many questions can be answered by reading a text closely and by paying attention to captions and picture titles. Some children enjoy writing their questions on sticky notes and working to answer them during the reading.

Previewing a text and asking questions are two terrific ways to navigate nonfiction texts. Enjoy spending more time with some fascinating informational books!



Growing readers!

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Literacy in the Sciences: Activity No. 14

How to Read Nonfiction Text

Kids love to read about real people, places, and events. Nonfiction books present real information in engaging and interesting ways. However, most kids read a lot more fiction than nonfiction, so spend some extra time helping your reader learn how to navigate a nonfiction book.

Talk about nonfiction

Begin by explaining that the book you're about to share is nonfiction. That means that the book will give us information that is true. The book will be organized around a specific topic or idea, and we may learn new facts through reading. Some kids even enjoy sorting their home libraries into fiction and nonfiction books. This simple categorization task helps your child understand the difference between fiction and nonfiction.

Look at the parts

Most good nonfiction books will have helpful features that are not a part of most fiction books. These parts include a table of contents, an index, a glossary, photographs and charts with captions, and a list of sources. Share the purpose of the features with your reader.

- **Table of Contents:** Located at the front of a book, the table of contents displays a list of the big ideas within the book and where to find them.
- **Index:** An index is an alphabetical list of almost everything covered within the book, with page numbers. Readers can use the index to look up specific terms or concepts and go right to the specific information they're looking for.
- **Glossary:** Located at the back of the book, a glossary contains key words that are related to the topic and their definitions. These definitions provide more information about new vocabulary words.
- **Captions:** Captions are usually right under photographs, figures, maps, and charts. Captions give a quick summary of what information is presented in the graphic.
- **Photos and Charts:** A lot of information can be found by "reading" the charts and photos found within nonfiction text. Readers will first need to figure out what information is presented. Then they'll need to discover how to navigate the information. Some charts use clear labels, others require more careful examination. Help your reader learn more about the different ways information can be displayed.

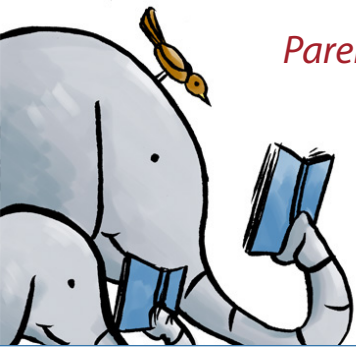
Be the reading boss

Nonfiction books do not have to be read from cover to cover. Readers can use the table of contents and index to jump right to the information they are most interested in. In that way, they are the "reading boss" of that book! However, if your reader wants to read from cover to cover, encourage him to use the table of contents to understand how the book is organized. "First we will learn about the different types of frogs. Then we'll learn where they can live, what they eat, and how they survive." Passages from the book can be reread as often as necessary until your child understands what is written. You can refer to pictures, charts and tables over and over again as well.

As natural learners, young readers are drawn to books that give information about something or explain something they've always wondered about. With a little help and guidance about reading nonfiction, you can feel good about introducing your child to a new world of information.

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Parent tips for raising strong readers and writers

Growing readers!

Brought to you by Reading Rockets, Colorín Colorado and LD OnLine

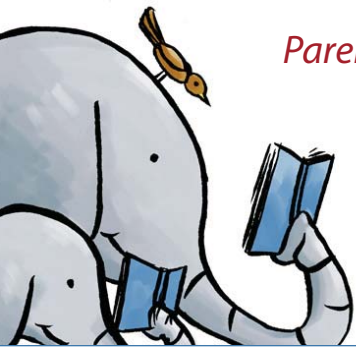
Summer Literacy Challenge!

For most parents, it's a challenge to keep kids reading and writing all summer. Suddenly 10 weeks of summer can feel like a very long time! We've got a summer literacy challenge for you and your child. It's modest enough to be manageable –pick just one thing a week to kick start your week's literacy adventures. But it's also challenging enough to include a wide range of literacy fun for the whole family.

