



Career Exploration Extension

Grades K-2

Ramps/Space Unit

[Career: Astronaut](#)

Videos

Astronauts | Science Trek <https://bit.ly/3ibxglx>



Journey to the Moon <http://ow.ly/TChA50CMbS8>



Printable Resources & Evidence Piece (see attached)

Share some facts about astronauts so that students can complete the bio sketch activity.

- ❖ www.pbs.org/wgbh/nova/station/hardhats.html
- ❖ www.ducksters.com/biography/explorers/neil_armstrong.php
- ❖ www.ducksters.com/science/physics/astronaut.php
- ❖ pbslearningmedia.org/resource/teachers-guide-document/xavier-riddle-and-the-secret-museum/

Optional Activities

- ❖ The Right Stuff: Moon Landing Game | Ready Jet Go! <http://ow.ly/d3fy50CMcvR>
- ❖ Our Solar System | Ready Jet Go! pbs.org/parents/printables/our-solar-system
- ❖ DIY Solar System Scale Model <http://ow.ly/snCk50CMcDG>

Astronauts

What is an astronaut?

An astronaut is a person who is specially trained to travel into outer space. Astronauts aboard a spacecraft may have different responsibilities. Typically there is a commander who leads the mission and a pilot. Other positions may include flight engineer, payload commander, mission specialist, and science pilot.



NASA Astronaut Bruce McCandless II
Source: NASA.

Astronauts have to undergo extensive training and testing before they can participate in a spaceflight. They must show that they can handle the physical rigors from the high [gravity](#) of launch to the weightlessness of orbit. They also must be technically knowledgeable and able to handle stressful situations that may arise during the mission.

Spacesuits

Astronauts have special gear called a spacesuit that they use when they must leave the safety of their spacecraft. These spacesuits provide them with air, protect them from the extreme temperatures of space, and protect them from the radiation of the Sun. Sometimes the spacesuits are tethered to the spacecraft so the astronaut won't float away. Other times the spacesuit is equipped with small rocket thrusters to allow the astronaut to navigate around the spacecraft.



The flight crew from the Apollo 11.

Neil Armstrong, Michael Collins, Buzz Aldrin (left to right)

Source: NASA.

Famous Astronauts

- Buzz Aldrin (1930) - Buzz Aldrin was the second person to walk on the Moon. He was the pilot for the lunar module on the Apollo 11.
- Neil Armstrong (1930 - 2012) - [Neil Armstrong](#) was the first person to walk on the Moon. When he stepped onto the Moon he made the famous statement "That's one small step for man, one giant leap for mankind." Neil was also part of the Gemini VIII mission which was the first time two vehicles successfully docked in space.



Astronaut Guion Bluford.

Source: NASA.

- Guion Bluford (1942) - Guion Bluford was the first African American in space. Guion flew on four different space shuttle missions starting as a mission specialist on the Challenger in 1983. He also was a pilot in the U.S. Air Force where he flew 144 missions during the Vietnam War.
- Yuri Gagarin (1934 - 1968) - Yuri Gagarin was a Russian cosmonaut. He was the first human to travel into outer space and orbit the Earth. He was aboard the Vostok spacecraft when it successfully orbited the Earth in 1961.
- Gus Grissom (1926 - 1967) - Gus Grissom was the second American to travel to space aboard the Liberty Bell 7. He also was the commander of the Gemini II which orbited the Earth three times. Gus died in a fire during a pre-flight test for the Apollo 1 mission.
- John Glenn (1921 - 2016) - John Glenn became the first American astronaut to orbit the Earth in 1962. He was the third American in space. In 1998, Glenn once again traveled to space aboard the space shuttle Discovery. At the age of 77, he was the oldest man to fly in space.



Astronaut Sally Ride.

Source: NASA.

- Mae Jemison (1956) - Mae Jemison became the first black woman astronaut to travel to space in 1992 aboard the space shuttle Endeavour.
- Sally Ride (1951 - 2012) - [Sally Ride](#) was the first American woman in space. She was also the youngest American astronaut to travel to space.
- Alan Shepard (1923 - 1998) - In 1961, Alan Shepard became the second person and the first American to travel to outer space aboard the Freedom 7. Several years later he was the commander of the Apollo 14. He landed on the Moon and became the fifth person to walk on the Moon.
- Valentina Tereshkova (1947) - Valentina was a Russian cosmonaut who became the first woman to travel to space in 1963 aboard the Vostok 6.

