



THE SCHOOLS'
OBSERVATORY

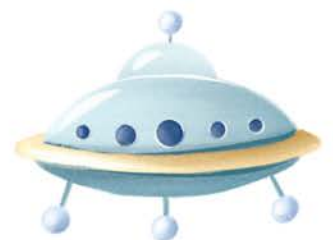
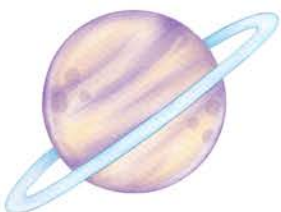
PROUD TO BE PART OF



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Let's Explore Aliens!

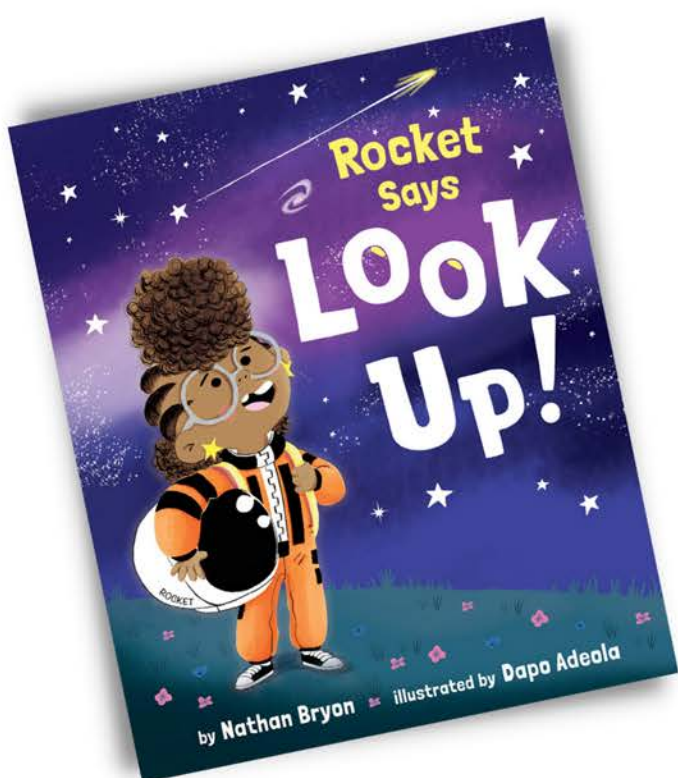


Background information

The Schools' Observatory use the wonders of space to inspire the next generation of scientists, programmers and engineers. They provide resources for schools, support for teachers and free use of the world's largest robotic telescope through their website, schoolsobservatory.org.

The Schools' Observatory is proud to be part of Liverpool John Moores University and are based in LJMU's Astrophysics Research Institute in Liverpool, UK.

In partnership with Durham Book Festival's Little Read, The Schools' Observatory have created packs of themed resources for Early Years Foundation Stage children. These can be used at home or in nursery settings to engage children with the story, "Look up" by Nathan Bryon.



The main character in "Look up" is Rocket. Rocket is going to be the greatest astronaut, star-catcher, space-traveller who ever lived! Rocket is totally prepared for her future. She has "defied gravity... captured rare and exotic life forms... and built a ship to the stars!"

This pack of activities focuses on the topic of aliens. Rocket refers to these as "rare and exotic lifeforms".

This booklet has astronomy information for you on pages 3 to 5, ideas for activities to do with the children on pages 6 to 10 and finally additional resources and weblinks we think you might be interested in on pages 11 to 13.

Aliens: Contents

Information	Page 3
Activity 1 - Hunting for alien clues	Page 6
Activity 2 - Signals from aliens	Page 7
Activity 3 - Collecting alien evidence	Page 8
Additional Resources & Web Links	Page 11

Please note: the images used in this document are not to scale.

Aliens

What are aliens?

In science fiction, an alien is a creature from outer space. The word alien also means something unfamiliar or different. Aliens in science fiction are usually 'intelligent' – this means they can communicate, use technology, and travel through space.



When scientists talk about aliens, they often use the words 'extra-terrestrial life'. This means anything living beyond the Earth. This kind of alien life does not need to be intelligent. It could be more like bacteria, plankton, or algae.

Do aliens exist?

