

PECULIAR THINGS IN THE SOLAR SYSTEM

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PECULIAR THINGS IN THE SOLAR SYSTEM (AS TOLD BY JOHARI)



I felt so glad to be in the *Race to the Big Bang Contest*. It was my best activity of the pandemic. Even better than Grandma's cooking classes that I was allowed to sit in on, even though she wasn't *my* grandma. The contest was definitely the GOAT. I loved our *Room* meetings, and the moon visit was lit. And it kept my brother from driving me completely crazy.

The contest and all the new pandemic routines were bringing back some amount of normalcy to my life in California. I started taking singing lessons. My mom signed me up with a voice coach who teaches online. Lizzy, VC, Neddy, and I were doing *Room* calls twice a week to talk about girl stuff. Lizzy saw my brother online when they played gin rummy, at which she is still winning. Neddy was FaceTiming with Richie, and of course Milo and Svetlana were a thing. But VC just has six-year-old Griffin for boy company. Like me, VC and I just have our brothers. Ugh!

I told the girls about this great new boy band that was playing free concerts on the Santa Monica pier. People were coming to listen and dance. A boy asked me to boogie with him. Everyone wore masks, so I wasn't sure I would ever recognize him again. The band leader saw me singing along to one of their songs and invited me up on stage. He handed me the microphone, and I sang three songs. It was way lit.

The last girl meeting was all about new clothes. I showed the girls my great collection of California boy-band T-shirts. They loved them.

In addition to those activities, I was taking a lot of pictures for Grandpa's wildlife photo contest. It was nothing but cute cats and dogs—not exactly wildlife. But finally, I got a pretty sure winner. On my morning run, I was going out to the end of the pier. Halfway there, I was stopped in my tracks by a crazy scene. There on a bench, sleeping like it was a homeless person, was a sea lion. This was my best shot. Wow, I would have thought that the beach would have been a better place for a nap, but I'm not a sea lion.



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I have been looking but no whale sightings yet. But I'm feeling confident with that sea lion shot.

At 11:00 a.m. Pacific time, we started our second *Qualifier* exercise, the Peculiar Things in the Solar System. I was nominated as the leader of this mission. I decided to keep Jackson as the *Safety Officer*.

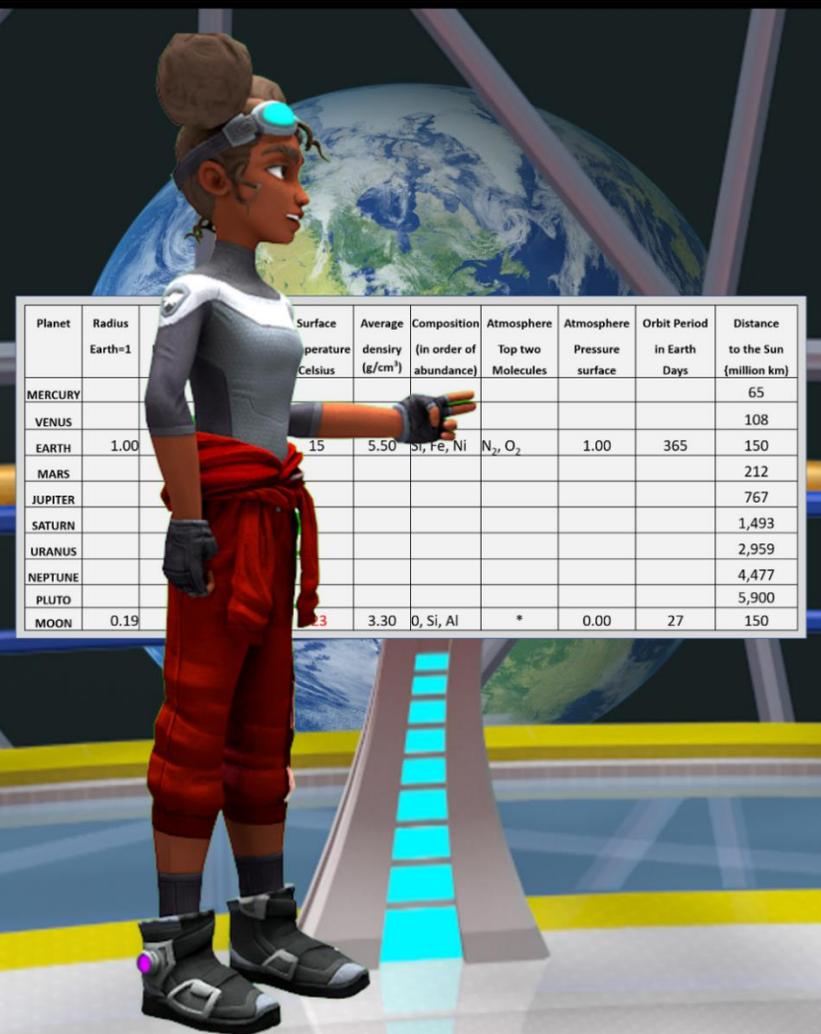
When everyone was logged on, I went over the mission objectives. "OK, guys, this is what we have to do. One, we need to visit all eight planets plus Pluto. Two, we need to do the complete survey of the planet's physical properties like we did for the moon. Three, we need to find something peculiar and unique about each planet. And Four, we need to submit a report on what we found. We have to produce a good report to qualify for the *Regionals*. There is a great NASA website called [Solar System Exploration](#) that we can use to get information. This mission could be the GOAT."

