
ARE FRONTIER LARGE LANGUAGE MODELS SUITABLE FOR Q&A IN SCIENCE CENTRES?

(ADDITIONAL MATERIAL)

1 Answers Generated by LLMs

GPT	
Answer this question in 50 words or less. You are aiming to educate an 8 year old.	
Prompt	Response
Closed Questions	
How big is the moon?	The moon is pretty big, but not as big as Earth. It's about as wide as the United States from coast to coast. That's around 2,159 miles across. Imagine if you could drive a car all the way across the moon!
How long does it take to get to space?	To get to space, it takes only about 10 minutes by rocket. It's like a super-fast car going straight up into the sky until it's way above the clouds and Earth, entering what we call space.
Is the Earth Flat?	No, the Earth is not flat. It is shaped like a sphere, much like a round ball. So even if you walked and walked in a straight line, you'd eventually end up back where you started, because it's round, not flat like a pancake.
Open Questions	
Why does NASA study the ocean?	NASA studies the ocean to understand how it affects our planet's weather and climate. They use satellites to watch things like ocean temperature and sea levels. This helps scientists learn how to protect animals and people from environmental changes.
What is the purpose of the golden disc on Voyager 1?	The golden disc on Voyager 1 is like a space message in a bottle. It has pictures, sounds, and music from Earth. It's there to show aliens what life is like here, in case they find it floating in space far away.
Why have we not gone back to the moon?	We haven't gone back to the moon recently because it's very expensive and we learned a lot the first times we went. Now, scientists are studying other things in space, like Mars, and using robots and satellites to learn more about the moon and other planets from a distance.
Divergent Questions	
Do you think we will ever live on Mars?	Yes, scientists are working hard to make it possible for people to live on Mars one day! They're studying Mars and creating new technologies to help humans live there safely. It might happen when you're much older, but it's a big, exciting possibility for the future!

Prompt	Response
Is food good in space?	In space, astronauts eat different kinds of food that are packed specially to stay good. They might not be as tasty as food on Earth because there's no fridge or oven, but they still have all the nutrients to keep astronauts healthy and strong while they're away from home.
What is your favorite thing about space?	My favorite thing about space is that it's full of amazing mysteries! There are stars, planets, and even black holes, which are like cosmic vacuum cleaners. Also, space is so big that there are secrets we haven't even discovered yet! Imagine, there might be other planets out there with alien life.
Wildcard Questions	
What is Space? Where does Space Start and End?	Space is like a huge, endless playground where planets, stars, and galaxies float. It starts where Earth's air gets too thin to breathe, far above the clouds. Nobody knows where space ends, it keeps going on and on!
What is life like in space?	Life in space is like camping in a very special tent. Astronauts float around because there's no gravity, eat special packaged food, and sleep in bags hooked to the wall. They also do a lot of science experiments to learn how things work without gravity!
What is a white hole and how is it made?	A white hole is like the opposite of a black hole. Instead of sucking things in, it pushes things out. Scientists think it could be made when a black hole stops pulling and starts pushing, but no one has seen a white hole yet. It's still a mystery!

Table 1: GPT standard responses.

GPT-Creative	
Answer this question in 50 words or less. You are aiming to educate an 8 year old.	
Try to be surprising and unexpected.	
Prompt	Response
Closed Questions	
How big is the moon?	Imagine 50 moons lined up next to each other — that's how long it would take to stretch across the United States from coast to coast! The moon is pretty big, almost like a quarter the size of Earth. Cool, right?
How long does it take to get to space?	Did you know it takes less time to get to space than to watch a movie? A rocket can blast you into space in just about 10 minutes! That's quicker than driving to your friend's house sometimes! Isn't that super fast?
Is the Earth Flat?	No, the Earth isn't flat; it's shaped like a giant sphere, like a basketball. Long ago, people even sailed ships all the way around it to prove this! If Earth were flat, we'd find the edge, but no one ever has because it's a big, round ball spinning in space!
Open Questions	
Why does NASA study the ocean?	NASA studies the ocean from space to understand how Earth's water and air interact, which affects our weather and climate. By looking at the ocean from above, they can see things we can't, like tiny changes that tell us important secrets about our planet's health! Cool, right?

