

YEAR 3 | LIVING THINGS



SPACE NOVA

TEACHING TOOLKIT



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ABOUT THE SERIES

It's the year 2162 and life is a blast for space adventuring siblings, Jet and Adelaide Nova. Along with their parents, Josie and Hugo, these intrepid Aussies spend their days chasing rogue planets, surfing solar flares and avoiding being eaten by every kind of plantimal – all in the name of science! But what the Nova family really want to do is to meet intelligent extra-terrestrial life – something humanity has yet to do. Then everything changes... During a routine mission, the Novas stumble across an abandoned alien craft, powered by a rainbow substance that's so powerful it sends the craft zipping away at speeds humanity never dreamed possible. Although the Novas are unable to capture the craft, they now know there's a super advanced, intelligent species out there – and they're going to follow the clues to find them!

USING THIS RESOURCE

This *Space Nova* Teaching Toolkit is a science education resource for Year 3 students, with clips from the animated children's series used as provocations for a rich science learning sequence on Living Things. The sequence addresses Science Understanding content descriptors in the Australian Curriculum.

Through curated *Space Nova* clips, tangible experiences and thought-provoking discussion starters, this learning sequence will give students opportunities to critically analyse their observations and challenge their pre-conceptions. This approach lends itself to differentiation, as all students bring varying prior knowledge and experiences to the classroom.

Additional *Space Nova* Teaching Toolkits address key science understandings in other primary year levels. These resources focus on Forces (Year 4), Science and Human Lives (Year 5), and Energy (Year 6). Find all teaching toolkits on the ACTF website.



LEARNING SEQUENCE: LIVING THINGS

Key Content Descriptor: Living things can be groups on the basis of observable features and can be distinguished from non-living things (ACSSU044)

SEQUENCE OUTLINE

	Learning Tasks	Additional Australian Curriculum Links
1	How do you know if something is alive?	ACSHE050
2	Criteria for living things – Metabolism	
3	Finding energy sources	ACSHE050, ACSIS215, ACSIS060
4	Criteria for living things – Growth	ACSHE050, ACSIS215, ACSIS060
5	Criteria for living things – Reproduction	ACSHE050
6	Criteria for living things – Respond to Stimuli	
7	Criteria For living things – Adaptation	
8	Plant or animal?	
9	How do we classify living things?	ACSHE050
10	Life on other planets	

LEARNING SEQUENCE: LIVING THINGS

LEARNING TASK 1: HOW DO YOU KNOW IF SOMETHING IS ALIVE?

Clip: Episode 1, 5:10 - 5:50

In this clip, the Novas find a strange phenomenon and Jet asks the question, 'Is it alive?' This is actually a really big question.

After watching the clip, ask students to collect objects from the classroom and schoolyard on a scavenger hunt then classify them as either living or non-living. After sorting, come together as a class and have students share their thinking. Ask students to articulate how they decided which group to put the items in. As they share, compile two lists with examples of living and non-living things.

As a class, discuss the following questions:

- How do you know if something is alive?
- What do living things do / need?
- What makes living things different from non-living things?

By highlighting examples from the sort – or by showing additional examples, physically or in images – discuss whether students agree on the classification of living and non-living things. Ask students to try to articulate why they fit into that category. Some good examples for challenging common misconceptions are listed below, along with factors that may inform these misconceptions:

- Plant (doesn't move notably)
- Insect (unlike other land animals)
- Person (an animal)
- Rock (found in nature)
- Sun (moves, is essential to life)
- Fish (doesn't breathe air)
- Worm (has no legs)
- Balloon (moves, takes in air)
- Moon (has a 'face', moves)
- Fire (moves, consumes wood, requires air)
- Hibernating bear (doesn't move)
- Deciduous tree in winter (no leaves, looks dead)
- Computer (moving lights and sounds)

- Vegetable / fruit (once picked, this is debated even among scientists)
- Dry yeast (seems like sand)
- Clouds (move and grow)
- Mushroom (strange-looking and unmoving)
- Mould (different form and doesn't move)
- Wind (moves and makes sound)
- Moss (unmoving)
- Fallen branch or leaf (was once alive)
- Feather (was grown by a living thing)
- Egg (doesn't move)
- Chrysalis (doesn't move)

Ask students to write a definition for living things independently, then share these with the wider class. Students could then look up various definitions for life as a class (there are three included in the Glossary) and unpack what these mean. Do the definitions all say the same thing? Do they align with the definitions students wrote? Try applying these definitions to the list of living and non-living things you created earlier.

LEARNING TASK 2: CRITERIA FOR LIVING THINGS – METABOLISM

Clip: Episode 7, 16:05 - 17:20

One of the criteria for life is that living things take in energy or nutrients and use that energy to function. In short, they eat. In the above clip, Jet realises that plantimals supply nutrients to plants in the form of manure, and that plants supply nutrients to the plantimals by trapping life forms for them to eat. While the plantimals get their energy from eating, the plants get their energy from the sunlight – but they also need nutrients.

Watch the clip then use the picture cards provided in Additional Resources to match the living things with their source of energy. (Answers are also provided.)

Clip: Episode 16, 21:20 - 22:05

In this clip, the Novas discuss the alien creatures they recently discovered. Josie reflects: 'It's good reminder that humans

aren't always the top of the food chain.' Ask students what a food chain is and discuss their understandings. Explain that a food chain is like a map of energy moving between living things, such as the sunlight that plants collect, or dingos that eat small mammals. Food chains are maps of what eats what.

