

STARDOME OBSERVATORY & PLANETARIUM FACTS, RESOURCES AND ACTIVITIES ON...

WHY PLANETS ARE DIFFERENT

Our Solar System has eight planets which have environmental conditions very different from each other. Often students are just told what the planets are like; here we explore what causes the different conditions.

There are four main factors to discuss:

1. COMPOSITION

There are two main types of planets; gas planets and rocky planets.

- Rocky planets have a distinct surface (the ground).
- Gas planets are made entirely of gases so have no surface/ground. You can't land on them but would instead have to float in the clouds otherwise you would fall into the centre of the planet and be crushed by the pressure.
- In our Solar System all the inner planets are rocky and the outer planets are gas giants... but that isn't always the case. In other star systems gas giants have been found even closer to their star than Mercury is to ours.

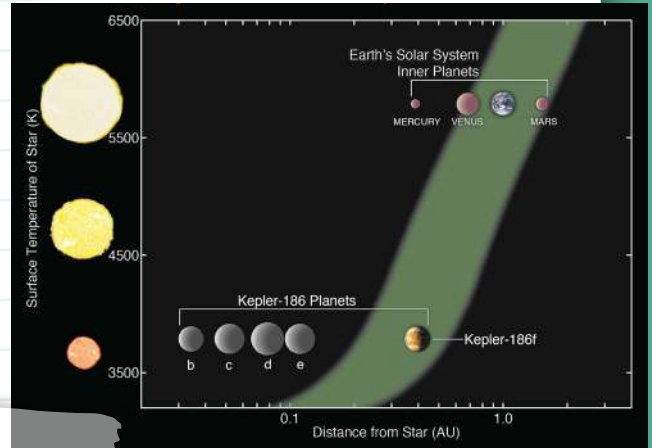
2. DISTANCE FROM THE SUN/STAR

- Planets closer to the Sun get more heat and light than planets farther away from the Sun, so tend to be hotter. A good analogy is standing by a heater; when you stand right next to it you can feel its heat and it warms you up but the farther you walk away the less you can feel the warmth.
- Earth is in the Goldilocks Zone, where it is not too hot and not too cold to have liquid water. As far as we can tell, liquid water is required for life to exist. Other stars can also have a Goldilocks Zone, but its distance from the star will depend on what the star is like.

3. SIZE

Planets come in different sizes and so have different gravity levels.

- Mars is smaller than Earth so has less gravity. On Mars you weigh less and would be able to carry more. Smaller planets are also less likely to have an atmosphere, as there may not be enough gravity to hold the gases to the surface.
- If you could stand on Jupiter you would feel 2.6 times more gravity than Earth, so would struggle to walk around. In other star systems there are planets much larger than Jupiter so we would be crushed flat!



Solar System comparisons. Credit: NASA

There are eight planets orbiting our star, the Sun. Other stars can have planets too - more than 2000 planets have been discovered orbiting other stars!

4. ATMOSPHERE

Atmospheres can insulate a planet and keep it warm, like being wrapped in a blanket. This is why Venus is hotter than Mercury, even though it is farther away from the sun.

- Rocky planets may or may not have atmospheres. They can be thinner (Mars's atmosphere is so thin that cyclone force winds would just feel like a light breeze) or thicker (Venus's atmosphere has as much pressure as 1km under water - it would crush us!).
- Gas planets have an atmosphere by default. The deeper you travel the more pressure and heat there would be.
- Atmospheres can be made from different chemicals, so we may not be able to breathe on a planet even if it has an atmosphere.

Check out this other resource...

➔ Build Your Own Solar System: <http://janus.astro.umd.edu/orbits/ssbuild.html>

What are some things that make the planets different from each other?

How would the conditions on other planets affect people? What sort of things would we need to bring with us to keep us alive on other planets?

How does the distance from the Sun affect a planet? What would happen if Earth were closer or farther away from the Sun?

DISCUSSION POINTS



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ACTIVITY

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MEET MY PLANET

Objective...

To demonstrate what causes different conditions on the planets in our Solar System, by creating their own scientifically accurate planet.

You'll Need...

- ⇒ Meet My Planet worksheet
- ⇒ Craft supplies
- ⇒ Internet access (optional)

Instructions...

In groups or individually, students select the characteristics of their planet. Beginning students can use the Meet My Planet worksheet, while advanced students can research the conditions of their planet in more detail.

Students create an artists interpretation of their planet; what does it look like? These pictures can be used to decorate the classroom. You could even make your own new star system!

Students can present their planet to the class and explain what it would be like to visit their planet.

Example...

ROOM 19'S SOLAR SYSTEM



Take a photo of your activity and send it to us.
We'd love to see it! education@stardome.org.nz



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MEET MY PLANET

COMPOSITION		SIZE		ATMOSPHERE		DISTANCE		MOONS + SATELLITES		
GAS Gas planets are like Jupiter. There isn't a ground to walk on. Instead, you would have to stay floating in the clouds so that you wouldn't fall into the middle of the planet and be crushed!		GIANT Gas planets are always big. But that doesn't mean they have lots of gravity. You would be almost the same weight on Saturn as you are on Earth.		SUPERGIANT Some gas planets can get so big they are almost the size of stars! These planets would have lots of gravity and would squish you if you could stand on them.		Gas planets are made of gas, so always have an atmosphere. They have lots of wind and big storms. They can be made of different gasses, which make them different colours. Some examples are: Hydrogen = red Ammonia = white Methane = blue		CLOSE A gas planet close to a star could heat up so much it would have clouds of hot iron! Not a pleasant place to be at all.	GOLDILOCKS ZONE These planets would be similar to Jupiter, but they might have a big moon that could be like Earth.	FAR AWAY These planets would be cold; definitely too cold for people to go outside.
ROCK Rock planets are like Earth, with a proper surface or ground.		TINY About the size of the Moon. You would feel so light on this planet you would have trouble walking!		NO AIR / ATMOSPHERE Tiny planets are too small to have an atmosphere. Without an atmosphere you cannot breathe. You also cannot fly in a plane, because planes need air to fly.		THIN AIR / ATMOSPHERE Mars has a thin atmosphere. There is wind, but even very fast winds would feel soft like a breeze. It would also keep the planet a little bit warmer than a planet without an atmosphere.		CLOSE These planets would be hotter than here on earth; water would boil away. Planets without atmospheres would be hot on the side facing the sun and cold on the side facing away.	GOLDILOCKS ZONE Not too hot and not too cold. A planet with an atmosphere here would have liquid water, like rivers and rain. This is a good place for life.	FAR AWAY Planets farther away would be cold; water would all be ice.
SMALL About the size of Mars. You would feel light and strong on this planet.		EARTH SIZE Similar to Earth; you can move around normally.		MEDIUM AIR / ATMOSPHERE Like on Earth. If it's the right kind of air, then there is enough air for people to breathe properly... and also get strong wind and storms. It also keeps the planet warmer than a planet without an atmosphere.		THICK AIR / ATMOSPHERE Venus has a thick atmosphere. The air is so thick it would crush you! It would also help keep the planet much warmer than a planet without an atmosphere.		MOONS + SATELLITES Planets often have many moons and other small bits of rock or ice orbiting around them. The bigger the planet the more moons it can have. Jupiter has over 60 moons, including 4 large moons. Saturn has lots of little rocks and ice orbiting it, so much they look like the pretty rings we see.		

