

GRADE LEVEL CONTENT EXPECTATIONS

1

 SCIENCE

v.4.07

Welcome to Michigan's K-7 Grade Level Content Expectations

SCIENCE PROCESSES

PHYSICAL SCIENCE

LIFE SCIENCE

EARTH SCIENCE

Purpose & Overview

In 2004, the Michigan Department of Education embraced the challenge of creating Grade Level Content Expectations in response to the federal No Child Left Behind Act of 2001. This act mandated the existence of a set of comprehensive state grade level assessments in Mathematics and English Language Arts that are designed based on rigorous grade level content. In addition, assessments for science in elementary, middle and high school, were required. To provide greater clarity for what students are expected to know and be able to do by the end of each grade, expectations for each grade level have been developed for science.

In this global economy, it is essential that Michigan students possess personal, social, occupational, civic, and quantitative literacy. Mastery of the knowledge and essential skills defined in Michigan's Grade Level Content Expectations will increase students' ability to be successful academically, and contribute to the future businesses that employ them and the communities in which they choose to live.

Reflecting best practices and current research, the Grade Level Content Expectations provide a set of clear and rigorous expectations for all students, and provide teachers with clearly defined statements of what students should know and be able to do as they progress through school.

Development

In developing these expectations, the Scholar Work Group depended heavily on the *Science Framework for the 2009 National Assessment of Educational Progress* (National Assessment Governing Board, 2006) which had been the gold standard for the high school content expectations. Additionally, the *National Science Education Standards* (National Research Council, 1996), the Michigan Curriculum Framework in Science (2000 version), and the *Atlas for Science Literacy, Volumes One* (AAAS, 2001) and *Two* (AAAS, 2007), were all continually consulted for developmental guidance. As a further resource for research on learning progressions and curricular designs, *Taking Science to School: Learning and Teaching Science in Grades K-8* (National Research Council, 2007) was extensively utilized. The following statement from this resource was a guiding principle:

"The next generation of science standards and curricula at the national and state levels should be centered on a few core ideas and should expand on them each year, at increasing levels of complexity, across grades K-8. Today's standards are still too broad, resulting in superficial coverage of science that fails to link concepts or develop them over successive grades."

Michigan's K-7 Scholar Work Group executed the intent of this statement in the development of "the core ideas of science...the big picture" in this document.

Curriculum

Using this document as a focal point in the school improvement process, schools and districts can generate conversations among stakeholders concerning current policies and practices to consider ways to improve and enhance student achievement. Together, stakeholders can use these expectations to guide curricular and instructional decisions, identify professional development needs, and assess student achievement.

Assessment

The Science Grade Level Content Expectations document is intended to be a curricular guide with the expectations written to convey expected performances by students. Science will continue to be assessed in grades five and eight for the Michigan Educational Assessment Program (MEAP) and MI-Access.

Understanding the Organizational Structure

The science expectations in this document are organized into disciplines, standards, content statements, and specific content expectations. The content statements in each science standard are broader, more conceptual groupings. The skills and content addressed in these expectations will, in practice, be woven together into a coherent, science curriculum.

To allow for ease in referencing expectations for the draft review, each expectation has been coded with a discipline, standard, grade-level, and expectation number. For example, **P.MO.00.09** indicates:

P - Physical Science Discipline

MO-Motion of Objects Standard

00-Kindergarten Expectation

09-Ninth Expectation in the Kindergarten Grade-Level

Discipline 1 Science Processes	Discipline 2 Physical Science	Discipline 3 Life Science	Discipline 4 Earth Science
Standards			
Inquiry and Reflection (IR)	Motion of Objects (MO) Energy (EN) Properties of Matter (PM) Changes in Matter (CM)	Organization of Living Things (OL) Heredity (HE) Evolution (EV) Ecosystems (EC)	Earth Systems (ES) Solid Earth (SE) Fluid Earth (FE) Earth in Space and Time (ST)

(Note: Final coding will be different than this draft document coding, and will incorporate content statements and content expectations into the coding.)

Preparing Students for Academic Success

Within the hands of teachers, the Grade Level Content Expectations are converted into exciting and engaging learning for Michigan's students. As we use these expectations to develop units of instruction and plan instructional delivery, it is critical to keep in mind that content knowledge alone is not sufficient for academic success. Students must be able to apply knowledge in new situations, to solve problems by generating new ideas, and to make connections between what they learn in class to the world around them. The art of teaching is what makes the content of learning become a reality.

Through the collaborative efforts of Michigan educators and creation of professional learning communities, we can enable our young people to attain the highest standards, and thereby open doors for them to have fulfilling and successful lives.

SCIENCE PROCESSES Inquiry, Reflection, and Social Implications

S.IR.01.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation. Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.

S.IR.01.01 Make purposeful observation of the natural world using the five senses.

S.IR.01.02 Generate questions based on observations.

S.IR.01.03 Plan and conduct simple investigations.

S.IR.01.04 Manipulate simple tools that aid observation and data collection.

S.IR.01.05 Make accurate measurements with appropriate units for the measurement tool.

S.IR.01.06 Construct simple charts and graphs from data and observations.

S.IR.01.07 Communicate and present findings of observations.

S.IR.01.08 Develop research strategies and skills for information gathering and problem solving.

S.IR.01.2 Reflecting knowledge is the application of scientific knowledge to new and different situations. Reflecting knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history.

S.IR.01.09 Recognize that science investigations generally work the same way in different places.

S.IR.01.10 Recognize that when science investigations are done the same way, very similar results are expected.

S.IR.01.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits and activities.

PHYSICAL SCIENCE Properties of Matter

P.PM.01.1 All objects and substances have physical properties.

P.PM.01.12 Demonstrate the ability to sort objects according to observable attributes such as color, shape, size, sinking or floating.

P.PM.01.13 Use appropriate tools (rulers, balances and thermometers) to measure observable attributes.

P.PM.01.3 Matter exists in several different states: solids, liquids and gases. Each state of matter has unique physical properties. Gases are easily compressed but liquids and solids do not compress easily. Solids have their own particular shapes, but liquids and gases take the shape of the container.

P.PM.01.14 Observe water as a solid that keeps its own shape (ice).

P.PM.01.15 Observe water as a liquid that takes on the shape of various containers.

LIFE SCIENCE**Heredity**

L.HE.01.1 Plants and animals share many, but not all, characteristics of their parents.

L.HE.01.16 Identify characteristics (including body coverings, ways to get air, leaf shape, flower type, and others) that are passed on from parents to young.

L.HE.01.17 Recognize offspring using parents' observable characteristics as evidence (such as dogs/puppies, cats/kittens, maple trees/saplings, beans, seedlings).

EARTH SCIENCE**Solid Earth**

E.SE.01.1 The surface of Earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as land slides, volcanic eruptions, and earthquakes.

E.SE.01.18 Describe the major landforms of the earth's surface (mountains, plains, valleys, deserts, hills).

Fluid Earth

E.FE.01.1 Water is a natural resource and is found under the ground, on the surface of the earth, and in the sky.

E.FE.01.19 Identify water sources (wells, springs, lakes, rivers, oceans).

E.FE.01.20 Identify household uses of water (drinking, cleaning, food preparation).

E.FE.04.2 Water moves in predictable patterns.

E.FE.01.21 Describe how rain collects on the earth's surface, flows downhill into bodies of water (streams, rivers, lakes, oceans), or into the ground.