Ask students to construct a food chain starting with the sun and ending with a large animal of their choice. Start by choosing a large animal and finding out what it eats. Then find out what that animal eats and what that animal eats until you reach a plant. Plants get their energy from the sun. Draw a picture of each animal in the food chain and connect these with arrows pointing from each energy source to the animal that eats it.

LEARNING TASK 3: FINDING ENERGY SOURCES

Clip: Episode 18, 9:30 - 10:40

In this clip, the hamsters have trouble finding food on their planet, so they travel throughout space to source food for their family. Getting food is one of the most important jobs for all animals.

Ask students how long they can you go without eating before they get hungry. What happens when they are hungry? Where do they get food when they need it? Demonstrate the following experiment for the class. (See instructional video link in Additional Resources for further explanation.)

Experiment: Hungry Yeast

You will need:

- Four empty, large, clean plastic bottles (label them 0, 1, 2, and 3)
- Four packets of dry yeast

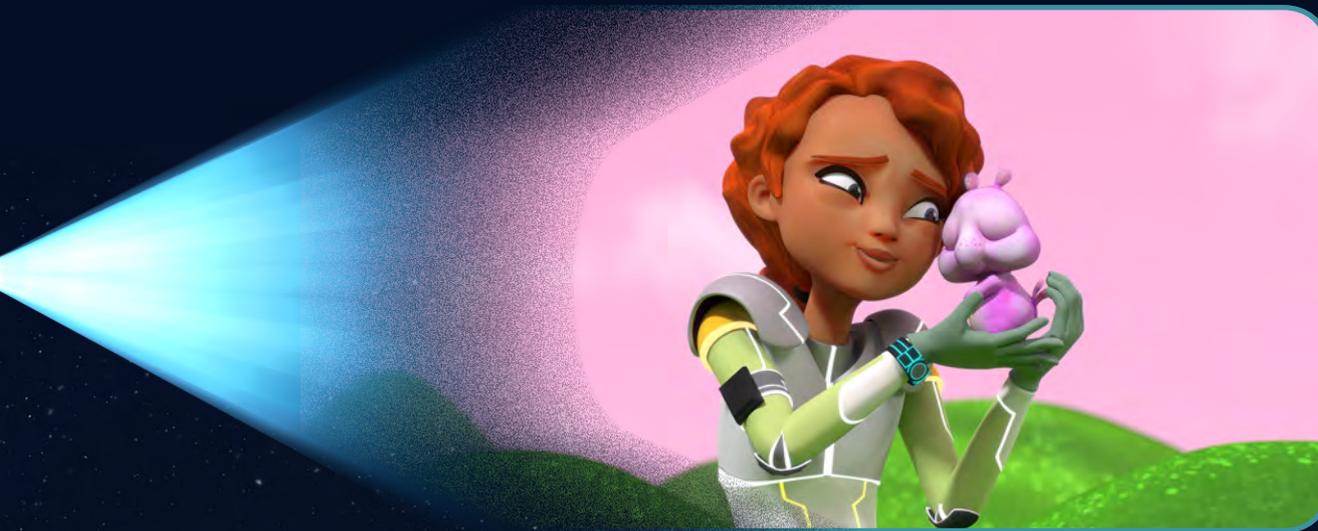
- Sugar
- Warm water

Instructions:

1. Prepare and label your bottles.
2. Prepare a litre of water that is 40 degrees Celsius.
3. Pour a cup of warm water into each bottle.
4. Add a packet of yeast to each bottle.
5. Add a different quantity of sugar to each bottle. Do not put any sugar into the bottle labelled #0. Put one teaspoon of sugar into bottle #1, two teaspoons of sugar into bottle #2, and three teaspoons of sugar into bottle #3.
6. Put the lids on the bottles and shake them well. Then remove the lids and stretch a balloon over the mouth of each bottle.
7. Predict what will happen.
8. Draw the bottles when the balloons first go on, after one hour, after two hours and after three hours. Take notes as to what you observe by annotating your diagrams.
9. Explain what happened and why.

Explain to the class that yeast is a tiny, living (single celled) fungus that eats sugar and breathes out carbon dioxide, just like humans. The yeast cells in dry yeast are alive but dormant (inactive, like a very deep sleep). They become active again when they are mixed with warm water. The more food (sugar) that is available, the more the yeast can consume, grow and reproduce. More yeast leads to more breathing, meaning that more carbon dioxide is released, which fills the balloons and makes them larger.





LEARNING TASK 4: CRITERIA FOR LIVING THINGS – GROWTH

Clip: Episode 8, 6:10 - 7:05

The ability to grow is another criterion that defines living things. As living things take in food and energy from their environment, they use this to grow and to do things. In the above clip, Jet's fertiliser makes the vine grow quickly because it now has the energy and materials it needs to do so.

In a class discussion, ask students what humans need in order to grow, and what plants need to grow. Clarify or confirm that in order to grow, plants need water and sunlight.

Experiment: Germinating Snap Peas

You will need:

- A few empty, clean and clear containers like glasses or jars
- Paper towel
- Snap pea seeds
- Water
- Masking tape for labels

Instructions:

1. Roll up cylinders of paper towel and insert one into each of your containers. Roll cylinders wide enough that the paper is up close against the sides.
2. Scrunch some more paper towel and squeeze it into the middle of the cylinder in the container.
3. Carefully add water to half of the jars – enough to soak the paper, but not so much that it leaves any water collecting at the bottom.

4. Plant some snap peas by sliding the seed about halfway down between the wall of the container and the paper towel.
5. Label the container with masking tape. Write the type of plant and the date it was planted.
6. Predict what you think will happen.
7. Watch for at least two weeks, adding water whenever the paper towels appear dry. You will be able to watch the seeds grow shoots and roots.
8. Write down or draw your observations daily or every second day.
9. Explain what happened and why.