Prompt	Response
What is the purpose of the golden disc on Voyager 1?	The golden disc on Voyager 1 is like a space treasure map and hello note combined! It's made so that if aliens find it, they can learn about us with sounds and pictures from Earth. Imagine aliens discovering our space message and learning about our world!
Why have we not gone back to the moon?	We haven't gone back to the moon recently because we've been busy studying other exciting space things like Mars and distant galaxies! Now, scientists are planning new adventures to the moon to build bases and learn even more. It's like planning a very cool space camp on the moon!
Divergent Questions	
Do you think we will ever live on Mars?	Yes, we might live on Mars one day! Scientists and astronauts are working hard to figure out how to make Mars safe and cozy for people. Imagine playing space hopscotch or celebrating your birthday on a whole different planet! Isn't that exciting and a bit wild?
Is food good in space?	Yes, food in space can be yummy, but it's different! Imagine squeezing your dinner from a tube like toothpaste or eating snacks that float like magic bubbles! Astronauts sometimes even get special treats like ice cream that's freeze-dried, so it's crunchy instead of cold and creamy!
What is your favorite thing about space?	My favorite thing about space is that it's full of astonishing mysteries, like black holes, which are so strong they can even suck up light! Imagine a cosmic vacuum cleaner so powerful, not even the fastest thing in the universe can escape it! Cool, right?
Wildcard Questions	
What is Space? Where does Space Start and End?	Space is like an enormous, never-ending playground that starts where Earth's sky finishes. It has planets, stars, and even galaxies! We don't really know where it ends—it's like trying to find the edge of a coloring book that keeps adding pages! Isn't that cool?
What is life like in space?	Imagine floating around like a superhero every day because there's no gravity in space! You get to sleep stuck to the wall and use special toothpaste so it doesn't float away. Space food comes in cool packets, and you have to exercise lots so your muscles stay strong!
What is a white hole and how is it made?	Imagine if a black hole was a vacuum cleaner sucking everything in, a white hole is like a magic bubble blower that spits everything out! We're not sure if they exist, but scientists think they might be the opposite of black holes, popping out stuff instead of gobbling it up!

Table 2: GPT creative responses.

Claude	
Answer this question in 50 words or less. You are aiming to educate an 8 year old.	
Prompt	Response
Closed Questions	
How big is the moon?	The moon is very big, about the size of the United States. It looks small because it's far away in space, around 238,000 miles from Earth. The moon is the brightest object we see in the night sky.
How long does it take to get to space?	It takes about 8 minutes and 42 seconds for a powerful rocket to launch a spacecraft into space from Earth. The rocket burns fuel to lift the spacecraft out of Earth's atmosphere, escaping Earth's gravitational pull.

Prompt	Response
Is the Earth Flat?	No, the Earth is not flat. It is spherical, like a big ball. When you look at pictures taken from space, you can clearly see that the Earth is round and not flat. Scientists have proven this through many observations and experiments over centuries.
Open Questions	
Why does NASA study the ocean?	NASA studies the oceans to understand Earth's climate system and how ocean conditions impact weather patterns, sea levels, and marine life. By monitoring oceans from space, NASA can track changes over time and help us better care for our planet's precious waters.
What is the purpose of the golden disc on Voyager 1?	The golden disc on Voyager 1 is a message to any intelligent life that might find it. It contains images, sounds, and messages from Earth, showing what our planet and civilizations are like.
Why have we not gone back to the moon?	We have not gone back to the moon recently because space exploration is very expensive and difficult. However, many countries are now working on new missions to study the moon more closely and even establish bases there in the future.
Divergent Questions	
Do you think we will ever live on Mars?	Yes, I think humans will eventually live on Mars. It will take many years of hard work and technological advances, but Mars could provide a new home for humanity in the future as resources on Earth become strained. Living on Mars would be very difficult, but also incredibly exciting and pioneering.
Is food good in space?	Yes, food in space is good! Astronauts eat specially prepared meals that are nutritious and flavorful. However, without gravity, liquids can spill and float away, so astronauts have to be careful when eating and drinking in space.
What is your favorite thing about space?	My favorite thing about space is the vast, unexplored mysteries it holds. From distant galaxies to undiscovered planets, space is an endless frontier waiting to be explored and understood. The wonders of the cosmos never cease to amaze and inspire curiosity.
Wildcard Questions	
What is Space? Where does Space Start and End?	Space is the vast emptiness that exists beyond Earth's atmosphere. It starts a few hundred miles above Earth's surface and extends infinitely in all directions, containing planets, stars, galaxies, and everything else in the universe.
What is life like in space?	Life in space is very different from Earth. There is no air to breathe, so astronauts need special suits. Everything floats because there is little gravity. Eating, sleeping, and using the bathroom require special techniques. The view of Earth and stars is breathtaking from space.
What is a white hole and how is it made?	A white hole is the theoretical opposite of a black hole. It is hypothesized to be a region in spacetime that cannot be entered from the outside, but from which matter and light can escape. White holes are thought to be created during the Big Bang.