- ✓ **Investigate your public library's summer reading program.** Most libraries offer a special program or two during the summer, including puppet shows, book authors and children's storytellers. Most are free of charge.
- ✓ **Extend your reading circle.** We often find ourselves checking out the same types of books over and over again. This week's challenge is to bring a new type of book into the house. Consider fantasy or science fiction, historical fiction, poetry, biography, or an informational book.
- ✓ **Listen up!** Audiobooks are a great way to engage readers and can introduce students to books above their reading level. Many libraries have audiobooks available for check out, and an Internet search can turn up several sites, including Speakaboos.com, that offer free audio books for children.
- ✓ **Make your own audio book!** Most phones and computers have simple recording apps on them which are perfect for making homemade audio books! Have your child make up a story, or reread a favorite loved book. The recordings will be priceless!
- ✓ **Go wordless.** Wordless picture books are told entirely through their illustrations — they are books without words, or sometimes just a few words. Grab a few wordless books the next time you're at the library and have fun "reading" different versions of the same story. The language and the conversation will inspire you!
- ✓ **Visit a museum, online!** You'll be surprised by how much you can explore without leaving your house. One example is the Smithsonian Institution Kids site. It's complete with offerings from Art to Zoo, for kids and students of all ages.
- ✓ **Pack in a whole adventure!** Find FREE themed reading adventure packs that encourage hands-on fun and learning, centered around paired fiction and nonfiction books. Visit Reading Rockets and search Adventure Pack.
- ✓ **Point, shoot, and write.** Most families have access to a digital camera, iPad or camera phone. Snap some photos and then encourage your child to write a silly caption for each photo. Not feeling that ambitious? Cut out some pictures from a magazine or the newspaper and have your child write original captions for those.
- ✓ **Mix up the media.** Your child has read every Clifford book on the shelf. But has she heard Clifford author Normal Bridwell talk about writing? Explore author interviews from over 100 authors on Reading Rockets Author Interview page. We'll bet you can't watch just one.
- ✓ **Write it down.** Encourage your child to keep a simple journal or summer diary. Track interesting things like the number of fireflies seen in one minute, the number of mosquito bites on a leg, or the different types of food that can go on the grill. Each entry is a chance to be creative!

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Growing readers!

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Literacy in the Sciences: Activity No. 4

Making Predictions

As a young reader, your child is learning to make predictions while reading. “What do you think will happen next?” “Who do you think drank Sara’s lemonade?” These types of questions we ask children as they’re reading help them learn to monitor their understanding of the story while thinking ahead to the next part. If your child is able to make good and fairly accurate predictions while reading, chances are she comprehends the story well.

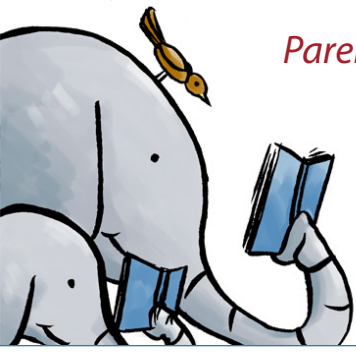
Scientists, just like readers, make predictions all the time. In fact, scientists use predictions as part of their hypothesis, or question they try to answer through their experiments. Help your child begin to see the connection between what she does as a reader and what she can do as a scientist.

Below are two simple ways you can encourage your child to put her prediction skills to work as a scientist:

- 1. Play favorites.** What is our family’s favorite flavor of ice-cream? What is our favorite movie to watch together? What is our favorite bedtime story? Choose a question, or make up your own, that your child is excited about. First, have your child predict or guess the answer to the question. Help her write down her prediction. “I think chocolate is our family’s favorite flavor of ice cream.” Then, have your child ask each member of the family for an answer. Have your child record the answers using a special Science Notebook or simply mark tally marks on paper. Finally, ask your child to compare her prediction to the actual answers.
- 2. Good guess!** Estimation is often very similar to a prediction. In both cases, your child will be working to make a good guess about an answer. As with our Play Favorites idea, encourage your child to write down (or write together) the questions and answers in a special Science Notebook. Whenever possible, encourage the use of scientific words like estimation, predication, collect data, analyze, and prove. Here are some estimation questions that require your child to make a prediction:
 - How many noodles will it take to fill up this jar? Encourage your child to use scientific language and thinking to answer. “I predict it will take 300 noodles to fill the jar.”
 - How many steps is it from our front door to the mailbox?
 - How much does our dog weigh?
 - How many library books fit on one shelf?
 - How long do you think it will take for the ice cubes to freeze (or melt)?

We predict your child will have great fun with these activities! And you can have fun knowing that you’re helping your child make important connections between the skills of prediction, reading, and science.

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Growing readers!

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Literacy in the Sciences: Activity No. 11

Making Inferences and Drawing Conclusions

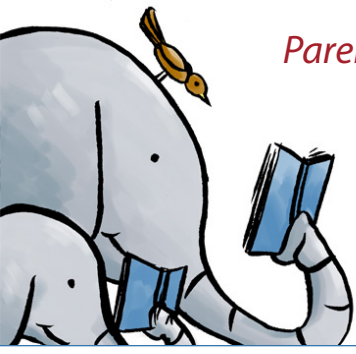
Observations occur when we can see something happening. In contrast, inferences are what we figure out based on an experience. Helping your child understand when information is implied, or not directly stated, will improve her skill in drawing conclusions and making inferences. These skills will be needed for all sorts of school assignments, including reading, science and social studies. Inferential thinking is a complex skill that will develop over time and with experience.

