Science - Volume 3 - Version 12

CARDINAL COMPASS - NO. 3 • HANDS-ON LEARNING • WITH CARL THE CARDINAL

Liquid Density - Vol. 3

Why liquids stack. Why things float or sink. And three experiments you can build safely at home.



Some liquids stack in layers. Some things float. Some things sink. Density tells us why. The colored column in this cover picture is an illustration. Your real column will use four liquids and may look different.

Read together | Build together | Adult with you for every experiment



Meet Carl - Density Carl

Carl the Cardinal is your guide. For density, he stands by a tall rainbow column. An egg floats inside it. His green neckerchief and gold compass medallion stay on. Color your own Carl on the last page.

How to use this book: Pages 2-3 tell the story. Page 4 is safety. Read it first. Then do the three builds on different days. Finish with the questions. Color Carl at the end.

Keep a notebook near you. Write what you guess. Write what you see.

You will need, for all three experiments: honey, dish soap, water, food coloring, cooking oil, a tall clear glass or jar that holds at least 1 and a half cups, a clear jar that holds at least 2 cups, a measuring cup, level measuring spoons (a 1-tablespoon spoon), table salt, a raw egg, spoons, a spoon for stirring, safety goggles, a tray with a rim, small cups, a separate small clear cup for the mixing test, and test things: a grape, a cork, an ice cube, a coin, a wooden bead, a raisin, and a paperclip, plus a sheet of aluminum foil for the test on page 12. Plus a notebook and crayons.

What is density?

Look at the tall glass on the cover. That colored column is an illustration. In the picture, the liquids did not mix into one color. They stacked. Each one sits in its own layer. Why?

Density is how much mass fits in a certain amount of space. Mass is how much stuff something is made of. More mass packed into the same space means more dense. Less mass packed in means less dense.

Float means to stay on top of a liquid, or to hang in it without sinking to the bottom.

Sink means to go down through a liquid to the bottom.

Dissolve means to mix in so fully that you cannot see the bits anymore. Salt can dissolve in water.

Mixture means two or more things put together. Salt water is a mixture.

Mass is how much stuff something is made of.

Why things float or sink

A thing floats in a liquid when it is less dense than the liquid. A thing sinks when it is more dense than the liquid. It is a fair test. Compare the thing to the liquid it sits in.

Ice is less dense than water. So an ice cube floats. A coin is more dense than water. So a coin sinks.

Why liquids stack - and why some mix

The most dense liquid sinks to the bottom. The least dense liquid floats to the top. Poured gently, they can stack. But not all liquids stay apart. Some mix right in. Watch what happens in yours. There is no single right stack to copy.

Salt changes water. When salt dissolves in water, the water gets denser. The salt is still there. You just cannot see it. Denser water can hold up things that sank before. You will test this with an egg on page 7.

> **Remember honey from Unit 1?** Honey is back. In Unit 1, honey flowed slowly. That is **viscosity** - how easily a liquid flows. Honey is slow and thick. Honey is also the densest liquid in this book. Watch for it at the bottom of your column.

A first look: same mass, different space

Picture two lumps of clay on a scale. Each lump has a mass of 60 grams. On the scale, they match. The scale cannot tell them apart.

Now roll one lump into a small, solid ball. Shape the other lump into a bigger, hollow ball, like a tiny bowl closed up with air inside it. The mass did not change. Both lumps still have 60 grams of clay. But the hollow ball takes up more space.

Same mass. More space. That means less mass is packed into each bit of space, so the hollow ball is less dense. On page 11 you will work this same idea out with numbers, step by step, and check your work.