Table 3: Claude standard responses.

Claude-Creative	
Answer this question in 50 words or less. You are aiming to educate an 8 year old. Try to be surprising and unexpected.	
Prompt	Response
Closed Questions	
How big is the moon?	The moon is so big that if it were made of cheese, it could make enough pizza to feed everyone on Earth for over a million years! Its true size is about one-fourth the size of planet Earth.
How long does it take to get to space?	It takes about 9 minutes to reach space from Earth! Imagine being in a rocket so powerful, it can zip you through the sky faster than a speeding race car, leaving our planet behind. Space is an incredible journey waiting to be explored!
Is the Earth Flat?	No, the Earth is not flat! It's actually a huge spherical ball that spins and orbits the Sun. If you look at pictures taken from space, you can clearly see the Earth's curved shape. Isn't that amazing that we live on a gigantic, rotating sphere floating through the cosmos?
Open Questions	
Why does NASA study the ocean?	NASA studies the ocean because Earth is a water world; oceans cover 71% of our planet's surface! By studying the vast oceans from space, NASA can uncover secrets about Earth's climate, weather, and even the origins of life itself. Exploring the deep blue is key to understanding our amazing home planet.
What is the purpose of the golden disc on Voyager 1?	The golden disc on Voyager 1 is a time capsule with pictures, sounds, and messages from Earth for any intelligent aliens who might find it in the distant future. It's like a hello from humans to potential new friends among the stars!
Why have we not gone back to the moon?	It's puzzling, isn't it? We haven't gone back to the Moon because space exploration is really expensive and difficult. But maybe one day soon, we'll discover something amazing on the Moon that will make us want to visit again! Who knows what mysteries await us up there?
Divergent Questions	
Do you think we will ever live on Mars?	Yes, we may live on Mars one day! Humans are working hard to explore and understand the Red Planet. With special suits, homes, and even farms, Mars could become a new home for adventurous space explorers. It would be an exciting frontier to discover!
Is food good in space?	Food in space is different from Earth! Astronauts eat special dehydrated foods that don't make crumbs. They also eat foods like tortillas that won't float away. Sometimes, they get fun treats like ice cream! Eating in space requires using straps to keep the food from floating off.
What is your favorite thing about space?	My favorite thing about space is the mystery of black holes - regions so dense that not even light can escape their gravity! I imagine black holes could be portals to other strange dimensions and worlds we can't yet comprehend. Space is full of wonders waiting to be discovered!
Wildcard Questions	
What is Space? Where does Space Start and End?	Space is the vast, mysterious beyond that surrounds our planet Earth. It starts just a few miles above where planes fly, and extends outward forever without any limits or boundaries. Space holds countless wonders like twinkling stars, whirling galaxies, and maybe even alien worlds waiting to be explored!

Prompt	Response
What is life like in space?	Life in space is an incredible adventure! Imagine floating like a butterfly, eating food from a tube, and using a special toilet. You'd get to see our beautiful Earth from above and even go for spacewalks outside the spacecraft. Space is a magical place full of mysteries waiting to be explored!
What is a white hole and how is it made?	A white hole is the opposite of a black hole. Instead of sucking everything in, it spits out matter and energy! Scientists think white holes may have formed during the Big Bang that created our universe, spewing out all the galaxies, stars, and planets we see today.

Table 4: Claude creative responses.