Fun Facts about Astronauts

- The word "astronaut" comes from the Greek words "astron nautes", which means "star sailor."
- It is estimated that 600 million people watched Neil Armstrong and Buzz Aldrin walk on the Moon on television.
- Astronaut John Glenn became the U.S. Senator from Ohio where he served from 1974 to 1999.
- Alan Shepard became famous for hitting a golf ball while on the Moon.

Neil Armstrong



Neil Armstrong
Source: NASA

- **Occupation:** Astronaut
- **Born:** August 5, 1930 in Wapakoneta, Ohio
- **Died:** August 25, 2012 in Cincinnati, Ohio
- **Best known for:** First man to walk on the Moon

Biography:

Where did Neil Armstrong grow up?

Neil was born on August 5, 1930 in Wapakoneta, [Ohio](#). His love for flying started at a young age when his father took him to an air show. From then on his goal was to become a pilot. At the age of 15, he got his pilot's license.

Armstrong went to Purdue University and earned his bachelor's degree in aerospace engineering. He later got his masters degree at the University of Southern California. During college, Neil was called up by the Navy and became a fighter pilot. He fought in the Korean War where he flew fighters from aircraft carriers. At one point his plane was hit by enemy fire, but he was able to eject and was safely rescued.

How did he become an astronaut?

After graduating from college, Armstrong became a test pilot. He flew all sorts of experimental planes testing them out to see how well they flew. It was a dangerous job, but very exciting. He flew over 200 different types of aircraft during his career.

Armstrong applied to become an astronaut and in September of 1962 he was selected for the NASA Astronaut Corps. He had to go through a series of harsh physical tests, but he passed and was soon part of the "new nine", or second group of nine NASA astronauts.

The Gemini 8

Armstrong's first trip into space was aboard the Gemini 8. He was the command pilot of the space capsule and piloted the first successful docking of two vehicles in space. The mission was cut short, however, when the capsules began to roll.

Apollo 11 and Walking on the Moon

On December 23, 1968 Neil was offered the command of the Apollo 11. This would be the first manned landing on the Moon. This was an exciting time for the entire country. The United States was in a [race with the Soviet Union](#) to put the first man on the Moon. If the flight was successful, Armstrong would be that man.



The Apollo 11 lander, the Eagle, on the Moon
Photo by Neil Armstrong

After months of practice and preparation, the Apollo 11 spacecraft launched from Kennedy Space Center in Florida on July 16, 1969. There was one scary moment in the flight where Armstrong had to take over manual control of the landing. This was not the plan and, if the landing took too long, would leave the crew short on fuel. The landing was successful and they had around 40 seconds of fuel remaining. Upon landing Armstrong said

"Houston, Tranquility Base here. The Eagle has landed."

After landing, Armstrong was the first to leave the craft and walk on the Moon. The historic date was July 21, 1969. His famous words upon being the first man on the Moon were "That's one small step for man, one giant leap for mankind". Buzz Aldrin also walked on the Moon during this trip. They collected Moon rocks and were on the Moon for over 21 hours. While the lunar module, named the Eagle, was on the Moon, the third astronaut, Michael Collins, orbited the Moon in the command module.

The three pilots arrived back on Earth on July 24th. They landed in the Pacific Ocean and returned heroes.



After Apollo 11

Buzz Aldrin by Neil A. Armstrong

After the Apollo 11 flight, Neil held many positions with NASA. He also worked as a professor of aerospace engineering at the University of Cincinnati.

Fun Facts about Neil Armstrong

- He earned the Eagle Scout badge in Boy Scouts.
- Six hundred million people watched the first moon walk on TV.
- The footprints made by Armstrong and Buzz Aldrin are still on the Moon. The dust is thick, but there isn't any wind to remove them.
- He was awarded the Presidential Medal of Freedom, which is the highest honor a civilian can earn from the US government.
- He stopped signing autographs after he found out that people were selling them on the internet.

Astronauts in Hard Hats

Outer space is a heck of a place to build a home. Just ask the astronauts charged with assembling the International Space Station. For starters, it's alternately frigidly cold and dark as ink, then blisteringly hot and bright as a noontime desert—a climatic flip-flop that takes place every three-quarters of an hour. Below, see and hear six astronauts tell what it's like to "translate" (spacewalk) and otherwise cope with the largest construction project ever undertaken in orbit. For capsule biographies of the astronauts, click on their names.

Working in space

"Building the space station is not an ordinary construction job. It's very different, and it's different from building a house or a skyscraper, in that we're working in a very hostile environment, a very isolated environment. So, first of all, we're not as efficient working in these big, bulky spacesuits. We're time-constrained, up to eight hours at a time. We're constrained on the amount of tools and weight we can carry to space. So there it's somewhat unique.

