

GRADE LEVEL CONTENT EXPECTATIONS

2

 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	Discipline 2	Discipline 3	Discipline 4
Science Processes	Physical Science	Life Science	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
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S.IR.02.1 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.02.01 Make purposeful observation of the natural world using the five senses.

S.IR.02.02 Generate questions based on observations.

S.IR.02.03 Plan and conduct simple investigations.

S.IR.02.04 Manipulate simple tools that aid observation and data collection.

S.IR.02.05 Make accurate measurements with appropriate units for the measurement tool.

S.IR.02.06 Construct simple charts and graphs from data and observations.

S.IR.02.07 Communicate and present findings of observations.

S.IR.02.08 Develop research strategies and skills for information gathering and problem solving.

S.IR.02.2 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.02.09 Recognize that science investigations generally work the same way in different places.

S.IR.02.10 Recognize that when science investigations are done the same way, very similar results are expected.

S.IR.02.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits and activities.

S.IR.02.12 Identify technology used in everyday life.

S.IR.02.13 Describe the effect humans and other organisms have on the balance of the natural world.

PHYSICAL SCIENCE	Properties of Matter
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P.PM.02.1 All objects and substances have physical properties.

P.PM.02.14 Describe objects and substances according to their properties.

P.PM.02.15 Compare weight and volume of objects.

P.PM.02.4 Some objects are composed of a single substance, while other objects are composed of more than one substance.

P.PM.02.16 Classify objects as single substances or mixtures.

L.OL.02.1 Animals need air, water, and a source of energy (food). Plants also require air water, and a source of energy (light to make food). Plants and animals break down food to produce growth and repair.

L.OL.02.17 Identify the needs of familiar plants.

L.OL.02.2 Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.

L.OL.02.18 Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.

L.OL.02.3 Organisms have different structures that serve different functions in growth, survival and reproduction.

L.OL.02.19 Describe the function of the following plant parts, flower, stem, root and leaf.

L.OL.02.4 Organisms can be classified on the basis of observable characteristics.

L.OL.02.20 Classify familiar plants on the basis of observable physical characteristics including roots, leaves, stems and flowers.

Evolution

L.EV.02.1 Different kinds of organisms have characteristics that help them to live in different environments.

L.EV.02.21 Distinguish characteristics and functions of observable parts in a variety of plants that allow them to live in their environment.

L.EV.02.2 Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.

L.EV.02.22 Identify individual differences in organisms of the same kind.

L.EV.02.23 Explain how physical characteristics (traits) or adaptation of animals (sharp teeth or claws for catching and killing prey or color for camouflage) help them to survive in their environment.

E.ES.02.1 The sun warms the land, air and water and helps plants grow.

E.ES.02.24 Identify the sun as the most important source of heat which warms the land, air, and water of the Earth.

E.ES.02.25 Demonstrate the importance of sunlight and warmth in plant growth.

E.ES.02.2 Weather changes from day to day and over the seasons.

E.ES.02.26 Compare daily changes in the weather related to temperature (cold, hot, warm, cool); cloud cover (cloudy, partly cloudy, foggy) precipitation (rain, snow, hail, freezing rain); wind (breezy, windy, calm).

E.ES.02.27 Describe and compare weather related to the four seasons in terms of temperature, cloud cover, precipitation, and wind.

E.ES.02.28 Describe severe weather events.

E.ES.02.29 Describe precautions that should be taken for human safety during severe weather conditions (thunderstorms, lightning, tornadoes, high winds, blizzards, hurricanes).

E.ES.02.3 Scientists use tools for observing, recording, and predicting weather changes.

E.ES.02.30 Identify the tools that might be used to measure temperature, precipitation, cloud cover and wind.

E.ES.02.31 Observe and collect data of weather conditions over a period of time.

Solid Earth

E.SE.02.3 Earth materials that occur in nature include rocks, minerals, soils, water, and the gases of the atmosphere. Some Earth materials have properties which sustain plant and animal life.

E.SE.02.32 Describe how Earth materials (air, water, soil) help support the growth of plant and animal life.

Fluid Earth

E.FE.02.1 Water exists on Earth in three states: liquid, solid, gas. It can go back and forth from one form to another.

E.FE.02.33 Describe the properties (visible, flowing, melting, dew) of water as a liquid (lakes, rivers, streams, oceans).

E.FE.02.34 Describe the properties (hard, visible, freezing, ice) of water as a solid (ice, snow, iceberg, sleet, hail).

E.FE.02.35 Describe the properties (invisible) of water as a gas (water vapor).