Supplemental Materials for Standard 3 – Physical Science

The materials on the following pages are supplemental to the core. Each objective in Standard 3 has a sheet of information vital to student learning of science and the scientific processes inherent in the core. They are intended to give guidance to the teacher on the following topics:

- The Big Ideas go beyond discrete facts or skills to focus on larger concepts, principles, or processes (Grant Wiggins and Jay McTighe*, Understanding by Design,* 1998, p. 10). Big Ideas are cumulative, meaning that students revisit ideas that are previously developed, but in more and more complex ways at each successive grade level. This allows teachers to anchor learning at the beginning of the grade level to "concepts and reasoning abilities that young children bring with them" (NRC, 2008).

- Indicators provide both Measureable Outcomes framed by Standard 1objectives and Big Ideas and measurable indicators of student content knowledge and scientific processing for teachers.

- Science language is the language that students should use when conversing on each objective within the standard. Students may not be expected to spell and read each and every term.

- Guidance for combining Content and Process are suggested strategies teachers may use to teach the core. One-letter abbreviations (L, M, A, S) are included to show how the science learning may be integrated into Language Arts, Mathematics, Arts, and Social Studies concepts. Science content should never be taught as content alone, but should be taught through the process of scientific practice, embedding content into inquiry, hands-on learning, experimentation, interpretation of evidence, and communication of findings. "When students engage in science as practice, they develop knowledge and explanations of the natural world as they generate and interpret evidence." *(Ready, Set, Science: Putting Research to Work in K-8 Science Classrooms, pg. 34)*

- According to the National Science Education Standards, it is important to help students "establish connections between the natural and designed worlds." Guidance for combining Science, Technology, and Society provide support to teachers in this area.

- A key for interpreting the abbreviations used in the supplementary materials is found at the bottom of the page.

Important Note: A guide for reading the supplementary materials is found in Appendix B.

Subject	Grade	Standard	Objective
Science	**K**	**3. Physical Science**	**1. Identify how non-living things move.**

Content Big Ideas	Standard 1 Big Ideas – Intended Learning Outcomes	Science, Technology, and Society Big Ideas
(F) Things move in many different ways, such as straight, zig zag, round and round, back and forth, and fast and slow.	(PoS) People can often learn about things around them by just observing those things carefully (raise questions about the world around them, be willing to seek answers to some of those questions by making careful observations). (NoS) People are more likely to believe your ideas if you can give reasons for them (ask "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same questions). (CoS) When doing science activities, it is often helpful to work with a team and to share findings with others.	(T) People use appropriate tools and models to investigate the world. (A) People working alone or in groups, often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.

Indicators: Measureable Outcomes framed by Standard 1 Big Ideas

Indicator 1. Observe and record how objects move in different ways, e.g., fast, slow, zigzag, round and round, up and down, straight line, back and forth, slide, roll, bounce, spin, swing, float, and glide.

Indicator 2. Compare and contrast how physical properties of objects affect their movement, e.g., hard, soft, feathered, round, square, cone, geometric shapes.

Science language students should be able to use correctly: fast, slow, zigzag, round and round, up, down, straight line, back, forth, slide, roll, bounce, spin, swing, float, glide, push, pull.

Guidance for Combining Content and Process	Guidance for Combining Science, Technology, and Society
Suggested Strategies Have students build an incline ramp, have them place different items on the ramp and observe the movement as the objects go down the ramp. Use different shaped items, such as marbles, potatoes, geometric shapes, and cars. Ask the students to investigate the following questions (and others that you or your students choose): (PoS) • What are some of the ways that we can describe the movement of the objects? Can you predict which way an object will move? Have the students write their predictions in a journal. (L) • Which objects move faster down an incline ramp? Why do you think this? Predict which object would 'win' in a 'race' down the ramp. • How can you integrate measurement into these activities? Have students count how long it takes an object to move down the ramp and then make a graph for comparison. (M) (CoS) Have the students observe different objects moving through different mediums in the sensory table, as well as through the air. (Suggested mediums: water, rice, sand, clay) Ask the students to observe and record the movements of the objects. Ask them to investigate the following questions (and others that you or your students choose): (PoS) • How can objects (e.g., boats, balls, manipulatives) move in your sensory table (e.g., water, sand, rice)? Are some objects easier than others to move? • Does the shape of the object change the way it moves? Why do you think this?(FA)	(T) Discuss the use of technology in the process of science by pointing out the various tools used while learning this objective. Examples of tools are simple machines (ramp), rulers, stopwatches, Frisbee. (A)Explain the application of science by discussing how investigation into objects has led us to invent technology such as airplanes, cars, and bicycles. (S)Show that society has benefited from the use of science in studying how objects move in aerospace programs, athletics, and satellite technology.

Physical Science	Curriculum Connections		Processes, Communication, and Nature of Science	Applications: Science, Technology, and Society
(A) Atomic/Molecular	(M) Mathematics	(FA) Fine Arts	(PoS) Processes of science	(T) Tools of science
(F) Force and Motion	(L) Language Arts	(SS) Social Studies	(CoS) Communication of science	(A) Applications of science
			(NoS) Nature of science	(S) Implications of science for people