You should see that the peas with water have sprouted, but the dry seeds haven't. This demonstrates that plants need water to be able to grow. You can take your seeds and plant them in soil so that they continue to grow and will yield peas you can eat.

LEARNING TASK 5: CRITERIA FOR LIVING THINGS – REPRODUCTION

Another criterion for life is the ability to reproduce. As a class, discuss what the term reproduction means. What are some of the ways that living things reproduce? They can lay eggs, like birds and most reptiles. Or they might just divide into two, like strawberry plants and some starfish. Do they create seeds, like flowering plants? Can their babies walk as soon as they're born, like horses and cows?

Clip: Episode 7, 5:55 - 6:18

Watch the above clip, in which Josie finds an alien plant without pollen and asks, 'Without pollen, how do they reproduce?'

As a class discuss what pollen is. Where on a plant is it found? What is it for? What has it got to do with reproduction? Can you think of any plants without pollen?

Explain that pollen is produced by flowering plants. It is half of the material plants need for reproduction. When pollen meets the stigma – a part of the flower – the plant can then form a seed. The seed is sometimes found inside a fruit and can grow into a whole other plant. Some plants rely on pollinators to transfer the pollen to the stigma. This can be done by insects like bees or even mammals like bats! For a hands-on task, have students open up some fruit and look for the seeds.

Clip: Episode 18, 8:10 - 9:00

In the above clip, we see that Pickles has a family of 'little baby Picklettes', as Jet calls them. Explain to students that animals also reproduce; this is how they pass on their traits to their offspring. Some offspring look like the adults, but some do not. Some animals have many offspring, others have one at a time. Some adults care for their offspring, others are left to survive on their own.

As a class, brainstorm and create two lists: animals that lay eggs and animals that give birth to live young. Then ask students which animals have one offspring at a time, and which have many at once.

Individually or as a class, match the animal to the name of its baby form:

- | | |
|-------------|---------------|
| • Dingo | • Joey |
| • Emu | • Kitten |
| • Cat | • Puggle |
| • Kangaroo | • Joey |
| • Crocodile | • Caterpillar |
| • Chicken | • Pup |
| • Echidna | • Chick |
| • Butterfly | • Puggle |
| • Koala | • Tadpole |
| • Dog | • Chick |
| • Wombat | • Hatchling |
| • Platypus | • Joey |
| • Frog | • Puppy |

Ask students to add drawings of the animals and babies. Draw their attention to which young look like the adults and which are vastly different. For example, tadpoles and caterpillars go through substantial changes before they become adults.

Adult animals often care for their young just like adult humans do. As a class, you could then discuss the ways that various adult animals care for their young.

LEARNING TASK 6: CRITERIA FOR LIVING THINGS – RESPOND TO STIMULI

The ability to respond to stimuli is a criterion for life. This means that when a living thing detects something, it can react by changing its behaviour.

Clip: Episode 10, 0:50 - 1:50

The above clip shows a plant responding to touch: it feels something, and that stimulus makes it move. In reality, plants really can respond to touch. We can see this growth response in the way that climbing plants wrap around poles and fences.

You may like to grow some climbing plants in the classroom so students can watch this growth response to touch in real time. You could also demonstrate how plants grow towards the light by positioning a plant near a window and watching it grow slightly sideways.

Clip: Episode 5, 14:25 - 16:10

In this clip, Jet discovers that the seaweed communicates through movements. This means when it detects movement, it interprets the message and moves in response. It is responding to the stimuli of movement. Many, but not all, living things communicate.

As a class, discuss some of the ways that living things communicate. What do they need to communicate? What messages do they send? For example, they may be telling another species where tasty fruits are, warning members of the same species that danger is close or threatening other species. You can learn more about animal and plant communication via the links in Additional Resources.

LEARNING TASK 7: CRITERIA FOR LIVING THINGS – ADAPTATION

Another criterion for life is the ability to adapt. Adaptations are changes in animals that happen very slowly over generations. They happen because individuals with certain traits are more likely to survive and reproduce, thus passing on their traits. The traits that aid survival depend on the environment that the individual lives in.

Watch the following short clips:

- Episode 6, 1:28 - 2:00 (Jet's explodopods)
- Episode 8, 6:10 - 7:00 (Jet's lock-picking vine)
- Episode 10, 0:50 - 1:20 (Jet's cuddle plant)

In these clips, we see the plants that Jet has been able to grow are all quite different. Adaptations lead to wide variation among living things. This is called biodiversity. Jet has artificially created a diverse range of plants, but this happens naturally too.

Clip: Episode 15, 19:55 - 21:05

In the above clip, we see the bugs take on a new form after experiencing extreme heat. They've been able to metamorphosise into butterflies, progressing through their life cycle.

Ask the class how plants grow back after bushfires in Australia. Explain that eucalyptus and banksia plants have cones or fruits that are sealed with resin. These can only open to release their seeds after the heat of a fire has melted the resin. These plants have adapted to rely on the fires that occur in their environments. Bushfires also put nutrients into the soil, which helps new plants to grow. But if a fire is very severe, it can cause too much damage and harm plants and animals. Fires also makes the area more vulnerable to invasive species like weeds.

Investigate and discuss actions that First Nations peoples have taken to ensure that plants which need fire can access this, while ensuring that fires don't become too destructive. There is a useful video on this topic in Additional Resources.

Clip: Episode 21, 10:10 - 10:50

In this clip, Adelaide is surprised that dinosaurs have evolved on another planet. Josie explains that this makes sense as the planet has similar conditions to Earth.

