

Physical Science Across The Grades K-7

The Office of School Improvement has developed the Science Across the Grades companion document to assist educators in their work with the Grade Level Content Expectations (GLCE). The Across the Grades K-7 document provides a look at each GLCE in a matrix format across the grades. This "cross-grade" document allows grade levels to be easily compared with each other. You will find three separate matrices which include the disciplines of Physical Science, Life Science, and Earth Science. Within each grade band, the expectations have been aligned to show progression of a concept from one grade to the next.

The Grade Level Content Expectations

The Grade Level Content Expectations (GLCE) 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. The expectations represent a research-based approach to science development, promote the use of higher level thinking skills, and assure that all students will be prepared for future academic success.

Our Goal

The Office of School Improvement encourages local and intermediate school districts to continue the stellar work they have begun over the past years supporting the implementation of the Grade Level Content Expectations. The resources that have been generated and shared throughout the state are a wonderful example of Michigan educators' commitment to help students attain the concepts and skills necessary to meet these expectations. Within the hands of teachers, the Grade Level Content Expectations are converted into exciting and engaging learning for Michigan's students. The art of teaching is what makes the content of learning become a reality. Through the collaborative efforts of Michigan educators we can enable our young people to attain the highest standards, and thereby open doors for them to have fulfilling and successful lives.

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Professional Organizations whose members have contributed to the Development of Michigan's K-8 Grade Level Content Expectations through their work on committees:



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PHYSICAL

LIFE

EARTH

	K	1	2	3	4	5	6	7
Force and Motion	<p>P.FM.00.11 Compare the position of an object (for example: above, below, in front of, behind, on) in relation to other objects around it.</p> <p>P.FM.00.12 Describe the motion of an object (for example: away from or closer to) from different observers' views.</p>							
	<p>P.FM.00.21 Observe how objects fall toward the earth.</p>			<p>P.FM.03.22 Identify the force that pulls objects towards the Earth.</p>		<p>P.FM.05.21 Distinguish between contact forces and non-contact forces.</p> <p>P.FM.05.22 Demonstrate contact and non-contact forces to change the motion of an object.</p>		
	<p>P.FM.00.31 Demonstrate pushes and pulls.</p> <p>P.FM.00.32 Observe that objects initially at rest will move in the direction of the push or pull.</p> <p>P.FM.00.33 Observe how pushes and pulls can change the speed or direction of moving objects.</p>			<p>P.FM.03.35 Describe how a push or a pull is a force.</p> <p>P.FM.03.36 Relate a change in motion of an object to the force that caused the change of motion.</p> <p>P.FM.03.37 Demonstrate how the change in motion of an object is related to the strength of the force acting upon the object and to the mass of the object.</p>		<p>P.FM.05.31 Describe what happens when two forces act on an object in the same or opposing directions.</p> <p>P.FM.05.32 Describe how constant motion is the result of balanced (zero net) forces.</p> <p>P.FM.05.33 Describe how changes in the motion of objects are caused by a non-zero net (unbalanced) force.</p>		

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Force and Motion	<p>P.FM.00.34 Observe how shape (for example: cone, cylinder, sphere), size, and weight of an object can affect motion.</p>			<p>P.FM.03.38 Demonstrate when an object does not move in response to a force, it is because another force is acting on it.</p>		<p>P.FM.05.34 Relate the size of change in motion to the strength of unbalanced forces and the mass of the object.</p>		
				<p>P.FM.03.41 Compare and contrast the motion of objects in terms of direction.</p> <p>P.FM.03.42 Identify changes in motion (change direction, speeding up, slowing down).</p> <p>P.FM.03.43 Calculate the speed of an object based on the distance it travels divided by the amount of time it took to travel that distance.</p>		<p>P.FM.05.41 Explain the motion of an object relative to its point of reference.</p> <p>P.FM.05.42 Describe the motion of an object in terms of distance, time and direction, as the object moves, and in relationship to other objects.</p> <p>P.FM.05.43 Illustrate how motion can be measured and represented on a graph.</p>		
Energy				<p>P.EN.03.11 Identify forms of energy: light and sound.</p>	<p>P.EN.04.12 Identify heat and electricity as forms of energy.</p>		<p>P.EN.06.11 Identify kinetic or potential energy in everyday situations (for example: stretched rubber band, objects in motion, ball on a hill, food energy).</p> <p>P.EN.06.12 Demonstrate the transformation between potential and kinetic energy in simple mechanical systems (for example: roller coasters, pendulums).</p>	