The answer is... we don't know! Scientists have not found any evidence of alien life yet, but there is a chance that life exists somewhere other than on Earth. Scientists and space agencies like NASA are hunting for clues to help them find alien life. It will probably take a long time to find it because the Universe contains billions of planets and life might be rare.

What kind of clues do scientists expect to find?

Scientists look for clues called biosignatures. Biosignatures are signs of life. A biosignature is a substance or feature that lets us know something lives there. A biosignature must also be something that can't be made without the presence of life.

A biosignature could be a chemical element, like carbon or oxygen. It could be a molecule (a molecule is something that contains more than one element) like protein. Another type of biosignature could be minerals in rocks that formed in the presence of life. Or material from a living creature or a fossil.

Aliens

However, no single chemical, molecule, or feature can prove life exists. They must be present in certain amounts, locations or containing certain patterns. Only then would they indicate the presence of life. So, scientists must rule out every possible alternative first.

For example, long ago, the Earth's atmosphere didn't contain as much oxygen as it does today. Over time, plants breathing out oxygen have increased the amount in our atmosphere. So, it is the amount of oxygen in our atmosphere that shows life exists on Earth, not just the presence of oxygen.

Another kind of clue could be a techno-signature. This would be a signal from any technology used by intelligent aliens. The same way our television and radio waves escape into space, aliens might also be transmitting messages into space. Radio telescopes that look for techno-signatures look a lot like satellite dishes.

Where do scientists look for aliens?

Scientists look for life elsewhere in our Solar System; on the 7 other planets and their moons which orbit our Sun. They also look for life on exoplanets – these are planets which orbit a star that is not our Sun. We think that most stars have some exoplanets orbiting them.

Because the Universe is so big, and there are so many places to look for life, scientists try to narrow down their search. They do this by trying to work out what aliens might be like. Then think about the conditions the aliens would need to survive. Then they start their search in places that have those conditions. For example, if we think aliens need liquid water, then we should look for planets in space with liquid water. Scientists have already found planets around other stars that do have liquid water!

What might aliens be like?

It is not easy to work out what aliens might be like. This is because we only have life on Earth to compare our ideas to. It's hard to know which features of life we would find elsewhere, and which are special to Earth. Just because we have eyes and arms doesn't mean an alien would. Aliens might be completely different!

Aliens would probably be suited to their own planet. If it's very dark, they might have huge eyes to help them see. If it's very cold, they might be covered in thick hair. If the gravity on their planet is very strong, they might not be able to grow very tall.

What kind of conditions would aliens need to live?

This depends on what the aliens are like. If the aliens are like life on Earth they would need water, oxygen, food and shelter. Or they might be able to drink liquids other than water! And breathe in chemicals other than oxygen!

Why do scientists look for aliens?

Scientists look for alien life because they are curious. They want to know as much as possible about the Universe. But also, because the aliens might be able to help us, teach us things, or even become our friends.

Feedback

We welcome feedback from practitioners. If you want to let us know how much your children have enjoyed our activity or how we could improve it, please send us some feedback using the details below:

Share your alien creations with The Schools' Observatory!
Email SchoolsObs@ljamu.ac.uk or tag [@SchoolsObs](https://twitter.com/SchoolsObs) on social media.

How to introduce the topic of aliens

- Use the 'Look Up' story – ask the children what they think rare and exotic lifeforms are? Are there any in space?
- Ask children what they know about aliens.
- Put out any books you have featuring aliens.
- Stage an 'alien crash landing' in the nursery
 - Case study from Nursery World:
 - www.nurseryworld.co.uk/features/article/eyfs-activities-we-ve-explored-aliens
- Introduce a toy alien/teddy from another planet to the learning environment.

Activity 1 – Hunting for alien clues

What living things are there in your local area. Can children find any clues that living things have left behind?

- Look outside for evidence of life – this could be leaves, feathers, flowers, nuts, shells.
- Ask children to record what they see – encourage mark-making or drawing.
- Encourage use of tools like magnifying glasses or torches to carefully look at objects.
- Encourage children to describe what they find.
- Depending on the time of year you could do this as a mini-beast hunt and look for spiders, insects, and other invertebrates.
- If you can't get outdoors, put out a selection of objects in the nursery. Encourage children to sort them into natural and human made. Which objects give us clues that living things are around?