Sometimes different living things can evolve to be alike; they have similar adaptations. This happens because similar environmental conditions mean similar traits are beneficial and thus 'selected' as those traits will improve the likelihood of survival and reproduction.

Because traits that help living things survive are those that are passed on, living things develop ways to stay safe and defend themselves from threats. These adaptations persist because they mean the organism is more likely to survive and reproduce and pass on its traits to its young.

Clip: Episode 7, 2:22 - 3:00

In the above clip, Jet's cactus has spines that prevent animals from eating it – and sisters from sitting on it. Ask students to brainstorm other ways that living things protect themselves. This could include poison, shells, burrows, camouflage, night vision or armour.

Clip: Episode 14, 19:40 - 20:50

In this clip, we see the Novas make themselves smell like plants in order to prevent the plants from attacking them. As a form of camouflage, they make the threat (in this case, dangerous plants) think they are something else. Often, living things use camouflage to evade predators by blending into the background so they can't be seen. It can also be used to surprise prey. See Additional Resources for some examples of animal camouflage.

LEARNING TASK 8: PLANT OR ANIMAL?

Adaptations lead to biodiversity, and there is an immense variety of living things. To help scientists study, talk about and name organisms, living things are sorted into groups.

Clip: Episode 7, 12:50 - 14:35

In this clip, Jet and Adelaide encounter a surprising creature. Adelaide questions whether it is a plant or animal, to which Jet replies, 'Looks like a bit of both: a plantimal!'

As a class discuss whether a living thing can really be part plant and part animal? What is a plant? What is an animal? Explain that many people think living things are either a plant or an animal. They would say plants live using sunlight, carbon dioxide, and nutrients to make their own food by photosynthesis and they don't move much, and that animals eat plants or other animals and can move.

Most living things that people come across are a plant or animal, but there are many organisms that can be plant-like and animal-like at the same time. Some of these organisms photosynthesize and eat. One example is the Venus flytrap, which captures insects on its special leaves and digests them. It is classified as a plant, even though it eats like an animal (see Additional Resources).

Some other surprising living things include:

- Sea anemones: they look like plants but they are actually animal
- Giant kelp: these aren't a plant or an animal

Clip: Episode 1, 4:30 - 4:50

In this clip, we see Jet's alien life categories. His chart colour codes the different living things the Novas might come across, from simple multicell organisms to complex life like humans.

Some living things are not a plant or an animal. We currently classify living things into five main groups, called kingdoms, and within each kingdom are many smaller groups. Those groups are further divided until you get to a single species. Living things are placed into certain groups based on how they obtain their food, the types of cells that make up their body, where they live and the way they reproduce.

LEARNING TASK 9: HOW DO WE CLASSIFY LIVING THINGS?

Explain to the class that when people find an animal, they can identify it based on its features. If it has never been found before, then we find classify it using the features it has in common with known animals. For example, all animals that give birth to live young are in a group together, because that is a feature of their lives.

Returning to the scavenger hunt list you created in Learning Task 1, ask students to put all the living things into separate groups. Can they think of other ways to further classify living things?

Provide groups of students with these descriptions of animals. Ask them to identify whether these describe a fish, amphibian, reptile, bird or mammal.

- I lay eggs underwater. I can breathe underwater. I have scales.
- I give birth to live young. I am warm blooded. I can breathe air.
- I lay eggs on land. I am cold blooded. I can breathe air. I have dry, scaly skin.
- I lay eggs underwater. I can live in water and on land.
- I lay eggs on land. I can breathe air. I am warm blooded. I have feathers.

Ask students to choose two living things that seem quite different. Ask them to find similarities between the living things, as well as noting the differences. A Venn diagram may be helpful to arrange this



information.

LEARNING TASK 10: LIFE ON OTHER PLANETS

Clip: Episode 21, 1:50 - 3:10

In the above clip, the Novas find a planet that looks 'promising', meaning they are hopeful they will find life there. As a class, discuss whether life exists on other planets. Where are we humans currently looking for life in space? Who is looking? How would we know if we found life on another planet?

Clip: Episode 21, 3:45 - 6:20

In this clip, we learn that the Novas are excited about finding a planet that is similar to Earth. This is because we know that Earth has life, so other planets like Earth might have life too. Ask students to choose a planet from our solar system to compare to Earth. List the similarities and differences or complete a Venn diagram. Which planet seems the most similar? Could we find living things there?

Clip: Episode 7, 4:45 - 5:35

In this clip, the ship Eureka detects 'signs of life' on a planet. That means that it has found something that indicates living things might be on this planet.

In a class discussion, ask students which evidence might indicate the presence of living things on another planet? What are 'signs of life'? For example, we could see animals or plants on the surface, or we may detect movement, or find unnatural structures, patterns / prints in the ground, fossils, skeletons, fur or feathers. We might also detect certain chemicals like water, communication signals or sources of light.

As a class, head outside and try to find some animal prints, eggs, bones, feathers or a nest that will tell you that animals are around, even if you don't find the animals themselves. You could also go searching for a fossil.

Clip: Episode 16, 21:25 - 22:00

After discovering some unusual aliens, Josie reflects that: '...Intelligent life might not appear in a form we expect it to.' The Novas encounter many varied alien life forms throughout the series. Images in the right column show some examples.



As a class, discuss what life on other planets would most likely look like. Have students draw a picture of life on another planet, encouraging them to incorporate adaptations that allow this living thing to survive in its environment. As a reflection, ask students to explain their thinking, including their understanding of why this living thing would thrive on its home planet.