"Johari," interrupted Richie, "that's the second time you called something the goat. What's the goat?"

"Oh, sorry Richie," I answered. "It's a California thing. GOAT means Greatest Of All Time."

"I have a suggestion," offered VC. "Let's make a table of properties with the first column naming the planets and the top row with all the things we need to measure, like the weight, atmosphere, temperature, composition, size, time for a complete orbit, and stuff like that."

"VC," I said, "we are spending way too much time together. We are starting to think alike. I already made the table. I filled in the numbers that we measured on the moon and those for Earth. I also put in the planet's distance from the sun." I brought it up on the computer screen.



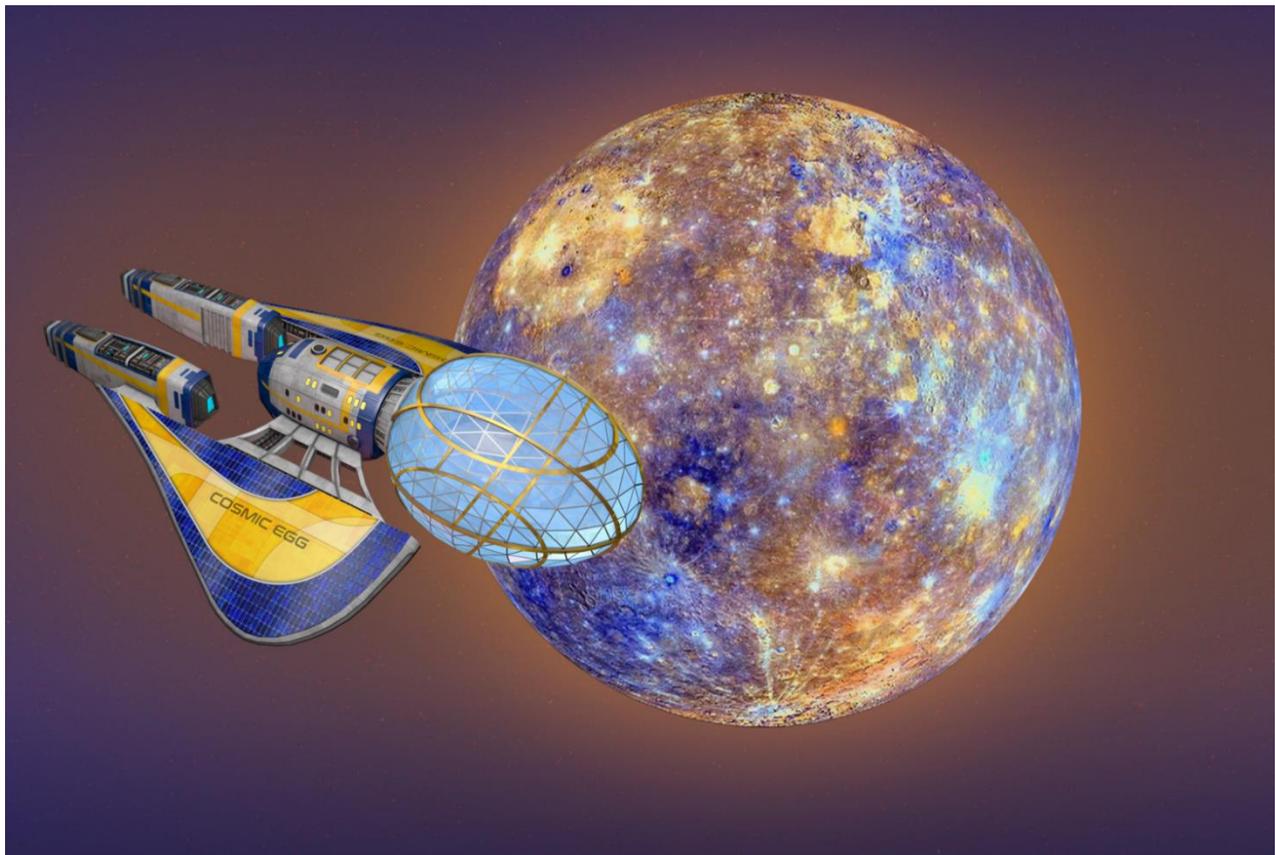
Planet	Radius Earth=1	Surface temperature Celsius	Average density (g/cm ³)	Composition (in order of abundance)	Atmosphere Top two Molecules	Atmosphere Pressure surface	Orbit Period in Earth Days	Distance to the Sun (million km)
MERCURY								65
VENUS								108
EARTH	1.00	15	5.50	Si, Fe, Ni	N ₂ , O ₂	1.00	365	150
MARS								212
JUPITER								767
SATURN								1,493
URANUS								2,959
NEPTUNE								4,477
PLUTO								5,900
MOON	0.19	23	3.30	O, Si, Al	*	0.00	27	150

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"That was just what I had in mind," said VC. "Let's start with Mercury, the closest planet to the sun, and work our way out."

"Mercury it is. Let's go," I commanded. We logged onto the [Virtual World](#).

VC, who was the *Navigator* for this trip, mimicked Lizzy with an "aye, aye, sir," and away from Earth we went. It would take us two minutes plus speed-up and slow-down to reach Mercury.



