GENERATIONGENIUS
STREAM. EDUCATE. ENTERTAIN.

TEACHER GUIDE

PROPERTIES OF MATTER
GRADES 3-5

COMMON MISCONCEPTIONS

- **The term matter has many different meanings in our everyday language. "What is the matter with you?"**
  In science, matter is anything that takes up space (volume) and has mass (weight in elementary).
- **Energy is matter.**
  Energy is the ability to do work. It does not take up space and does not have weight, and so is not matter.
- **Gases and liquids (particularly gases) are not matter.**
  Students may think that matter must be solid. Solid, liquid, and gas are all forms that matter takes. Each takes up space and has weight (mass).

MATTER

Matter is anything (physical substance or material) that has weight and takes up space. It is easy to comprehend solid materials as matter, for example, a paper clip or spoon, but less easy to understand that liquids and gases are also matter. In the video, Dr. Jeff shows evidence that air (a gas) meets the qualifications for matter in that it takes up space and has weight with the balance and one inflated and one uninflated balloon. Matter can be solid, liquid, or gas. There are things that are not matter, however. These things do not take up physical space or have weight (mass). Energy is a great example of something that we talk about and use that is not matter. Energy is the ability to do work. Other things that aren't matter include ideas, peace, and love.

PROPERTIES OF MATTER

Different types of matter have different properties. Some properties of matter that are accessible to students at this level include color, hardness (you may want to explore Mohs Hardness Scale for minerals), reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility—how well one thing dissolves in another. Density is not necessary at this level, but relative density can be addressed in preparation for Middle School.

RELATIVE DENSITY

Although the clarification statement for Performance Expectation 5-PS1-3 states that density is not intended to be an identifiable property at this grade level and density is outside the assessment boundary at 5th grade, it is included in a relative sense in the video as preparation for student study of density at the Middle School level. At the elementary level, density is not defined quantitatively. The concept of mass is not introduced at this level (weight is used instead). Density is introduced in a relative sense—something that sinks in water (or example, a rock) is denser than water, and something that floats in water (for example, wood) is less dense than water. Something that sinks in air is denser than air and something that floats in air is less dense than air. Sulfur hexafluoride gas is denser than air and helium is less dense than air. How something rises or sinks is related to a property of matter called density.