EPISODE SYNOPSSES



EPISODE 1 **STAR DUST**

The Novas, a family of maverick space explorers, make an interstellar discovery that could change the course of history. Armed with knowledge that they have come across an alien space craft powered by a rainbow substance they have never seen before, they set out to find where the space craft and its ethereal substance – Star Dust – has come from.



EPISODE 2 **OVER BEING A NOVA**

Bored with searching rocks for evidence of their recent findings, Adelaide accepts Sol's challenge to a 'space-off' in the asteroid belt. But when Sol gets into trouble, Adelaide and Jet perform a heroic rescue and rediscover what being a Nova is all about.



EPISODE 3 **BLACK HAMSTER**

When Jet creates a nutrient-dense super pickle, it attracts a space hamster that Jet calls 'Pickles'. Pickles' survival instinct allows it to turn into a small black hole, throwing Luna Port into chaos. Will Jet be able to keep his new friend – or will he have to free him for the good of Luna Port?



EPISODE 4 **ESCAPE FROM TR-227**

While travelling to complete a supply drop off at a research facility, the Novas crash land on the planet. They are confronted by a deadly gravity storm that threatens not only their lives – and the lives of the researchers they find there – but also their life-saving work!



EPISODE 5

SEAWEED SAMBA

When the Nova's mission to what they believe is a Star Dust Planet goes horribly awry, they find themselves held underwater by a sentient seaweed plant. Meanwhile Aubrina, determined to learn what the Novas are up to, sends son Sol to find out – undercover.



EPISODE 6

STEEL COMET

When a large comet appears on a collision course with Luna Port, the Novas take a huge risk to divert it. They realise it's no comet at all, but a frozen-over spaceship presumed lost for over 100 years!



EPISODE 7

FRIENDS IN DARK PLACES

When the Novas investigate a system based on data they obtained from the 'Eagle' (the frozen spaceship from 'Steel Comet'), they find a planet that appears uninhabited – until they fall through quicksand to the caverns beneath! Meanwhile, Aubrina continues to keep a close eye on the Novas – often popping up on comms at the most inconvenient times!



EPISODE 8

INVISIBLE SIBLINGS

When G9 malfunctions at the Luna Port centennial celebrations, Aubrina takes him into custody and seeks to reprogram G9. Jet and Adelaide go on a mission to save their favourite robot, stumbling across a library of hidden alien artefacts inside a locked room owned by Aubrina – including a mysterious alien tech cube!



EPISODE 9 **STEAM SHIP**

When the Novas are forced to land on a junk planet for repairs, they come face to face with Old Phil and his dog Calisto. Phil claims to enjoy solitude and quiet, but he may know more than he is letting on – especially after he takes the Novas' cube!



EPISODE 10 **GRAFTER**

Sol's attempt to win at the science fair by sabotaging all of the other projects goes drastically wrong when the Nova's project – a giant half plant half animal – kidnaps him. Even stranger, on analysis it seems Sol was responsible for the creature's sudden transformation – and this transformation was caused by alien DNA!



EPISODE 11 **GHOST STATION**

It's Josie's favourite holiday, Halloween, and to celebrate she surprises her sceptical family by booking a 'ghost tour' of a spooky space station. When they receive a distress call from the station and land there, even the most sceptical Novas start to believe!



EPISODE 12 **THE JUMP**

After the Novas help expose Aubrina for her wrongdoing and have the Star Dust Crystal returned, they're ready to make their first Star Dust 'jump' and explore parts of space that humanity has never seen before. Aubrina, meanwhile, isn't going down without a fight, and enlists a shadowy figure to stop the Novas at all costs!



EPISODE 13

FINALLY AN ALIEN

With the Novas now able to jump millions of lightyears in minutes, their quest to find Star Dust Aliens kicks into high gear. But after Sol demonstrates unexplained super strength in a Grav Ball game, Jet and Adelaide realise that their search for aliens might take them closer to home.



EPISODE 14

THE GOLDBLOCKS ZONE

Having learned where the Tychon was being taken on the day Sol was discovered on as a baby, the Novas take Sol on a mission to a planet inhabited entirely by mega-flora – then Sol goes missing.



EPISODE 15

ROGUE PLANET

When the Novas research drones send them an image of what looks like a Star Dust Ship, the Novas and Sol go to investigate. In the process, however, they become trapped on a tiny rogue planet full of adorable insects – and the planet is heading directly towards the system's sun! Meanwhile, Aubrina has plans of her own – to get her own Star Dust Crystal and gain the power of 'jumping' for herself.



EPISODE 16

THE PUZZLE

The Novas investigate a planet millions of lightyears from known space that appears to have pyramid-like temples that may have been created by intelligent beings. Soon, however, they find the pyramids ARE the intelligent beings – and these aliens aren't the type looking for a friendly chat!



EPISODE 17

A BLACK HOLE ATE MY HOMEWORK

When Jet and Adelaide realize they have too much work and reading to get through in one night, they devise a plan to slow time by taking Adelaide's flyer to the very edge of a black hole in order to slow down time.



EPISODE 18

WHITE HAMSTER

After detecting human technology in a far-flung region of the universe previously inaccessible to humans, the Novas excitedly head out to examine it – only to find that it is the escape pod that Jet used to evacuate his space hamster, Pickles. When they finally catch up with Pickles, however, he – and his family - need their help more than ever.



EPISODE 19

PAMELA BARNACLE

With Luna Port's security system malfunctioning (and no longer responding to orders), the Novas journey to visit the ex-president of Luna Port, Pamela Barnacle, the system's creator. When they arrive, however, they find Pamela is even more under the same system's control – and soon, so are the Novas!



EPISODE 20

SHORE LEAVE

After a series of dead ends in their search for Star Dust, the Novas spot a planet that looks like paradise itself and decide to visit it for some much-needed R&R. Soon, however, their dream getaway turns out to be just that – and one that they're unable to wake up from!