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Energy				<p>P.EN.03.21 Demonstrate that light travels in a straight line and that shadows are made by placing an object in a path of light.</p> <p>P.EN.03.22 Demonstrate what happens to light when it travels from water to air (straw half in water looks bent).</p>				
				<p>P.EN.03.31 Relate sounds to their sources of vibrations (for example: a musical note produced by a vibrating guitar string, the sounds of a drum made by the vibrating drum head).</p> <p>P.EN.03.32 Distinguish the effect of fast or slow vibrations as pitch.</p>				<p>P.EN.07.31 Identify examples of waves, including sound waves, seismic waves, and waves on water.</p> <p>P.EN.07.32 Describe how waves are produced by vibrations in matter.</p> <p>P.EN.07.33 Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).</p>
					<p>P.EN.04.41 Demonstrate how temperature can be increased in a substance by adding energy.</p>		<p>P.EN.06.41 Explain how different forms of energy can be transferred from one place to another by radiation, conduction, or convection.</p>	<p>P.EN.07.43 Explain how light energy is transferred to chemical energy through the process of photosynthesis.</p>

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Energy					<p>P.EN.04.42 Describe heat as the energy produced when substances burn, certain kinds of materials rub against each other, and when electricity flows through wire.</p> <p>P.EN.04.43 Describe how heat is produced through electricity, rubbing, and burning.</p>		<p>P.EN.06.42 Illustrate how energy can be transferred while no energy is lost or gained in the transfer.</p>	
					<p>P.EN.04.51 Explain how electrical energy is transferred and changed through the use of a simple circuit.</p> <p>P.EN.04.52 Create a simple working electromagnet and explain the conditions necessary to make the electromagnet.</p>			
								<p>P.EN.07.61 Identify that nuclear reactions take place in the Sun, producing heat and light.</p> <p>P.EN.07.62 Explain how only a tiny fraction of light energy from the sun is transformed to heat energy on Earth.</p>

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Properties of Matter		<p>P.PM.01.11 Demonstrate the ability to sort objects according to observable attributes such as color, shape, size, sinking, or floating.</p>	<p>P.PM.02.12 Describe objects and substances according to their properties (color, size, shape, texture, hardness, liquid or solid, sinking or floating).</p> <p>P.PM.02.13 Measure the length of objects using rulers (centimeters) and meter sticks (meters).</p> <p>P.PM.02.14 Measure the volume of liquids using common measuring tools (measuring cups, measuring spoons).</p> <p>P.PM.02.15 Compare the weight of objects using balances.</p>		<p>P.PM.04.16 Measure the weight (spring scale) and mass (balances in grams or kilograms) of objects.</p> <p>P.PM.04.17 Measure volumes of liquids and capacities of containers in milliliters and liters.</p> <p>P.PM.04.18 Demonstrate the use of centimeter cubes poured into a container to estimate the container's capacity.</p>			<p>P.PM.07.11 Classify substances by their chemical properties (flammability, pH, acid-base indicators, reactivity).</p>
		<p>P.PM.01.21 Demonstrate that water as a solid keeps its own shape (ice).</p> <p>P.PM.01.22 Demonstrate that water as a liquid takes on the shape of various containers.</p>			<p>P.PM.04.23 Compare and contrast the states (solids, liquids, gases) of matter.</p>			<p>P.PM.07.21 Identify the smallest component that makes up an element.</p> <p>P.PM.07.22 Describe how the elements within the Periodic Table are organized by similar properties into families (highly reactive metals, less reactive metals, highly reactive nonmetals, and some almost completely non-reactive gases).</p>

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Properties of Matter								<p>P.PM.07.23 Illustrate the structure of molecules using models or drawings (water, carbon dioxide, salt).</p> <p>P.PM.07.24 List examples of physical and chemical properties of elements and compounds (boiling point, density, color, conductivity, reactivity).</p>	
		<p>P.PM.01.31 Identify materials that are attracted by magnets.</p> <p>P.PM.01.32 Observe that like poles of a magnet repel and unlike poles of a magnet attract.</p>			<p>P.PM.04.33 Demonstrate magnetic field by observing the patterns formed with iron filings using a variety of magnets.</p> <p>P.PM.04.34 Demonstrate that non-magnetic objects are affected by the strength of the magnet and the distance away from the magnet.</p>				
			<p>P.PM.02.41 Classify objects as single substances (ice, silver, sugar, salt) or mixtures (salt and pepper, mixed dry beans).</p>						
				<p>P.PM.03.51 Demonstrate how some materials are heated more than others by light that shines on them.</p>	<p>P.PM.04.53 Identify objects that are good conductors or poor conductors of heat and electricity.</p>				

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				P.PM.03.52 Explain how we need light to see objects: light from a source reflects off objects and enters our eyes.				
Changes in Matter					P.CM.04.11 Explain how matter can change from one state (liquid, solid, gas) to another by heating and cooling.		<p>P.CM.06.11 Describe and illustrate changes in state, in terms of the arrangement and relative motion of the atoms or molecules.</p> <p>P.CM.06.12 Explain how mass is conserved as it changes from state to state in a closed system.</p>	
								<p>P.CM.07.21 Identify evidence of chemical change through color, gas formation, solid formation, and temperature change.</p> <p>P.CM.07.22 Compare and contrast the chemical properties of a new substance with the original after a chemical change.</p> <p>P.CM.07.23 Describe the physical properties and chemical properties of the products and reactants in a chemical change.</p>