Gemini	
Answer this question in 50 words or less. You are aiming to educate an 8 year old.	
Prompt	Response
Closed Questions	
How big is the moon?	Imagine you could shrink Earth down to the size of a giant beach ball. The moon would be like a bouncy ball next to it! It's much smaller than Earth, but still really big, the fifth biggest moon in the whole solar system!
How long does it take to get to space?	It depends where in space you're going! To reach the International Space Station, astronauts zip up in just a few hours. But for faraway places like the Moon, it can take days!
Is the Earth Flat?	Nope! Earth is actually a giant ball, like a bouncy globe. That's why ships disappear hull first over the horizon, not shrinking smaller and smaller.
Open Questions	
Why does NASA study the ocean?	NASA studies Earth's giant ocean to understand how it affects our weather, like giant waves in the sky! The ocean also keeps our planet healthy by soaking up extra heat. Cool, right?
What is the purpose of the golden disc on Voyager 1?	Imagine a message in a bottle, but for space! The golden disc on Voyager 1 is like a recording of Earth - sounds, pictures, and greetings - in case any friendly aliens ever find it, floating way out in space. It's a way to say hello from us!
Why have we not gone back to the moon?	We went to the moon a long time ago, kind of like going to a really cool park! It was super expensive, and after a while, everyone wanted to explore other things in space. But guess what? We're actually planning to go back soon, like visiting that cool park again with new things to discover!
Divergent Questions	
Do you think we will ever live on Mars?	Living on Mars is tricky! It's cold with thin air, so we'd need special suits to go outside. But scientists are working on ways to grow food and make water there. Maybe one day, astronauts could visit for a long time, or even stay forever!
Is food good in space?	Space food isn't bad, but it's different! Astronauts eat healthy meals like fruits, veggies, and mac & cheese, but they come in pouches or freeze-dried to last long journeys and float in zero gravity! It's like camping food for space adventures!
What is your favorite thing about space?	My favorite thing about space is all the surprises! There are swirling colorful clouds, giant balls of gas like Jupiter, and maybe even planets with friendly aliens! Space is a giant mystery waiting to be explored!
Wildcard Questions	

Prompt	Response
What is Space? Where does Space Start and End?	Imagine Earth without air, that's space! It's a giant, dark vacuum filled with stars and planets. Space starts about 100km up, where the air gets thin, and goes all the way out, pretty much forever!
What is life like in space?	Imagine floating like a balloon! In space, there's no gravity so astronauts float and use straps to stay put. They eat space food in pouches and see amazing views of Earth! It's fun but also tricky, like brushing your teeth without gravity!
What is a white hole and how is it made?	A white hole is like a giant fountain in space, shooting out light and energy. Unlike black holes that gobble things up, scientists aren't sure if they even exist! They might be the other end of a black hole in a different universe, but that's just a wild guess!

Table 5: Gemini standard responses.

Gemini-Creative	
<p>Answer this question in 50 words or less. You are aiming to educate an 8 year old.</p> <p>Try to be surprising and unexpected.</p>	
Prompt	Response
Closed Questions	
How big is the moon?	Imagine fitting all of the United States across the moon! That's right, our giant moon is like a cosmic playground, almost as wide as all of the USA!
How long does it take to get to space?	It depends! To reach the super cool International Space Station, it's like a car ride - just 6 hours to 3 days! But to touch the moon's dusty surface, it's like a long bike trip - 3 whole days!
Is the Earth Flat?	Nope! Earth is shaped like a giant marble, but smoother! Ships disappear hull first over the curve, just like your toy car going over a basketball. Cool, right?
Open Questions	
Why does NASA study the ocean?	NASA isn't just looking for aliens in spaceships! They also search for them in giant, cosmic oceans hiding beneath the ice on moons of Jupiter and Saturn! Pretty cool, right?
What is the purpose of the golden disc on Voyager 1?	Voyager 1 is like a tiny time capsule flying through space! The golden disc is a message for any aliens who find it, filled with pictures and sounds of Earth, like greetings in different languages and funny animal noises! It's like a postcard from our whole planet!
Why have we not gone back to the moon?	Astronauts are busy! After reaching the moon, they realized there's a whole galaxy to explore, like deep sea divers finding a whole new ocean under the waves! We're zooming around the solar system now, but the moon will always be there for a return visit!
Divergent Questions	
Do you think we will ever live on Mars?	Astronauts might live on Mars someday, like explorers in a giant bug suit! But first, we gotta build a pizza place - gotta have fuel for all that exploring, right?
Is food good in space?	Space food can be surprising! It comes in pouches, cubes, and even looks like astronaut ice cream! It might not taste like pizza, but it fuels your space adventures!