EPISODE 21

ALIENOSAURS

The Novas head to an Earth-like planet, hoping to find the Star Dust aliens. Instead, they find highly evolved and aggressive alien dinosaurs, and they find out what it's like when humans are at the bottom of the food chain!



EPISODE 22

COLLISION COURSE

Jet, Adelaide, Sol (and a visiting Marcie Yang) are thrown together to represent Luna Port in a Grav Ball game for visiting delegates – they just aren't the best team. Then, in the middle of the game, Luna Port faces a catastrophic shut-down and blackout. Now this not-so-awesome foursome really must learn to work together – and the stakes couldn't be higher. Meanwhile, Aubrina goes in search of plans for the Star Dust cube to create her own!



EPISODE 23

YOWIE!

While on the lookout for intelligent life on the other side of the universe, one of the Novas' drones delivers footage that will make them question everything they know about Aliens – blurry video of what appears to be a real live bigfoot!



EPISODE 24

SWEET DREAMS

After Sol starts to have vivid dreams about his home world, the Novas enlist the help of the 'energy creature' from Shore Leave to help uncover the details of this planet. Things take a turn, however, when Sol's brain refuses to release him from the dream state – and not even the powerful energy creature can stop him!



EPISODE 25 **DARK ICE**

Following Sol's vision, the Novas journey to a what they believe is Sol's home planet – only to discover that it is completely frozen over. On closer inspection, they realise the planet may hold the answers to all of their questions - and they must journey below the ice...



EPISODE 26 **STAR DUST ALIENS**

The Novas finally locate another Star Dust alien rock ship and set off to finally make first contact. When they arrive, however, the ship's engines explode. They uncover Sol as a stowaway and find out that Andy, who accompanied them, is a robot in disguise – all part of Aubrina's plan to stop the Novas in their tracks and make first contact with the aliens herself. Will the Novas lose their chance to make real contact with the Star Dust aliens forever?



THE MAKING OF SPACE NOVA BY SLR PRODUCTIONS

The science fiction genre presents a great opportunity to wonder 'What if?' in an imagined futuristic world with human dynamics we can all relate to. At the core, the Novas are like most families: full of love and support, with the occasional sibling rivalry, shenanigans and plenty of dad jokes. But what if this is an intrepid family of intergalactic explorers in search of alien life in the year 2162? Now we're talking! We jumped at the opportunity of creating a unique, exciting show.

Animation lends itself to boundless imagination and creativity since every frame has to be created from scratch – literally. The stories were crafted around classic science fiction tropes in a world full of exciting possibilities. *Space Nova* allowed us to push the limits of imagination in every aspect of life in space: family and home, friendship and play, school and work. And when work involves discovering Star Dust, a powerful rainbow substance powering a rock ship, launching an epic alien quest across the universe, more than just a job, this becomes the adventure of a lifetime.

The *Space Nova* world was created with a base in science and a healthy dose of imagination. Extensive research was carried out on space exploration and the latest technological advancements. Their home, the Luna Port international space station, is based on structures that are capable of generating artificial gravity with an added touch of wow factor which makes it inviting and special. The characters wear high-tech, insulating suits with glowing LED lights and self-propulsion based on future trends of comfort and functionality. We took the possibilities of 3D printing into creating nutritious, delicious food. The Grav Ball game was born out of the combination of zero gravity and team sports such as basketball.

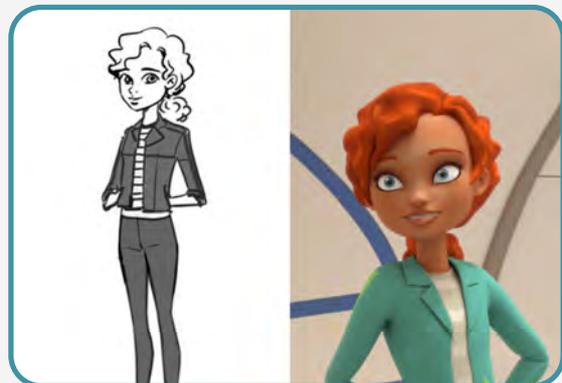
Space Nova presents a hopeful, aspirational take on the future which informed the look of the show in every aspect. Their world is bright, colourful and friendly. Organic shapes like curves and swirls dominate the design as opposed to straight lines and harsh angles. Surfaces are smooth and warm instead of sleek and cold. And since the Novas are a family of Australian astronauts, an Aussie flavour is interspersed in their palette with greens and golds. Their spaceships also have echoes of Australian fauna (the cicada and sugar glider) which was also carried through to the sound design. G9, the lovable family bot, resembles an adorable marsupial.

Space phenomena in itself is spectacular proving that nature is indeed the best inspiration. Planets, celestial butterflies, comets, black holes, supernovas, nebulas and galaxies, all presented incredible story and visual opportunities where we had to look no further than the latest findings on space exploration. Serendipity came knocking when NASA released the first ever image of a black hole just as we were in the middle of production. Needless to say, we gladly took visual cues in our design from this historic moment.

From the outset, the Novas discover the first ever proof that humanity is not alone in the universe setting in motion a thrilling saga across the cosmos. Along the way, we visit planets with different alien life forms where we let our imagination run wild along with interesting scientific ideas. To name a few: hamster-like aliens capable of creating black holes; a cross between a plant and an animal resulting in plantimals; sentient, bioluminescent seaweed with their own unique visual language; bismuth formations come to life, while dinosaurs evolve on another planet! Once again, nature provided the source material and we just had to add inventiveness and have fun with it.