To kill time, Jackson and Lizzy continued their gin rummy tournament. VC and Neddy got into a discussion with Milo about high school. They wanted to know all about the experience.

I started singing a song my dad loves: "*Fly me to the moon. Let me play among the stars. Let me see what a spring is like on Jupiter and Mars.*" I got weird looks from the team, so I stopped.

Richie started telling bad jokes. This was becoming his thing. It was almost as bad as having VC's six-year-old brother around. "What do planets like to read?" he asked and then answered, "Comet books. How do space aliens serve dinner? On flying saucers."

Most of the team groaned. Neddy glared at him and said, "Zip it, Richie. I'd rather hear Johari singing."

When we got to Mercury, Jackson did his job as our *Safety Officer*.

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"Problemo," Jackson said when we arrived. "We are not going down to the surface. The surface temperature is pizza-oven hot, like over four hundred degrees Celsius. We have to do all the measurements from the *Cosmic Egg*."

Neddy launched her drone to get a picture of Mercury with the *Cosmic Egg* in front.

"OK, team," I said, "let's get to work on the measurements."

"Jack," Lizzy asked, "is measuring your weight aboard the ship still good for determining Mercury's gravity?"

"It'll be OK," said Jack. "The measurement will be a little smaller because we are stationed one hundred kilometers above the surface, but I'll correct for that."

"I tested out the new *Distance* tool," said Milo. "I just have to point it at a distant object, and it reads the distance to it. We are sixty-five million kilometers from the sun."

