

Astronomy Lesson for small children about the Solar System

Note: Sentences in *Italics* are instructions for the communicator

(Depending on the number of children we have 8 planets, 5 dwarf planets, and 7 interesting moons all scaled to the right size in comparison to each other. The 4 large planets have only one piece, but everything else has a necklace in addition to a small planet/moon on a stick. The necklace is so that the features can be seen since some of the moons are only a few millimeters across)

(If there are many extra children you can also use Cassini, New Horizons, and Osiris-REX)

Planets

The Earth, Sun and Moon are not alone in the solar system

I have beautiful photos of other planets and moons here for you to choose from so we can make the solar system together.

(Let the students choose either when they come into the lesson or after this introduction. Both options work well)

There are 3 types of planetary bodies in the solar system we are using today: planets, moons, and dwarf planets. The solar system has 8 planets and 5 dwarf planets.

There are so SO many moons, but I have chosen 7 of the most interesting ones. Planets are big and dwarf planets are small and moons are **very** small.

(Now sort the children into types of celestial body)

Whoever thinks they have a planet come stand here, those with dwarf planets here, and those with moons here.

(They arrange themselves and it's probably good but give hints and change them around if needed)

(As you introduce the planets the kids come and get in order from the sun. If you have something that can represent the sun then the students can make circles around it. If they are really brave they can spin and orbit the sun at the same time)

-Ok Planets: The first planet, nearest to the sun is Mercury, the smallest normal planet. What do you think of Mercury? It looks a bit like the moon. This is because it has almost no atmosphere like the air we breathe on earth.

-The next planet is beautiful Venus. Venus has so much atmosphere and so many clouds the we can't see the ground, but we have sent robots there. Under the clouds there are volcanoes and it is so hot that some metals can melt! If you see ever Venus in the sky it is so bright that people in the past thought that it was a star, so they called it the evening star or the morning star. This is because you can see it at sunrise or sunset. Venus spins backwards compared to the other planets.

(If the child with Venus wants to spin, have them spin the opposite direction to Mercury)

-Then comes the Earth – not too warm or too cold with lots of water, animals and plants. It's the only planet that we know of that has life.

-The fourth planet is Mars – What color is Mars? Maybe brown or orange or red? People sometimes also call it the Red Planet. Mars has the highest volcano in the whole solar system called Olympus Mons and a huge valley called Valles Marineris *(Point this out on the image necklace)* . Long ago people thought that there were canals on Mars because of the lines on the surface. We have sent several different robots to Mars to drive around and look at the dirt and rocks on the surface and look for water or signs of life. The most recent robot – Perseverance – arrived in 2021 and has a little helicopter with it to fly around and discover things. *(Update this if there is a newer mission)*

– Jupiter is the next planet, it is the largest planet with beautiful stripes and shapes in its clouds. It has a very thin ring that you don't usually see in photos. There is a giant red storm like a hurricane on Jupiter called the Great Red Spot that is larger than the earth and has been around for more than 400 years.

(Have the student with Earth show that their planet is about the same size as the Great Red Spot)

– The sixth planet is Saturn with beautiful rings. For a long while there was a mission called Cassini visiting Saturn and taking pictures of the planet and its moons. Cassini showed us that Saturn has a hexagon shaped cloud at the north pole! Even though all 4 of the big planets have rings, Saturn has the biggest and brightest.

(If using Cassini, include here)

– Uranus is the seventh planet. It could not be seen without a telescope, so we haven't known about it very long, only about 200 years. Uranus also has rings, but they are very dark. Uranus is a bit strange because it is sideways so it rotates like it is rolling instead of spinning.

(The student with Uranus may want to try to spin leaning sideways. This usually gets some giggles)

– Neptune is the last planet in our solar system. It is a beautiful blue color and sometimes it has giant storms – the Great Dark Spot is one. This picture was taken more than 30 years ago (1989) and astronomers have now seen that the Great Dark Spot is gone!

(If there is space then have the students with planets sit in order from the sun)

Questions to check understanding and break up the lesson

*Which planets do you think you can see without a telescope?

(Mercury, Venus, Mars, Jupiter, Saturn. If they are visible in your area in the evening, tell the students)

*What similarities can you see between different planets?