"But part of the problem is, **we have to have it all figured out before we show up in space.** It's got to be all figured out, while on a construction site, if you're building a house and you cut a two-by-four to a certain length and you go to install it and it doesn't work, well, it might be a little inefficient, but basically you toss that board, you go cut another one, and you're off and running. If we show up in space, and now that piece that we're putting on doesn't fit, we're out of luck. That may have just delayed the next series of missions. We may have to add another mission now to bring up the right component, because they're all linked. So it's very complicated." -[Kent Rominger](#)



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See Julie Payette in
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"When you go up there for construction, not only do you have to bring the material to do the construction and all the equipment to do the outfitting, but you have to bring every single little tool that you might require, every infrastructure that you require to build the actual station. And then you have to bring every single thing you need to sustain the lives of the construction workers, the crew members, that go up there, because there is absolutely nothing. As I often say to people, unfortunately, **there is no hardware store around the corner**, so if you forgot a particular type of washer or you don't have the right screwdriver, well, you can't go back and get it." -[Julie Payette](#)

"The tasks themselves are actually rather mundane. Although the environment is rather exciting, we were hooking up power and data cables between Zarya, the Russian control module, and Unity, the American-built node. So we were hooking up data cables, power cables, we were putting out sun shades, cleaning things up, preparing for the next missions. So on some level, the tasks are the mundane tasks that go into building something—to making a laboratory, an office building, ready for people to inhabit it and do work in it.



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"That's what's fascinating about it. **It is the environment in the end which is the challenge** and not the mundane tasks. It's being able to go outside and to have only two people at a time typically, and to work in a vacuum with temperature extremes from -200°F to +200°F, and [going] from daylight, and 45 minutes later it's dark, 45 minutes later it's day." -[Jim Newman](#)

"There is a plan as the space station grows to take up a large space station manipulator arm, and once it is on the station, that will be able to help us with



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the construction....**This new space station arm is able to walk**, it can literally walk from one end to another. The beauty of that is that, as the station grows and becomes very large, you'd have a hard time designing any arm to do everything you wanted it to do. So what's been designed into the station is, either end of the arm can attach itself to any point on the station. So ideally you attach to an area where you need to work, and if a week later or days later you need to work in another area of the station, you can walk the arm around the station to position it to a more usable space to work." -[Kent Rominger](#)

Spacewalking

"What we call 'translating' around the space station, people call spacewalking. But, of course, you can't actually walk in space. There's nothing for your feet to walk on, in the sense of gravity holding you down to walk. **What we end up doing is actually more of a space crawl.** It's like climbing something that's going straight up. That is, you use your hands a lot, in fact, almost entirely, in order to move around the space station. So you grab ahold of one handrail, then you grab ahold of the next one. You let go of the last one, you grab the one you're on, you grab the next one. And that's literally how you do it, from one after the other handrail to wherever it is you're going.



See Newman in
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"There is one other way, and we call it the Elevator. That is, if you get on the end of the robotic manipulator system, on the end of the arm, it can actually take you wherever it is you need to go." -
[Jim Newman](#)



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"One of the things we have to do while we're on our spacewalks is loosen a lot of bolts. And that's complicated in space because you have to react to all the torques. That's the technical way to put it, but if you've ever been in a swimming pool and worked on something, you know that if you turn something one way, it's going to turn you the other. If you're on ice and you push on something, you obviously go the other way, and in space, of course, that's true in all three dimensions.

"So if you have an electric drill as we did, and loosen a bolt, and you're not tied down with your feet or your hands, **you can feel it trying to turn you the other way.** So we have to react to all the torques ourselves, and there are two ways to do it: one with your feet in a foot restraint, [or free-floating.](#)" -Jim Newman

"[A] lot of the tasks we have to do free-float. You're really working hard. You might watch an EVA [Extra Vehicular Activity, or spacewalk] and think, 'Gosh, these guys are moving slow, and they're not working that hard.' Inside the suit, **you're constantly flexing all of your muscles to keep control.** A good example: If you start translating [spacewalking], and then you go to stop—you put on the brakes with your hand—you're going to pitch up. Your feet are going to tend to fly up over your head. So you have to constantly sense any rates that your body might be getting on it, then put in a force to null that rate. So when you go to stop, you're stopping with one hand and you're pushing up with the other, so you don't pitch out of control." -[Mike Gernhardt](#)



See Mike Gernhardt in
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See Newman in
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Inside a spacesuit