"Now, guys," I asked when we finished our measurements, "what is peculiar about Mercury?"

"I think it is the size of the sun when you look at it from here," offered Richie. "It looks three times bigger than on Earth."

"I see something peculiar too," said Neddy. "Mercury hasn't rotated at all since we have been here. The side that was in daylight when we got here is still in daylight."

"I'll move us back in time to see how long it takes to turn," VC said as she programmed a time hop. "Wow, it has taken almost fifty-nine days for the sunrise area of Mercury to become sunset and go back to sunrise again. That is 1,408 hours. Talk about long, boring days."

We voted that the 1,408-hour Mercury day was its most peculiar thing.



After a short break, we traveled on to Venus.

"Why is Venus named after the Roman goddess of beauty?" asked Richie. "Because it's the hottest planet in our solar system."

"That one isn't too bad," I said, chuckling.

"We have to work from the *Cosmic Egg* again," announced Jack. "The Venus surface temperature is even hotter than on Mercury. We'd be cooked in an instant in its almost seven-hundred-degree Celsius atmosphere."

We did all the physical measurements. "Venus has an atmosphere of mostly carbon dioxide," Neddy reported.



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"That's why Venus is hotter than Mercury, even though it is farther from the sun," explained Jackson. "It is similar to the global warming problem on Earth. The carbon dioxide absorbs the radiation coming from the surface and sends half of it back. That returned energy heats up the planet instead of going off into space to cool it. And that makes the surface hotter."

We measured the length of the Venus day, and it was even longer than a Mercury day.

"It is almost six thousand hours long," reported VC. "That's two-thirds of a year."

"OK," I said, "is that its peculiar thing?"

"Hey, guys," Neddy offered, "I measured small amounts of phosphine gas in the Venus atmosphere. I thought that might be peculiar, so I did a Google search. In a recent paper, scientists asserted that there could be something currently alive on Venus. That is the most likely explanation for phosphine's source. But how could life survive in the hot atmosphere of Venus?"

After much discussion, the *Cosmic Explorers* team agreed that possible life on Venus is its most peculiar thing.

Having finished the two planets that are closer to the sun than Earth, we decided to wait until the following day to do those that are farther from the sun. Mars would be our next stop. Grandpa was coming too.



"Good news, everyone," announced Jackson. "We can go down to the Martian surface. Dress warm. The temperature in the sun today is ten degrees Celsius. And wear your breathing helmets; there is very little atmosphere, and it's mostly carbon dioxide."

While we were circling the planet, we saw something reflecting the sun. On close inspection, we determined it was the [Mars Rover](#) Curiosity sent by NASA in 2011. Grandpa remembered some of the people who worked on the team.



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"Let's go there," Richie said, smiling. "I'd like to see it." We teleported to the surface.

"This is one cool piece of equipment," Jack said, walking up and checking it out. We took lots of pictures, including one of Grandpa that he sent to some of his old NASA coworkers.

We measured all of Mars's physical parameters, and nothing was really unusual.

"I think the Mars Rover is the planet's most peculiar thing," said Lizzy. "It's the only other planet besides Earth that has had a vehicle driving around on its surface."

With that decided, we teleported back to the *Cosmic Egg* and headed for Jupiter.

"Well," said Jack, "the temperature of the atmosphere is really cold, about minus 145 Celsius. But maybe the surface is OK."

"I'll go down and check it out," I offered. So, I dressed in the warmest spacesuit I could find and teleported to the surface. I hit the atmosphere, and it was cold. My avatar started to turn blue, but I kept going lower, and it got warmer. But no matter how far I went down, there was no surface. Finally, I reported back to the crew. "We can't go down to the surface of Jupiter. There doesn't appear to be a surface. Almost the whole planet is made of gas, mainly hydrogen."

I teleported back to the ship, and we got to work doing our measurements from there.