Families can create opportunities to practice inferential thinking. Below are a few ways to help familiarize your child with this way of thinking and learning:

- Explain to your child that we make conclusions about things and draw inferences all the time. Draw a conclusion together and then talk about what clues were used to come to that conclusion. For example, Erin played outside today. How can we tell? Muddy shoes, jump rope on front porch, water bottle out. Dad seems tired tonight. How can we tell? He's rubbing his eyes, he's on the couch, he was yawning at the dinner table.
- Paper bag mystery person: Put a few items into a brown paper bag. Tell your child the bag belongs to a certain type of person. Their job is to tell you something about the person. Then, take out each item one by one and talk about it.
 - Example #1: goggles, a swim cap, a swim ribbon, a stop watch
 - Example #2: a bookmark, a library card, a stuffed animal, a book
- Wordless picture books provide your child with practice using clues to create meaning. There are no wrong stories with wordless picture books, only variations based on what the “reader” sees and puts together. *Rosie's Walk* (Hutchins), *Good Dog, Carl* (Day), and *Beaver Is Lost* (Cooper) are all interesting and fun wordless picture books to explore.
- Play twenty questions! This familiar word game helps build inference skills. As your child develops skill with the game, encourage him to avoid asking direct questions like, “Is it a dog?” Rather, encourage him to ask broader questions, “Does it walk on four feet?” Then, when your child figures it out, ask him to tell you the clues that lead to the right answer.
- Create scenarios in which your child must use what they already know to predict an outcome. For example, growing seeds. Present your child with various scenarios (a seed will be given water and sunlight, a seed will get no water, a seed will be in a dark room). Ask your child to predict whether the seed will grow. Help your child become aware that she used information she knew about growing seeds, combined with new information, to fill in information about the seeds.

Learning to draw conclusions and inferences is a skill that develops over time. The skill requires children to put together various pieces of information, and relies on good word knowledge. Help your child develop skill by providing experience with inferential information, making implied information more clear, and helping your child draw conclusions based on the evidence.

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Growing readers!

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Literacy in the Sciences: Activity No. 6

Recording Observations

Science and math explorations provide your growing reader with a chance to record all kinds of observations. Young children love to keep a special journal, and fill it with all sorts of drawings, scribbles, sketches, notes, and graphs. Try to date each entry and watch as your child's observational and recording skills grow along with your child.

Create a special journal

Use any paper for the cover: cardstock, interesting cardboard and pretty greeting cards can all be used as a cover. Then, collect some twigs from the backyard and find a large, thick rubber band. Fold your cover in half. Fold your inside pages, and put them inside the cover. Trim as needed. Punch two holes with a hole punch, measuring down from the top and up from the bottom about 2 inches. Pull one end of the rubber band through the bottom hole and slide twig into the loop. Pull the other end of the rubber band through the top hole and slide the other end of twig through that. You now have a special journal into which your budding scientist can record observations.

A scientist's field notes

Begin using the science journal by taking your child outside. Encourage your child to write down what she observes about her surroundings, looking at both the big picture and the small, examining plants and rocks and insects up close. Have her make a record in their journal of what they experience with each of their senses. Then have her choose one animal or plant to watch for 10 minutes. Your child can choose anything: a dandelion, a grasshopper, a bird soaring overhead. Ask her to describe it as clearly as they can, as if she is writing for someone who's never seen that before. Have her watch for movements and take note of any sounds made. Ask your child to draw and label a picture of the plant or animal.

Other fun ideas to record in your field journal

A flower tally: Count the flowers in an area in the spring once a week for three weeks. Compare your tallies. Your child will have fun watching the numbers go up as flowers bloom in the spring.

Ant watching: There are ants everywhere! Try following them to their home and see what they're up to. Where do they live? How many can you count in one place? Record these observations and your ant grand total.

Dig a hole: As parents know, dirt can be pretty interesting to kids. Have your child dig a hole and notice how the dirt changes as he digs deeper. Can he describe the different layers? What creatures did he find as he dug? Record these and other interesting findings in the journal.

Nature scavenger hunt: Use your notebook to make (or draw) a list of some common things and a few rare ones that can be found outside near your home or in a park. Include things like: acorn, pine cone, flat rock, bird feather, weed, flower. Hand your child the notebook and let the scavenger hunt begin!

Special thanks to the Two Writing Teachers (www.twowritingteachers.wordpress.com) for their field journal directions, and Nature Rocks (www.naturerocks.org) for the nature-based ideas for family fun.

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