"Training in the Neutral Buoyancy Lab [a swimming pool used for instruction before spaceflight] is very good training. It's harder in some ways than actually going outside, because of the gravity effects in the pool. Once we're in the pool, they put us in a spacesuit, a real spacesuit, and pressurize us ... and that's what really makes a lot of spacewalking difficult, because your hands are in this balloon. And you know that if you want to bend a balloon, it takes work. So every time you close your fingers or open your hands, you're actually working against the suit...The training in the tank is very important because it doesn't pay to fight the suit. The suit will win, so **you have to learn how to be one**

with the suit." -[Jim Newman](#)

"Different tasks can be more tiring than others. But just the entire experience of being in the suit, which is pressurized, can be very, very tiring, because any movements—you're sort of like the Michelin Man, you know, you're puffed up in this suit, which means that any movements you make with your hands or your arms, they're all against pressure. It's like, you're pressurized, and you're a little puffed up, so there's a lot of resistance.

"The way the suit is designed, it's very protective, because, of course, you don't have anything out there. **You're in your own little spacecraft**, actually, when you're wearing this suit. So as a result of all the protections, it's kind of stiff. So essentially what they're doing is lifting weights for six to seven hours. And so obviously if the task is very intensive with their hands, then they're lifting even more weight. So there are times built in for them to rest. But from an endurance and a strength standpoint, it's an incredible workout." -[Pam Melroy](#)



See Pam Melroy in
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See Rick Husband in
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"The American suits will have a SAFER backpack on. It's called a Simplified Aid for EVA Rescue, and it's a fancy acronym for saying that if for some reason your two tethers have come loose and the worst has happened and you've floated away from where you've been attached to the station, you can activate this SAFER, and it's got some nitrogen jets that you can use to fly yourself back to the station and **grab hold and get yourself retethered.**" -[Rick Husband](#)

"If we got a small hole [in our spacesuit], our oxygen would start coming out of the spacesuit, and the pressure would start to drop. If the pressure drops too far, then you'll get the bends, and if it drops below about 2.5 psi, then you don't have enough oxygen to maintain useful consciousness.

"Now, we have a device called the Secondary Oxygen Pack on the back of our backpack, and it's got a whole lot of oxygen in it, and it would be able to support a small leak for—depends on how small it is—but for at least 30 minutes. So for a small leak, we'd have our secondary-oxygen system kick in, and we'd be heading back to the airlock and repressurizing, and we'd be fine. **A big leak**—like a big hole in the suit, say a half-inch hole or something like that, or if your glove blew off—**would pretty much be a real bad day for you.**" -[Mike Gernhardt](#)



See Gernhardt in
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See Gernhardt in
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Better be tethered

"Your safety tether is like a reel. It's a wire tether on a spring-loaded spool that tends it, and that is attached to you and the space station at all times, because if you should ever let go of the station, the tether will pull you back in, or you can grab it and pull yourself back in. If you didn't have that tether and you let go, **even if you're two inches away from the station, you can't swim over there**. There's no water to create forces against. So it's critical from a safety perspective that you be tethered at all times." -[Mike Gernhardt](#)

"It is a challenge, because if you let go of something, it floats away. So you have to be very careful in how you tether. **If you let go of the structure, you would float away**, so you have to be very careful, make sure your safety tethers are secure." -[Jim Newman](#)



See Newman in
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See Gernhardt in
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"One of the things that you learn to do, in addition to processing the task that you're working on and thinking two or three steps ahead, **you're also constantly thinking about where your tether is**, where your buddy is, where his tether is, and where the airlock is. So that in any point in time, if something should go wrong, if he should get a leak in his suit, I know where he is, and I'm going over there, and I'm going to help him get back to the airlock." -[Mike Gernhardt](#)

My person's mantra is:

Learning more...

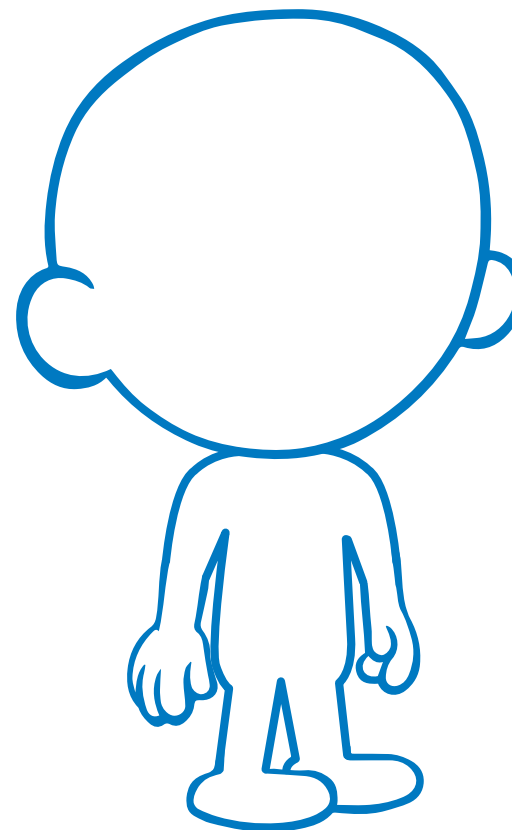
What other questions do you have about your person? Where could you look for answers?