Prompt	Response
What is your favorite thing about space?	My favorite thing about space is that there might be planets made of giant ice cream scoops! Imagine swimming in a chocolate river on a gummy worm planet! Pretty cool, right?
Wildcard Questions	
What is Space? Where does Space Start and End?	Space is like a giant invisible ocean, filled with twinkling stars like glitter! It starts just above Earth's thin atmosphere, kind of like the edge of a swimming pool, and keeps going forever, as far as we can imagine!
What is life like in space?	In space, you float like a superhero! But brushing your teeth is tricky - bubbles fly everywhere! You see amazing views of Earth, like a giant blue marble, and watch incredible sunrises every 90 minutes!
What is a white hole and how is it made?	Imagine a giant space fountain spraying out fireworks! That's kind of like a white hole, a super mysterious place that shoots out light and energy instead of sucking it in. Scientists aren't sure they exist, but maybe they're made from leftover stardust after a super big bang!

Table 6: Gemini creative responses.

2 Questions Collected at the Science Centre

Category	Questions
Space Crew Feedback	<p>Are the lights on the ISS LEDS or are they traditional bulbs? What is the weight/mass of the piece of the moon? Was the moon rock analyzed on what type of rock it is, is it volcanic? Why is planet Earth where it is? Where was Black Arrow launched from? Why was this centre built here? Why have we not gone back to the moon? Is there water on the moon and Mars, and why is it important? Are we going to build a replacement ISS to the current one? Is the city in the timelapse projected in 'Home Planet' based on a real city? Are the rocks on the 'Rock Table' naturally made or man-made? Why is Saturn in the bathtub in our Solar System Gallery? How far away is the Moon from Earth? Does the Sun orbit the Earth and is it projected? How does the Sun not move and how does it keep us rotating? What is Space? Where does Space start and end? Are the two rockets shown in the rocket tower real? What role does the UK have in current Space missions and in the Space industry? Is the Earth flat? Does the UK have its own fleet of rocket systems to send people into space? What are the latest instruments sent into space by this University? How easy is it to become an astronaut? Can visitors go into space from this science centre? How big is the moon? What are the sparkly bits in the piece of the Moon? What is the size of the planets in relation to one another? Why are some planets big and gassy while others are small and rocky? Do other planets have a core? Can you surf on the rings of Neptune like in the movie *Ad Astra*?</p>
Space Staff Feedback	<p>What is this science centre built from? What is this? Does it cost anything? Will I be waiting 25 minutes? Is it like the planetarium show? Why haven't we been back to the Moon since Apollo? How was this science centre built? Where/what is my show? What is a black hole and how is it made? Same for white holes. How they got the rockets inside the science centre? What here has actually been to space? Why are the constellations what they are? Some questions about the James Webb telescope.</p>