(The 4 inner planets are small, the 4 outer planets are big, the outer planets have rings, the inner planets are made mostly of rock and the outer are made of gas, any other relevant observations are also good)

*Which planet is the warmest?

(They might guess Mercury, but it is actually Venus – because of its thick atmosphere)

*And which is the coldest?

(Uranus – even though it is the same size as Neptune and closer to the sun, it is colder)

Dwarf Planets

– There are also dwarf planets.

They are very small but larger than the other objects around them.

– Here is Ceres between Mars and Jupiter together with thousands of asteroids – large rocks sometimes with ice on them.

(Ceres should be positioned between Mars and Jupiter)

(If using Osiris-REX)

-- The NASA spacecraft Osiris-REX visited one of the asteroids named Bennu. Osiris-REX sucked up lots of dust and ice from the asteroid and is bringing it back to Earth (in 2023) for scientists to study and find out what asteroids are made of.

All of the other dwarf planets are out past Neptune in the Kuiper Belt where there are many more planetary bodies than we can count far, far away from the sun.

-- In 2015, the New Horizons spacecraft flew by Pluto to take beautiful photos. Now we know that Pluto has a little heart shape on it made of frozen air. Even though it isn't a planet anymore, it is still a beautiful dwarf planet.

-- We have not made photos of Eris, Makemake, or Haumea. Artists have drawn these to look the way astronomers expect. Haumea is not a ball but more of an oval. Makemake is very dark and about the same size as Pluto. Eris is very bright so it is probably icy.

(If using New Horizons)

--A couple of years ago (2019), New Horizons also flew past one of the other Kuiper Belt Objects, called Arokoth. It is not big enough to be a dwarf planet, but they took amazing pictures and it looks like 2 little planets stuck together.

Scientists think that it might become a comet some day.

Moons

Most of the planets in the solar system have moons.

The one we know the best is our Moon. Did you know it is also named Luna?

Our Moon goes around the earth and pulls on the oceans making the tides.

(The child who has the moon may orbit the earth. If they are having fun, then they can try being tidally locked by always facing the Earth while they orbit around. If you're really up for some chaos, then the Earth can orbit the sun while the moon is orbiting the Earth)

Jupiter has more than 60 moons but the 4 largest were discovered 400 years ago by Galileo Galilei. These moons are named Io, Europa, Ganymede, and Callisto.

(Bring these moons to orbit Jupiter one by one until you have all 4 moons going around)

--Io is the closest moon to Jupiter and it has more than 400 volcanoes and 100 mountains.

--The next moon is Europa with an upper layer of ice that makes scientists think that there could be water underneath, and maybe even life!

--Then comes Ganymede, the largest moon in the solar system, that might also have ice and water

--The last of Jupiter's big moons is Callisto and it has the most craters out of all the moons in the solar system

Saturn also has more than 60 moons, but I have chosen my two favorites to share with you.

(Again bring both moons to orbit Saturn and Cassini if you are using it)

*Titan is the second largest moon in the solar system and it has thick clouds. When Cassini was visiting Saturn it also had a smaller robot on it that landed on Titan. The lander took pictures of Titan's surface and Scientists saw from these pictures that there were mountains and lakes there, not made of water, but of methane (the same substance than the gas we use on the stove for cooking). Under its clouds, Titan looks like a little planet!

*Enceladus is a small icy moon and Cassini discovered that it has ice volcanoes. It is a very small moon, but if it has water then it might also have living things! Scientists were so worried that Cassini would crash into Enceladus after it ran out of fuel and hurt any living things that might be there that they crashed it into Saturn instead.

(If using Cassini and the kids are willing, they can crash Cassini into Saturn)

Uranus and Neptune also have lots of moons, but we haven't studied them very much because they are so far away.

Moon Questions

*Do you think some planets don't have moons?

(Mercury and Venus don't, but all the dwarf planets do!)

*Why do you think some moons have volcanoes?

(Their planet pulls on them so hard that the inside is always hot enough for lava)

Last questions:

*Which is your favorite planet/moon/dwarf planet/space mission?

(Fill in your own, but this is my answer: My favorite planet is Jupiter, but I also love Saturn. And my favorite moon is Enceladus.)

*Do you think that people will some day visit other planets or moons?

(open question)