Activity 2 – Signals from aliens

Intelligent aliens may be able to send us signals from space. They might use radio waves (like our tv and radio). Encourage children to think about technology and how we use it to communicate.

- Can the children find any technology in the learning environment to send a signal to space? (e.g., walkie talkies, phones, something that uses electricity, something that can record sound)
- What might an alien TV channel look or sound like?
- Can they make something to detect an alien tv signal?
 - You can use images of real technology as inspiration! See pages 12 and 13



Activity 3 – Collecting alien evidence

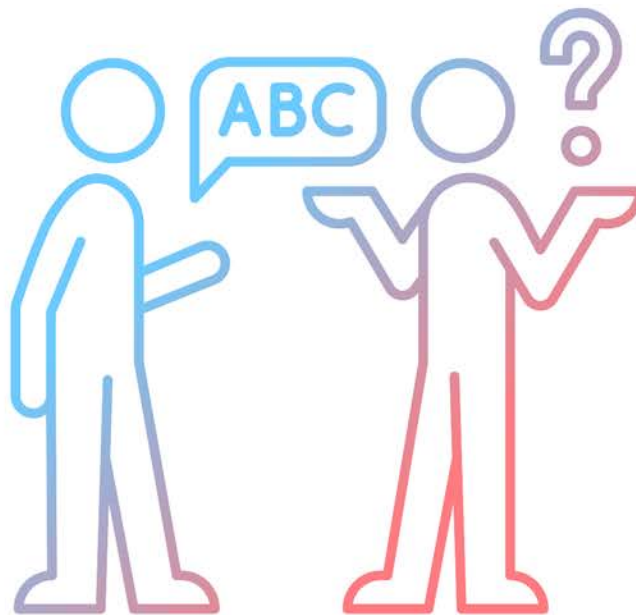
- In the sand area (or in a tray filled with sand), hide some “alien evidence”. This could include natural objects (stones), pieces of junk (packaging materials), craft materials (pipe cleaners), magnetic materials (fridge magnets).
- Provide different tools for children to discover evidence (trowels, magnets, spoons, tongs).
- Provide different containers for children to store their evidence.
- Encourage children to write down what they find – provide materials for mark making.
- Encourage one-to-one correspondence – e.g., 1 stone in the yellow cup; 1 piece of packaging material in the blue cup.
- Encourage counting – e.g., put 3 stones in the yellow cup; how many objects stick to the magnet.
- Encourage sorting – e.g., by colour, size, feel, if they stick to a magnet.
- Children could dress up and role play as scientists or space explorers.



Communication, Language, Emotions

If an alien landed on Earth, they probably would not know any Earth languages. They may be alone and feel very different from anyone else. Encourage children to think of ways of communicating without words and encourage them to empathise with how an alien might be feeling.

- Ask the children to leave a welcome message for an alien
- Maybe the alien 'writes back' in an alien language – what could it mean?
- How could children say hello to an alien?
- If an alien crash landed on Earth, how could children tell the alien where it was?
- Adult pretends to be an alien; they only know a few words/no words of English. Can children work out what they need or want?



Art & Design ideas

You can display pictures of exotic and strange living creatures from Earth and drawings of alien worlds as inspiration. See additional info on pages 12 and 13 for suggested image sources.

Encourage children to imagine what aliens from different planets and environments might look like. They could combine features from different living things on Earth.

- Draw an alien or alien planet
- Model an alien or alien planet using modelling clay
- Create an alien using junk materials
- Stick together cut up pieces from images of life of Earth to create an alien (e.g. selection of wings, legs, fur, scales, tails).
- Dress up as an alien

Ideas for different environments:

- A cold, dark planet
- A hot, dusty planet
- An underwater planet
- A planet made of clouds

Aliens: Additional Resources & Web Links

Word Bank

air	environment	looks like
alien	evidence	planet
astronaut	explore	scientist
clue	explorer	shelter
creature	feels like	signal
different to	find	strange
different	food	the same as
discover	habitat	water
Earth	life	world

Aliens: Additional Resources & Web Links

Alien Inspiration

The Natural History Museum website has a series called “What on Earth” showcasing pictures of weird and wonderful creatures on Earth. Visit the website, download some pictures, and display them in your classroom...

www.nhm.ac.uk/discover/what-on-earth.html

Scientists have discovered many exoplanets (planets that orbit a star other than the Sun). NASA has imagined what these alien worlds might be like in these interactive images designed by artists...