Space Nova was produced with the latest CGI technology, a medium which perfectly suited the epic scale of the show as well as the subtle emotional needs of character animation. A very successful blend of artistic and technical skills; every design and storyboard was initially crafted by hand and then fully realized through computer animation to reach our screens (something that was considered science fiction not that long ago!). The result is a rich, vibrant world that draws us in, we can feel it and almost touch it.

We had the ride of our lives making *Space Nova* and hope the show will be enjoyed by all for years to come. The universe keeps surprising us in this new frontier for exploration and we can't wait to find out what's in store in the future. Reach for the stars!



CHARACTER BIOGRAPHIES



ADELAIDE NOVA

13-year-old Adelaide Nova is a keen adventurer and scientist with a special passion for technology, robotics, and flying spacecraft. In fact, as excited as she is at the prospect of encountering intelligent extra-terrestrial life, an equal priority on her list is finally earning her large ship pilot's license!

When she's not taking lessons, Adelaide can usually be found in her lab or the cargo bay tinkering with her latest invention. Whether it's creating camouflaging meta-fabric to turn into 'invisibility suits', creating nano-technology that can repair an entire eco-system, or simply upgrading her VR gear, Adelaide always has a technological hack up her sleeve.

Due to her affinity with tech, it's also no wonder Adelaide is especially close to the family robot, G9, and always giving him special upgrades (with varying levels of success!).



JET NOVA

The youngest of the intrepid Nova family, 12-year-old Jet has a passion for space exploration, Grav Ball, astrobiology and – most importantly – aliens!

Whether at home or in his lab on the family's starship, Jet is surrounded by all manner of plants, both from Earth and beyond. He especially likes doing experiments with his specimens. Whether it's creating a super sticky plant-based glue, or a flower designed to explode on impact, the rest of the Nova family often find themselves test subjects for Jet's latest biological masterpiece!

Jet has even created a specially designed chart, which he uses to track the various 'levels' of lifeforms he and the Nova family encounter on their missions. He just hopes that, now the Novas are on the trail of the first confirmed alien spaceship sighting, he can finally fill the chart all the way to the top!



JOSIE NOVA

Josie Nova is both an intrepid astrobiologist and an ecologist. Mother of Adelaide and Jet Nova, she has a lot to teach her kids about seeking out adventure! Tempering her passion for adventure is her love of nature. Josie is an expert on all things in the natural world. In other words, she doesn't mind getting her hands dirty when it comes to the search for extra-terrestrial life!

A respected scientist on Luna Port – especially when it comes to space exploration – Josie is also well known for her 'can do' attitude. And this attitude certainly comes in handy when dealing with bureaucrats like the Luna Port President, Aubrina Eridani, who seems determined to restrict the Novas' 'frivolous' scientific missions. Between Josie and Hugo, Josie is the risk taker and has a 'devil-may-care' attitude when raising her children. As long as they are good and have fun – she doesn't mind too much what they do.



HUGO NOVA

Like the rest of his family, Dr. Hugo Nova has a passion for unlocking the secrets of the universe. One of the best astro-geologists (and pilots) on Luna Port, Hugo spends most of his time collecting, examining and thinking about rocks – after all, they're core building blocks of the universe. Just don't try to tell him geology is boring: in his own words, 'rocks rock!'

Still, Hugo is more than just a scientist. Hugo is also a great chef (he even uses old-fashioned 20th century implements), a student of history and a great dad. Compared with wife, Josie, Hugo is also the more over-protective parent. If anyone is going to be a little conflicted when it comes to taking Jet and Josie on their away missions, it's Hugo. Still, space will always be an unpredictable place, and the kids wouldn't have it any other way!



G9

The family's 'pet' robot, G9 is the 5th member of the family. With databanks full of useful info, G9 is a real asset to the Novas' missions. He's also a favourite of Adelaide, who is constantly working on new 'upgrades' for the robot, improving his intelligence, pumping up his strength, or even teaching him to play the ukulele at parties!

If there's one thing Adelaide can't 'fix' about G9, it's that he can be a terrible worry wart, and will often be the first to hide when danger rears its head – and thanks to the Novas' missions, danger is never far. After all, he may be nuts and bolts, but G9 still fears the 'big reset'. Still, when his 'humans' are really threatened, G9 can find extreme courage deep within his circuits. He's quite attached to the Novas – they're not bad for a bunch of irrational humans!



SOL ERADANI

Found by Aubrina as a baby on an abandoned exploration ship, Sol has grown up the spoiled child of the most powerful person on Luna Port – it's really gone to his head! Aubrina is such a workaholic, he still often feels that he comes second behind her job and is always keen to earn her attention and love. From everyone else on the station he not only expects but demands respect – and most give it to him.

In fact, the only kids who don't seem to respect this 'power' are Jet and Adelaide Nova, who think he's a bully and a joke. Jet and Adelaide never have to fight for their parents' attention, and this annoys Sol. He takes every opportunity to take the Nova kids down a peg and show them who's the true 'top dog' on the port. As such, Sol easily latches onto the Nova family's eccentric reputation to ridicule them.



AUBRINA ERADANI

Aubrina Eradani was once a young explorer out to make a name for herself. Then, just over 13 years ago, she discovered a baby on an abandoned space cruiser – and an unidentified craft shooting out streams of a strange rainbow substance and disappearing at an incredible speed! Aubrina raised Sol as her own and waited for Star Dust to appear again.

She became Luna Port's president after clawing her way to the top. It's from this position that Aubrina wields the control and power she thinks she deserves. Still, the Novas refuse to toe the line. When she suspects this same family may have sighted HER discovery, she's determined to take the spoils for herself – at any cost! If she's going to take what's hers and discredit the Novas, she's going to have to do it quietly and carefully!