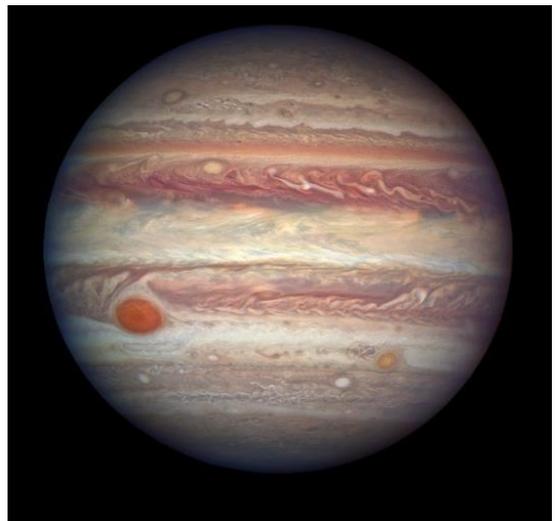
Lizzy called out, "It has more than three hundred times the mass of Planet Earth."

Neddy reported, "The clouds that make up the bands are made of ammonia crystals and sulfur."

We did a circle around the planet, and VC announced, "Jupiter is over eleven times bigger than Earth. For the most peculiar thing, I vote for the big red spot on the surface."

"It is definitely peculiar," I added. "According to *Solar System Exploration*, the Great Red Spot is a huge storm on Jupiter. It has raged for at least 350 years, and it is so large that three Earths could fit inside it."

The Great Red Spot got the vote for Jupiter's most peculiar thing.



Like Jupiter, Saturn was also a giant gas planet.

Milo said immediately, "The most peculiar thing about Saturn is the rings."

"The rings are made of chunks of ice and rock," announced Neddy who was busy using her *Composition* tool. "And the planet itself is mostly hydrogen and helium gas."

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"Here is another candidate for most peculiar," said VC. "Saturn has eighty-two moons."

"Wasn't there a space probe that went to Saturn?" asked Richie.

"Yes," answered Grandpa.

"But it was vaporized in Saturn's atmosphere in 2017," added Jackson, the showoff.

Saturn's rings and the eighty-two moons got the team's vote for most peculiar things. Hopefully, both were right. We took a break before going on.



As we approached Uranus, Grandpa requested that we all line up for a group photo with the planet in the background out the front windows. We even let the clone pets out of the equipment room for the photo. Grandpa took the picture.



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Getting the pets back into the equipment room was a huge pain.

"Uranus is known as the Ice Giant," said Neddy. "Its composition is water, methane, and ammonia."

"It is also known as the Sideways Planet," said VC, "because it rotates on its side. All the other planets turn on an axis that gives both halves a night and a day. But Uranus rotates so that half the planet is always pointed at the sun to make one half permanent day and another half permanent night."

