

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

# YOU'RE SO DENSE!

### What is Density?

The density of a substance is its mass per unit volume. Or, put more simply, it's how much stuff is in a certain amount of space.

For example, think of an elevator that goes up and down a tall building. The elevator always stays the same size, but sometimes it only carries a few people and other times it carries lots of people. The size of the elevator is its volume, and the number of people is the mass. So, an empty elevator will have a lower density of people than a full elevator.

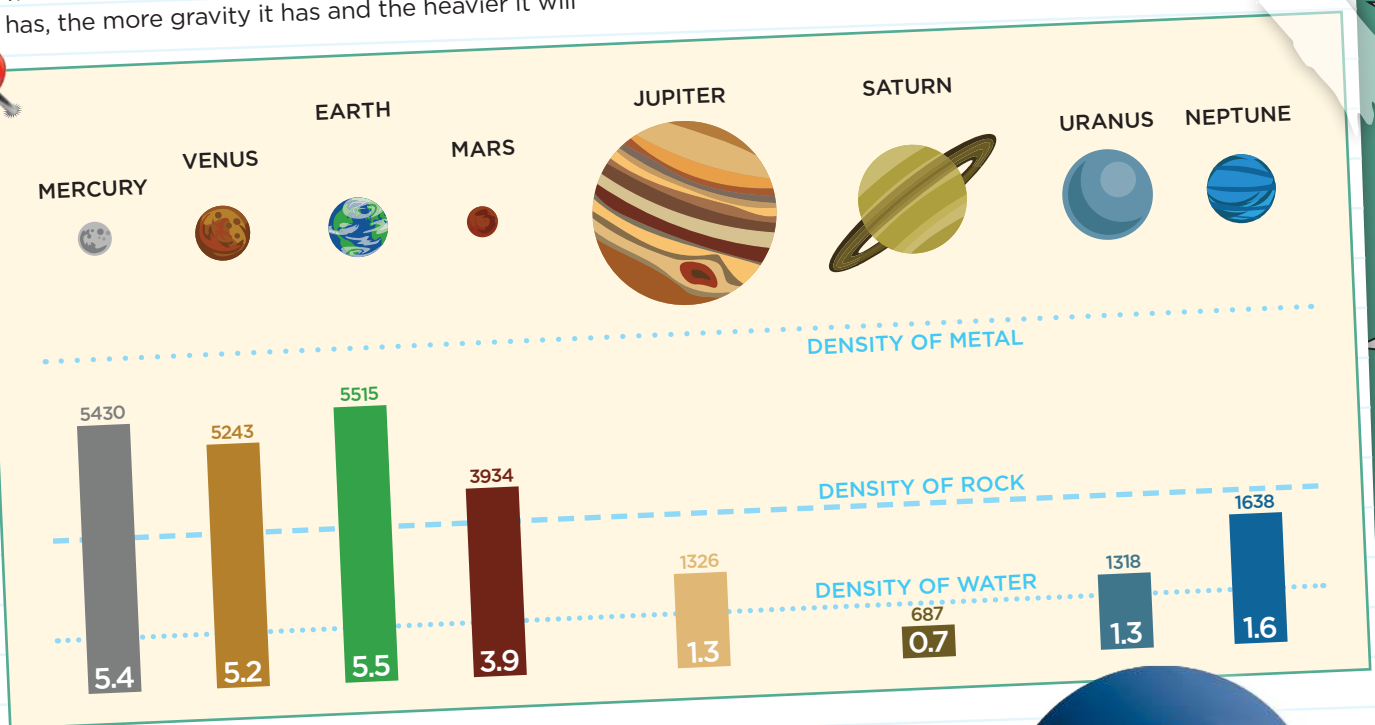
### You can't judge a planet by its size... at least not ONLY by its size!

Have you heard of gravity? Gravity is caused by mass and is the force that pulls us down onto the Earth. It's what makes you feel heavy. The more mass something has, the more gravity it has and the heavier it will

make you feel. Even you have gravity! But you would have to be very, very big to have enough gravity for anyone to feel it... as big as a moon or planet!

If you measure how much gravity a planet has and how big it is, you can work out its density. Knowing its density helps scientists figure out what the planet is made of. If you look at the diagram, you can see that the four planets closer to the sun are denser than rock but less dense than metal. This means they are likely made of both rock and metal, because the little bit of metal they have makes them a little bit heavier than rock.

*Saturn is less dense than water...  
so if you could put it in a giant  
tub of water it would float!*



Check out this other resource...

<https://curiosity.com/topics/the-densities-of-the-planets/>

Venus is less dense than Earth. Since metal is denser than rock, what does that tell us about how much metal Venus has?

### DISCUSSION POINTS

Do you think there is any rock in the four Gas Giant planets?



# ACTIVITY

## STARDOME OBSERVATORY & PLANETARIUM

# LOOKS CAN DECEIVE

### ACTIVITY ONE

#### WHICH IS HEAVIEST?

Explore the relationship between density and weight. Big things may not be heavy and small things can be very heavy.

#### You'll need:

- A set of boxes or jars of various sizes. It is best that students cannot see the contents.
- Material of different densities to fill the boxes/jars. e.g. sand, flour, water, metal, cotton wool, cornflakes, marshmallows etc.
- OPTIONAL: large container of water to float the boxes/jars in.

#### Instructions:

1. Fill your containers with different materials so that they are different weights and those weights do not correlate with size.
2. Display the containers (no touching!) and ask students which container they think is biggest/tallest/etc. and then which they think is heaviest/lightest. Discuss why they made that choice.
3. Let the children pick up the containers and weigh them to find out which one is heaviest.
4. Discuss the concept of density (also see next activity).
5. OPTIONAL: Students can measure the containers to work out their volume and then their density (mass/volume) in  $\text{g/cm}^3$ . Since water has a density of  $1 \text{ g/cm}^3$ , they can predict - and then test in the water - which containers will sink or float.

### ACTIVITY TWO

#### DEMONSTRATING DENSITY

Explore the relationship between density and volume.

#### You'll need:

- A bag of microwave popcorn and access to a microwave.
- A can of Coca-Cola, Coca-Cola Zero, Diet Coca-Cola and a bucket of water.

#### Instructions:

##### COCA-COLA

1. Display Coca-Cola cans so students can see they are the same size.
2. Gently place cans in water. Coca-Cola will sink. Diet Coca-Cola and Coca-Cola Zero will float.
3. Explain there is less sugar in Coca-Cola Zero so it is slightly less dense, just enough to float in water. Same volume, different mass.

##### POPCORN

1. Weigh popcorn packet.
2. Heat popcorn packet so that it expands.
3. Weigh popcorn packet again. Weight should be almost the same, despite being much bigger. Same mass, different volume.



Take a photo of your activity and send it to us.  
We'd love to see it! [education@stardome.org.nz](mailto:education@stardome.org.nz)



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