5th Grade Topic Model

Narrative and Rationale: The four bundles in this Grade 5 model all have a particular topical focus. Bundle 1 focuses on physical and chemical changes in matter. Bundle 2 builds on Bundle 1 to focus on energy and matter flows in ecosystems. Bundle 3 extends this study to focus on larger Earth systems and how they affect one another. Bundle 4 shifts the scale to the immensely large, as students build understanding of space systems.

By building familiarity with ideas related to the conservation and particulate nature of matter early on in the year, students are prepared to put this knowledge to work in investigating various life and Earth systems in later bundles. 5-PS1-1 is included in Bundles 2 and 3 to help students make this connection.

Note that the practices and crosscutting concepts described in each bundle are intended as end-of-instructional unit expectations and not curricular designations; additional practices and crosscutting concepts should be used throughout instruction in each bundle.

Bundle 1: How much does air weigh? **~10 weeks**	**Bundle 2:** What are we made out of? **~9 weeks**	**Bundle 3:** Where does rain come from? **~10 weeks**	**Bundle 4:** How far away are the stars? **~6 weeks**
5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. **5-PS1-2.** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. **5-PS1-3.** Make observations and measurements to identify materials based on their properties. **5-PS1-4**. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. **3-5-ETS1-3.** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen. **5-PS3-1.** Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. **5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water. **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. **3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**5-PS1-1.** Develop a model to describe that matter is made of particles too small to be seen. **5-PS2-1.** Support an argument that the gravitational force exerted by Earth on objects is directed down. **5-ESS2-1.** Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. **5-ESS2-2.** Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. **5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. **3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	**5-ESS1-1.** Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth. **5-ESS1-2.** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

1. The bundle only includes part of this PE; the PE is not fully assessable in a unit of instruction leading to this bundle.

5th Grade Topic Model Flowchart

Bundle 1

PS1.A as found in 5-PS1-1
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

PS1.A as found in 5-PS1-2
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.

PS1.A as found in 5-PS1-3
- Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.)

PS1.B as found in 5-PS1-4
- When two or more different substances are mixed, a new substance with different properties may be formed.

ETS1.B as found in 3-5-ETS1-3
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

ETS1.C as found in 3-5-ETS1-3
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Bundle 2

PS1.A as found in 5-PS1-1
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

PS3.D as found in 5-PS3-1
- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

LS1.C as found in 5-PS3-1
- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

LS1.C as found in 5-LS1-1
- Plants acquire their material for growth chiefly from air and water.

LS2.A as found in 5-LS2-1
- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

LS2.B as found in 5-LS2-1
- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Bundle 3

PS1.A as found in 5-PS1-1
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.

PS2.B as found in 5-PS2-1
- The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.

ESS2.A as found in 5-ESS2-1
- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

ESS2.C as found in 5-ESS2-2
- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

ESS3.C as found in 5-ESS3-1
- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

ETS1.A as found in 3-5-ETS1-1
- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

Bundle 4

ESS1.A as found in 5-ESS1-1
- The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.

ESS1.B as found in 5-ESS1-2
- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.

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ETS1.B as found in 3-5-ETS1-2

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.