<https://exoplanets.nasa.gov/alien-worlds/strange-new-worlds/>

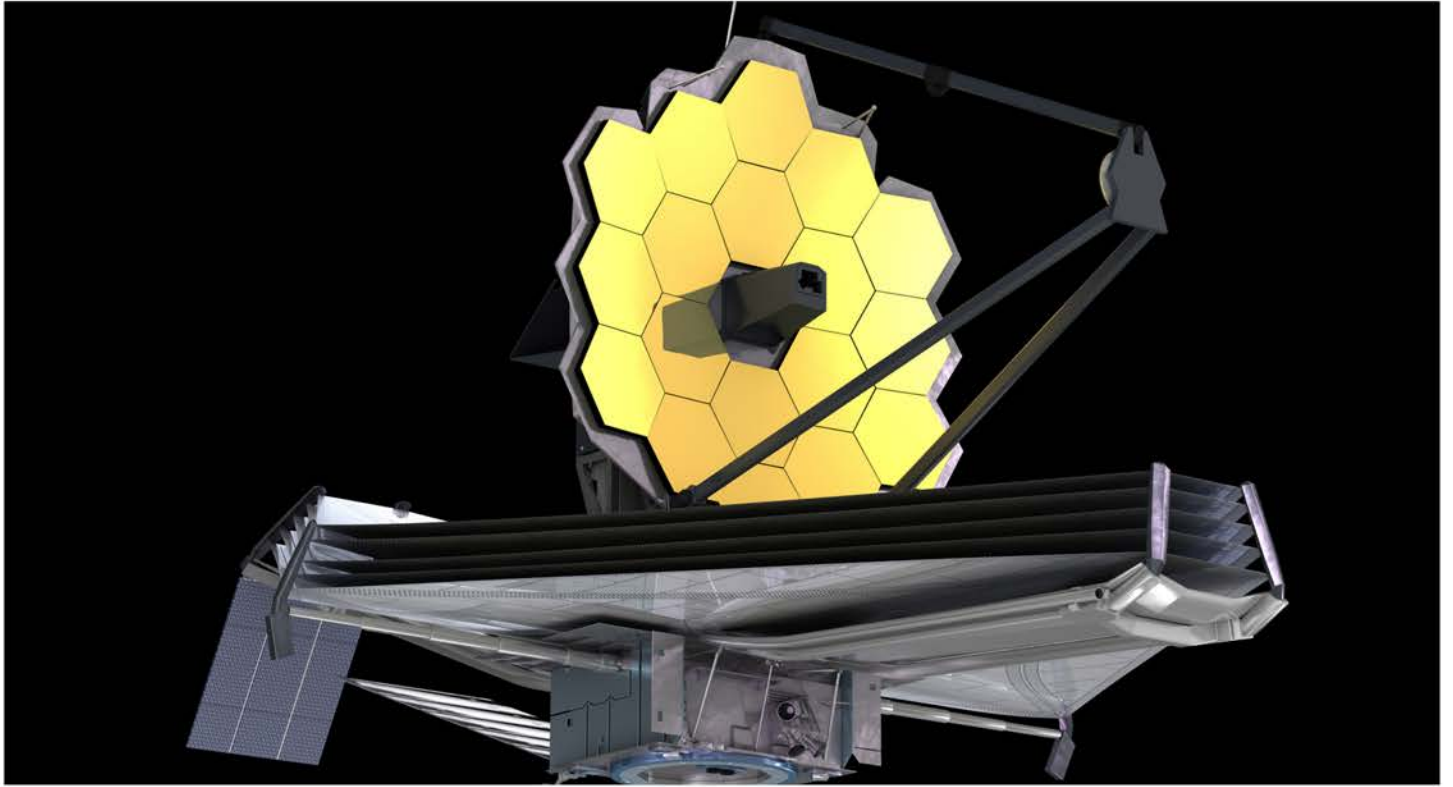
Using technology to hunt for aliens

Scientists and engineers have designed and built some out-of-this-world technology to hunt for aliens...



NASA's Mars perseverance rover is hunting for signs of life on Mars!

Aliens: Additional Resources & Web Links



The James Webb Space Telescope will look at the atmosphere's of exoplanets from space!



VLA outer space radio telescope array, Socorro, New Mexico