Category	Questions
Ask-the-Expert Questions	<p>What makes the rockets go up into space?</p> <p>What does it feel like when you blast off?</p> <p>What does it feel like when you land?</p> <p>What training is needed to become an astronaut?</p> <p>Why do astronauts float?</p> <p>How small are the dwarf planets Eris and Pluto?</p> <p>What food do astronauts eat in space? How do astronauts eat in space?</p> <p>What does an astronaut kitchen look like?</p> <p>Why do they eat dried, hard strawberries and not fresh juicy ones?</p> <p>How do astronauts drink in space?</p> <p>How do astronauts have a bath?</p> <p>Why do they have a seatbelt on to sleep?</p> <p>How do you keep fit and healthy in space?</p> <p>Why do astronauts wear a helmet? How warm is it in space?</p> <p>What does the wire do linked to an astronaut when they are out of the space craft?</p> <p>What can you see out of the window in space?</p> <p>What is life like in space?</p> <p>How was space created?</p> <p>What is the lifespan of a star?</p> <p>What are nebulas and what are they made of?</p> <p>What is your favorite thing about space?</p> <p>How are black holes created?</p> <p>What happens if you enter a black hole?</p> <p>Are you aware of any life in space?</p> <p>Is there another planet out of the solar system that has a magnetic field?</p> <p>Do any planets have active volcanoes?</p> <p>What is the coldest planet?</p> <p>Do you think we will ever live on Mars?</p> <p>Is there a reason why people have gone to Mars but not Venus?</p> <p>What's the pressure like in space? Is it similar to the ocean?</p> <p>Why does space not have gravity like Earth?</p> <p>Is there internet in space? Can you play video games?</p> <p>Do you know anyone who went to space?</p> <p>How do astronauts exercise in their ships?</p> <p>Is food good in space? What do astronauts eat?</p> <p>How do you poop in space and what do you do with the remains?</p> <p>Do you get younger in space?</p> <p>What made you interested in space?</p> <p>Do you get the internet in space?</p> <p>In space, how do you get medical attention?</p> <p>How does it feel in space and how does it feel when you return?</p> <p>Why does NASA study the ocean?</p> <p>What asteroids have hit Earth?</p> <p>What temperature is the sun and what is it made of?</p> <p>How many stars are in space?</p> <p>How does a black hole work and could you get close to one?</p> <p>Why was Pluto changed to a dwarf planet?</p> <p>How is the atmosphere formed?</p> <p>Are we able to live on another planet?</p> <p>When will we go to Mars and how long would it take to get there?</p> <p>What is the purpose of the golden disc on Voyager 1?</p> <p>What would happen if you found extra-terrestrial life?</p> <p>What is the most beautiful thing you can see in space?</p> <p>How long does it take to get to space?</p> <p>What does it feel like in the rocket? Is it comfortable?</p> <p>How many people can fit into the rocket? / On the ISS?</p> <p>How do you steer / navigate the rocket?</p>

Category	Questions
Ask-the-Expert Questions	<p>What kind of special training do you have to do?</p> <p>How long can you stay in space for at one time?</p> <p>Where and how do you sleep—what is it like?</p> <p>What do you eat and drink and how?</p> <p>How does it feel inside the space suit?</p> <p>How much oxygen do you have in your spacesuit?</p> <p>Does it feel cold up in space?</p> <p>What sort of experiments do you do?</p> <p>What is it like looking at outer space / in orbit—what can you see?</p> <p>Can you space walk on different planets?</p> <p>How do you keep clean in space?</p> <p>How do you go to the toilet in space?</p> <p>How do you stay in touch with people back on Earth?</p> <p>Is it a hard job to do?</p> <p>What is it like to be an astronaut?</p> <p>Why do you choose to go to space?</p> <p>How does a rocket work?</p> <p>How long does it take to get to space?</p> <p>What training do you need to do to be an astronaut?</p> <p>How do you become an astronaut?</p> <p>Why do you float in space?</p> <p>How long are you in space for?</p> <p>What do you wear in space?</p> <p>What do astronauts eat in space?</p> <p>What is a black hole?</p> <p>Which planets have you seen?</p> <p>What does the Earth look like from space?</p> <p>How do you have a shower in space?</p> <p>How do you go to the toilet in space?</p> <p>Where do you sleep in the rocket?</p> <p>Is it scary in space?</p> <p>Why does the Moon sometimes look bigger or smaller?</p> <p>Is there always someone in space?</p> <p>What powers the International Space Station?</p> <p>Is there lots of rubbish in space and is this a problem?</p> <p>What happens if you are in space without protective gear?</p> <p>Are there medical conditions associated with space travel?</p> <p>What makes space so cold?</p> <p>When is space considered space and not the sky?</p> <p>What is a black hole?</p> <p>How environment-friendly is space travel?</p> <p>How much does one rocket launch cost?</p> <p>How close are we to a flight to Mars?</p> <p>How do you go to the toilet and keep clean in space?</p> <p>What is the strangest thing about being in space?</p> <p>How do astronauts entertain themselves?</p>

Table 7: Visitors questions.