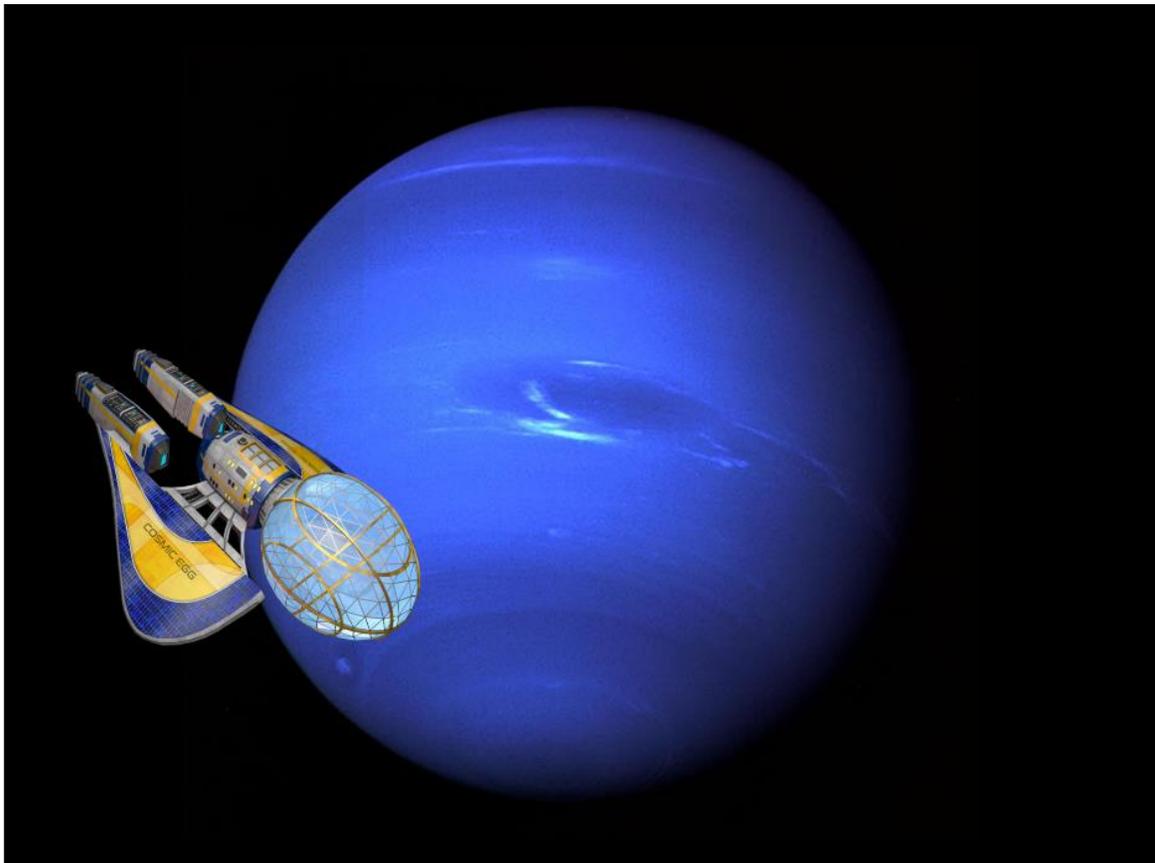
"I know something peculiar about Uranus," offered Grandpa. "There was an article about it in the *Washington Post* a couple of years ago. Astronomers think that the atmosphere of Uranus rains diamonds. They believe that under the high-pressure and carbon-rich environment, diamonds will form. How about that for peculiar?"

The team voted that the Sideways Planet with diamond rain were the most peculiar features of Uranus.



We traveled on to Neptune, which was 4.5 billion kilometers from the sun.

Richie, of course, had another joke. "What kind of music do planets like? Neptunes," he answered.



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Looking at the NASA [Solar System Exploration](#) website, Lizzy reported, "Neptune is a giant planet, four times larger than Earth. Its atmosphere is made of hydrogen, helium, and methane. Methane gives the planet its blue color."