1.

2.

3.

My biosketch about:



Draw your person.



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Based on the
book series



Author:

Amazing facts:

What does this person do?

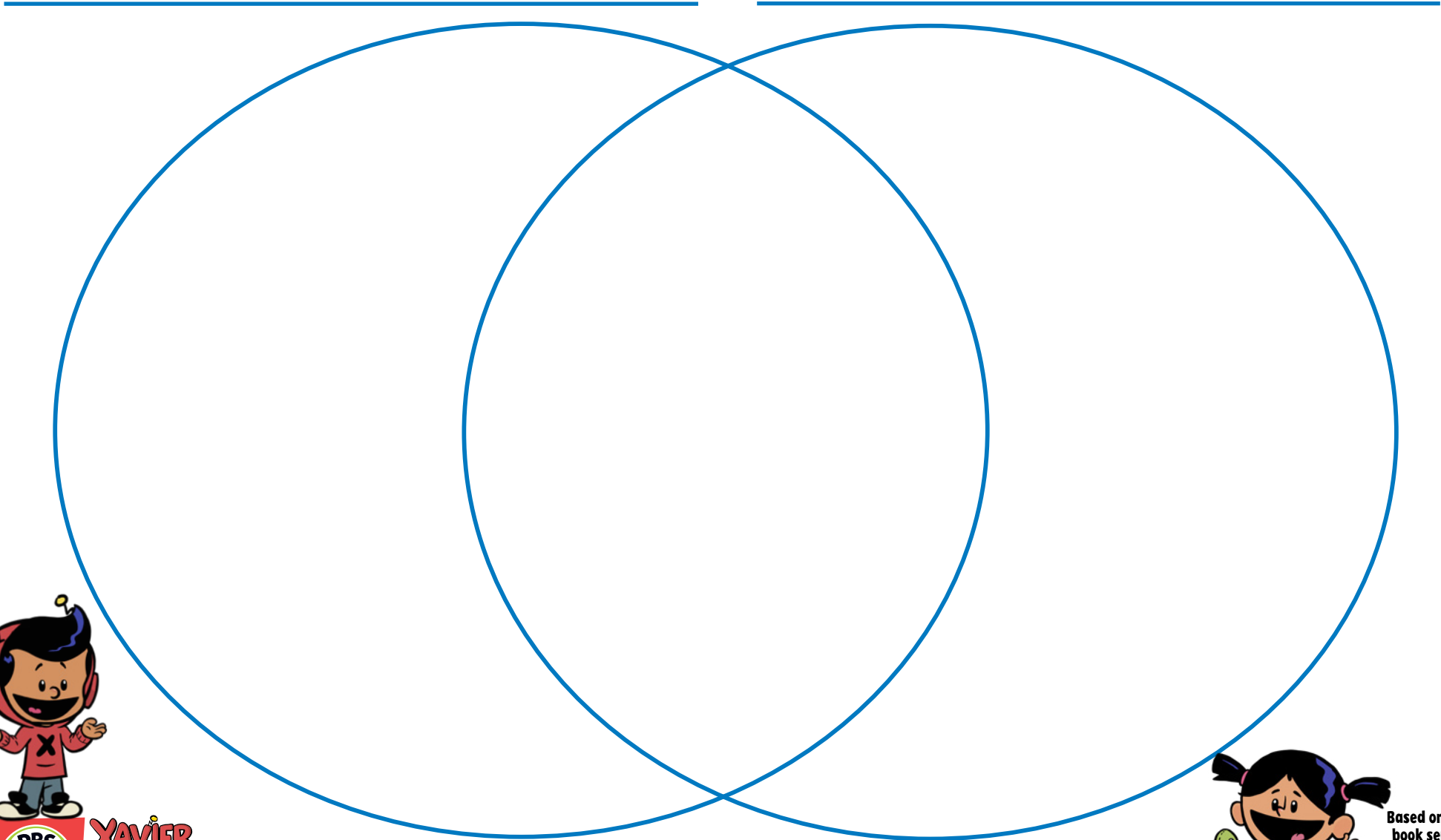
Why is this person important?

Draw something important to your person:

Write a caption about this drawing:

Compare and Contrast

Name



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