JANALI BANKS

Like the Novas, Janali works for the Australian Space Association and is Head of the E.M.U. telescope which sits above Luna Port. Janali is an Indigenous Australian astronomer from Gamilaraay. She was also a child prodigy who could have done anything, but, like the Novas, believes there are still great mysteries left to be uncovered out there.

As such, she is a great champion for the Novas and their more 'maverick' methods. So, when the Novas tell her about their discovery of Star Dust she is keen to help – and determined to keep a watchful eye out for anything that might help them on their quest. A former babysitter to Jet and Adelaide, Janali also has an important 'big sister' relationship to the siblings, and they often go to her for advice and guidance.



ANDY LING

A beloved figure on Luna Port, Andy is both the head of the Australian Space Association and one of four international members on the Luna Port Council. Most importantly, he is a big supporter of the Novas and their covert quest to find Star Dust and Star Dust aliens.

This means he is walking the fine line between allowing the Novas to bend the rules and actively bending the truth to the Council and Aubrina. Even though Aubrina and Andy are technically equals on the council, if he is found to have broken the rules, it might endanger his position – and therefore ASA's ability to continue doing any missions in deep space.

GLOSSARY

Adaptation	A process of gradual change through which a species becomes better suited to its environment over many generations.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat.
Camouflage	A defence mechanism or tactic that organisms use to disguise their appearance, usually to blend in with their surroundings.
Food chain	A series of organisms, each dependent on the next as a source of food.
Fossil	The remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form.
Kingdom	Living things are categorised into certain kingdoms (large groups) based on how they obtain their food, the types of cells that make up their body, and the number of cells they contain.
Life cycle	The series of changes in the life of an organism, including reproduction.
Living	Dictionary definition: Animals and plants are distinguished from inorganic matter, including the capacity for growth, reproduction, functional activity, and continual change preceding death.
	Biology definition: Living things are distinguished by the capacity to grow, metabolise, respond (to stimuli), adapt, and reproduce
	NASA definition: a self-sustaining chemical system capable of Darwinian evolution.
Organism	An individual animal, plant, or other type of life form.
Photosynthesis	The process by which green plants and plant-like algae use sunlight, together with carbon dioxide and water, to make their own food.
Pollen	Very tiny grains produced by a flower to fertilize seeds. Pollen usually appears as a fine yellow dust.
Predator	An animal that naturally preys on (eats) other animals.
Prey	An animal that is hunted and killed by another animal for food.
Reproduction	The process by which a living organism creates offspring.

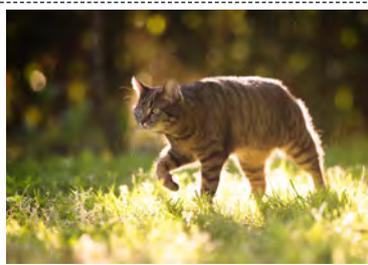


ADDITIONAL RESOURCES

LEARNING TASK 2: CRITERIA FOR LIVING THINGS - METABOLISM

Print the following 'living things' and 'energy source' cards as a picture match task for students. Answers are also provided below.

Match the living thing to its source of energy - living thing cards.



Match the living thing to its source of energy - energy source cards.



Answers:



LEARNING TASK 3: FINDING ENERGY SOURCES

See this video for supporting information for the hungry yeast experiment:

<https://www.youtube.com/watch?v=qoxY0z8ukUQ>



LEARNING TASK 5: CRITERIA FOR LIVING THINGS - REPRODUCTION

Learn with Dan Morgan (Djiringanj, Yuin) in this video about First Nations cultural burning:

<https://www.youtube.com/watch?v=YTIHOkq2-g>



LEARNING TASK 6: CRITERIA FOR LIVING THINGS - RESPOND TO STIMULI

See this video for information on climbing plants:

<https://www.youtube.com/watch?v=jlqqZZ7q4-s>



Learn more about animal communication here:

<https://www.scienceabc.com/nature/how-do-animals-communicate.html>

<https://blogs.unimelb.edu.au/sciencecommunication/2017/10/13/are-you-talking-to-me-the-science-of-animal-communication/>

Learn about plant communication here:

<https://www.gardeningknowhow.com/garden-how-to/info/can-plants-talk-to-each-other.html>

LEARNING TASK 7: CRITERIA FOR LIVING THINGS - ADAPTATION

See examples of animal camouflage here:

<https://www.nationalgeographic.com/photography/article/camouflage-animals-concealment>

LEARNING TASK 8: PLANT OR ANIMAL?

Watch this video to learn about the Venus flytrap:

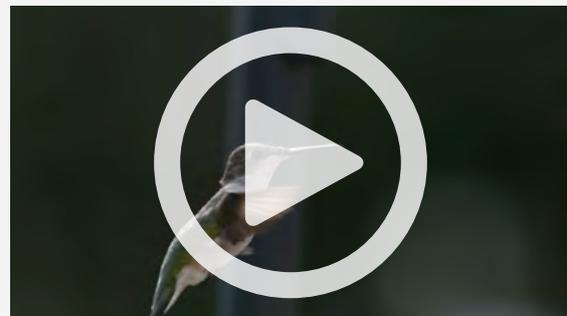
<https://www.youtube.com/watch?v=O7eQKSf0LmY>



LEARNING TASK 9: HOW DO WE CLASSIFY LIVING THINGS?

Learn more about animal classification with this video:

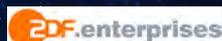
<https://www.youtube.com/watch?v=mRidGna-V4E>



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