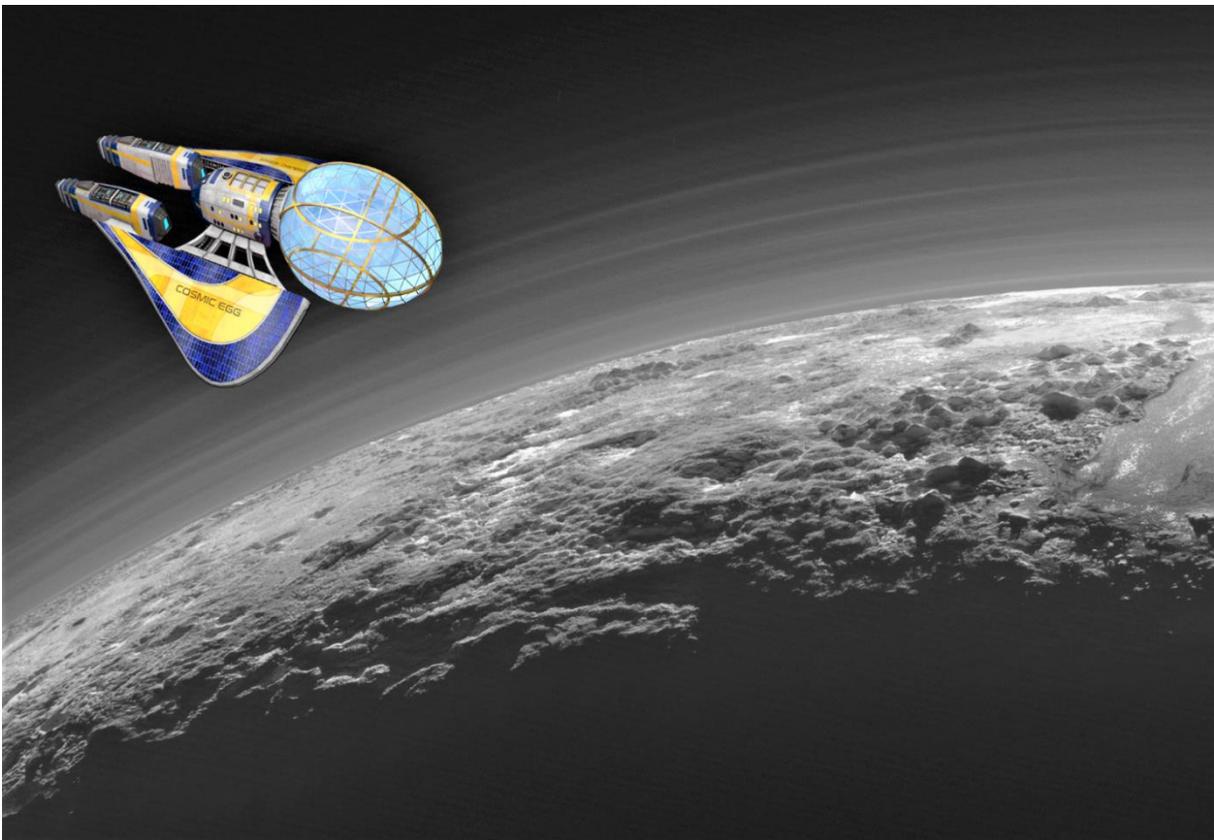
We measured all Neptune's properties and got its most peculiar thing from the NASA website: "Neptune is our solar system's windiest world. Clouds of frozen methane whip across the planet at speeds of more than 2,000 km/h (1,200 mph). That's close to the top speed of a fighter jet. Earth's most powerful winds hit only about 400 km/h (250 mph)."



Our final destination was Pluto. At our top speed of one million kilometers per second, the trip would take over one and a half hours. We used the time to put together what we had already discovered into a report for the contest.

"You know," said Grandpa, pointing at us all, "when I was your age, Pluto was the ninth planet. But it is small, about the same size as our moon, and it has only one-fifth the moon's mass. So, astronomers demoted it to a dwarf planet, and now we only have eight full planets in the solar system."

"I think that should be its peculiar thing," said Lizzy. "It's the only planet that ever got demoted."



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Everyone, even Richie the joker, laughed. When we got to Pluto, Jack did his *Safety Officer* thing. "Not going down to the surface," he said. "Way too cold. Its minus 233 Celsius."

"Hey," said Richie, "it kinda looks like the moon with all the craters."

We made all the measurements and went with Pluto's demotion as its peculiar thing.

To end our mission, we entered all of the physical parameters for each planet into my [Table of Planet Properties](#), and we made a table of each planet's most peculiar things. We submitted them, together with our pictures, for our report.

PLANET	MOST PECULIAR THING
MERCURY	1,408-hour day
VENUS	Possible signs of life
EARTH	Human life
MARS	Earth vehicle driving around on its surface
JUPITER	The 350-year-old Great Red Spot storm
SATURN	Saturn's rings and eighty-two moons
URANUS	The Sideways Planet that rains diamonds
NEPTUNE	The windiest planet
PLUTO	The only planet to get demoted to dwarf planet

VC and I also composed a rap about our mission:

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PLANET RAP

To visit all the planets is a mission that's long.
A billion-mile trip like that is worth a song.
Some planets are solid, and some are gas.
And except for Pluto, they have lots of mass.
Some are way hot, and some are way cold,
all are more than four billion years old.
Pluto, Uranus, Jupiter, and Mars,
Our neighboring planets that look like stars.

