

The Next Generation Science Standards (NGSS)

CHAPTER 3, LESSON 1: WHAT IS DENSITY?

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

DISCIPLINARY CORE IDEAS

PS1.A: Structure and Properties of Matter

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. (MS-PS1-1)
- Each pure substance has characteristic physical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3)

Students calculate the density of eight different cubes, all with the same volume but different masses. Students use illustrations of the atoms and molecules that make up the different cube materials to begin to understand how the atoms and molecules of a substance determine its characteristic properties, including density, and can be used to identify it.

SCIENCE AND ENGINEERING PRACTICES

Developing and Using Models

- Develop a model to describe unobservable mechanisms. (MS-PS3-2)

Planning and carrying out investigations

Analyzing and interpreting data

Using mathematics and computational thinking

Engaging in Argument from Evidence

Students investigate the question: Can density be used to identify eight cubes made of different materials? Students measure the mass of eight different cubes, calculate the density of each cube, and use this information along with data given in a chart, to identify the material the cubes are made from (4 metal, 2 plastic, and 2 wood). Students see molecular model illustrations of metal, plastic, and wood. Students use and further develop this molecular model and apply it to evidence they have observed to explain their observations on the molecular level and to answer the question to investigate.

CROSCUTTING CONCEPTS

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)

Students use molecular-level models of different substances to explain how these sub-microscopic characteristics affect the macroscopic observable characteristic of density.