

STEM *Sims*TM

Volume-Density

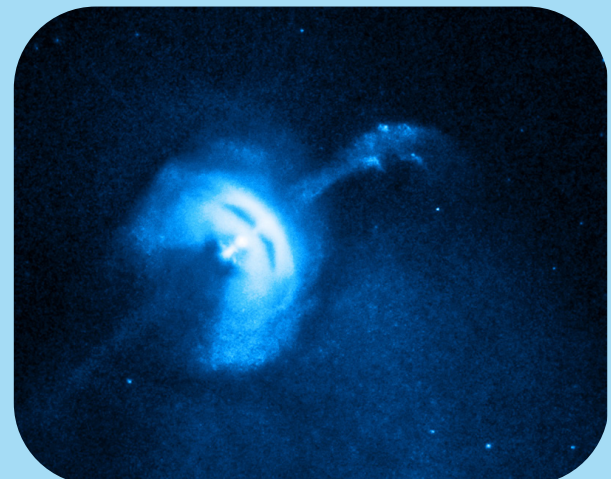


Volume-Density

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Start learning right now about the volume, mass, and density. Take the following brief quiz to see how much you already know about measurement and density. See the bottom of page 4 to check your answers.

- Which phase of water (H_2O) is the *most* dense?
 - solid
 - liquid
 - vapor
 - all three phases have the same density
- One thimble full of pulsar material (a type of star) would have about the same mass as:
 - 50 elephants.
 - 5,000 elephants.
 - 5,000,000 elephants.
 - 50,000,000 elephants.
- In interstellar space, about how many atoms are in one cubic meter of space?
 - 5
 - 500
 - 500,000
 - 50,000,000
- The average density of which of the following is the *most* dense?
 - fresh water
 - sea water
 - the human body
 - all three have exactly the same density.
- Which temperature of liquid water is the most dense?
 - 0 °C
 - 1 °C
 - 4 °C
 - 6 °C



Making a Cartesian Diver

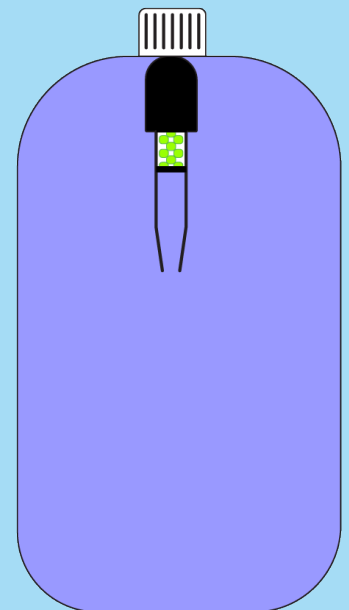
A cartesian diver is a great tool to both amaze your friends and family and also learn about density. Are you ready to dive into this experiment?

Materials

2-L empty soda bottle	water
1- eyedropper	towel

Directions

1. Make sure to get proper permission before you do this experiment. It can get messy.
2. Fill the empty soda bottle all the way to the top with water.
3. Fill the eyedropper about 1/4 of the way with water.
4. Place the eyedropper tip down inside the filled soda bottle. Make sure the dropper just floats. (You might need to slightly adjust the water inside the dropper to make it float.)
5. Add more water to top-off the soda bottle.
6. Place the bottle lid securely on the bottle.
7. Gently squeeze the sides of the soda bottle. The dropper should sink to the bottom of the bottle.
8. Release the sides of the bottle and the dropper should rise to the surface.
9. Continue squeezing and releasing the bottle sides to make the dropper hover in place.



Questions for you

1. Why did the dropper sink when you squeezed the sides of the soda bottle?
2. Why did the dropper rise when you released the sides of the soda bottle?
2. Which is denser, the air inside the dropper or the water? Please support your answer with a reason.

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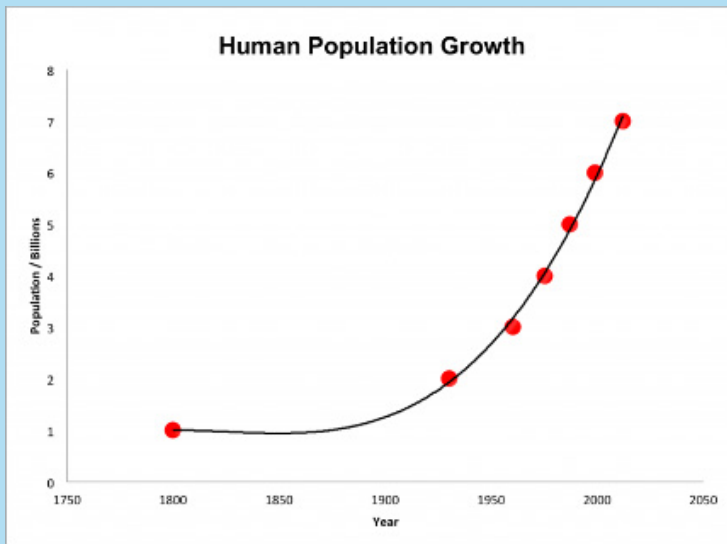
Density of a Different Type

While density in science is defined as the compactness of a material, other types of compactness occur in the world. Population density is the amount of people in a given area. Macau China currently holds the record for being the densest place on Earth with an average of over 21,000 people in each square kilometer of space. To give you an idea of how dense this is, the United States has an average population density of 34 people per square kilometers. Australia only has an average density of 3 people per square kilometer.



While Earth has over 510,000,000 square kilometers of land space, about one-half of this land is not fit for habitation. Antarctica, high mountain ranges, and desert areas all are spaces that most people would not want to

live in. In fact, over 95% of the total world's population lives in about 10% of the available land spaces. People must like to live close together.



In 1880, the world population was about 1 billion people. By 2020, the population soared to about 7.7 billion. Since land is a finite resource, the population increase will likely cause the population density to increase over the next hundred years. So, get ready to do as the Beatle's sang and "Come Together."

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STEMsims.com

Answers: Page 2 Answers: 1) b, 2) d, 3) c, 4) b, 5) c. Page 3 Cartesian Diver Answers: 1) Squeezing the sides of the bottle forced water up inside the dropper and reduced the volume of air inside the dropper making it denser. This caused the dropper to sink. 2) Some of the water inside the dropper moved out and decreased the density of the dropper causing it to rise. 3) The water is denser than air.

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