Some planets are big, and some are small,
The star that's our sun shines on them all.
Afternoons on Mercury have lots of time for play,
On a hot rock with a fourteen-hundred-hour day.
For the longest day, Venus is the winner.
One-third of a year between breakfast and dinner.
If vacations on Pluto are yearlong stays,
Pack plenty of provisions for ninety thousand days.
Mercury, Venus, Pluto, and Mars
Are some more planets that look like stars.

Astronomers see some signs of life on Venus.
It's hard to check with millions of miles between us.
Some planets have atmosphere, and some have none.
If you need to breathe oxygen, Earth's the only one.
Saturn is special because of rings around it.
I searched with my telescope; I'm glad I found it.
Blue Neptune is the windiest planet yet.
Winds blowing at speeds of a supersonic jet.
Venus, Saturn, Neptune, and Mars,
Our neighboring planets that look like stars.

GRANDPA'S GLOSSARY

Virtual World: Virtual worlds, also known as virtual environments, use computer technology to create a simulated world that a user can explore and interact with, while creating a feeling as if he or she were in that world. The representation of the user in that world is called an [avatar](#). The user can even wear goggles to make it appear that he or she is surrounded by the 3-D virtual world. That is called virtual reality.

Solar System Exploration: This NASA website at solarsystem.nasa.gov is an excellent source of data and images for all the objects in the solar system.

Mars Rover: The picture on page 52 is of the Mars Rover, Perseverance, that touched down on the surface of Mars on February 18, 2021. The Rover will be collecting samples of the Martian surface which will be sent back to Earth. When returned, the samples will be examined for any evidence of past life on Mars. Perseverance is the latest of six probes sent to Mars. The Curiosity Rover that landed in 2011 is still active.

Table of Planet Properties:

Planet	Radius Earth=1	Mass Earth=1	Surface Gravity (Earth = 1)	Surface Temperature Celsius	Average density (g/cm ³)	Composition (in order of abundance)	Atmosphere Top two Molecules	Atmosphere Pressure surface	Orbit Period in Earth Days	Distance to the Sun (million km)
MERCURY	0.38	0.0558	0.378	430	5.44	Fe, Ni, Si	*	0	88	65
VENUS	0.95	0.815	0.903	698	5.24	Si, Fe, Ni	CO ₂ , N ₂	91.78	225	108
EARTH	1.00	1	1	15	5.50	Si, Fe, Ni	N ₂ , O ₂	1.00	365	150
MARS	0.53	0.1075	0.379	-68	3.94	Si, Fe, S	CO ₂ , N ₂	0.01	687	212
JUPITER	11.20	317.83	2.54	-145	1.34	H, He	H ₂ , He	1.00	4,380	767
SATURN	9.42	95.147	1.16	-178	0.69	H, He	H ₂ , He	1.00	10,585	1,493
URANUS	4.01	14.54	0.919	-195	1.19	H, C, N, O	H ₂ , He	1.00	30,660	2,959
NEPTUNE	3.93	17.23	1.19	-200	1.66	H, C, N, O	H ₂ , He	1,000	60,190	4,477
PLUTO	0.19	0.002	0.063	-233	1.85	C, H, O	*	0.00	90,520	5,900
MOON	0.19	0.012	0.167	-23	3.30	O, Si, Al	*	0.00	27	150

THE STARDUST MYSTERY PROJECT

THE STARDUST MYSTERY WEBSITE

<https://TheStardustMystery.com>

STARDUST MYSTERY YouTube channel

<https://www.youtube.com/channel/UCa5CQnZA6StFXXvEs418DKg>

Science Videos

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ILLUSTRATED SCIENCE ADVENTURE BOOKS

THE STARDUST MYSTERY is on [Amazon](#) and [Barnes & Noble](#)

THE RACE TO THE BIG BANG: Coming in May 2021

NATIONAL SCIENCE FOUNDATION AWARD 1738291

https://www.nsf.gov/awardsearch/showAward?AWD_ID=1738291&HistoricalAwards=false

