Introductory Physical Science and *Force, Motion, and Energy*–Correlation with Michigan Middle School Physical Science Benchmarks

Benchmark	IPS Ch. 1	IPS Ch. 2	IPS Ch. 3	IPS Ch. 4	IPS Ch. 5	IPS Ch. 6	IPS Ch. 7	IPS Ch. 8	IPS Ch. 9	IPS Ch. 10	IPS Ch. 11	IPS Ch. 12	FM&E Ch. 1	FM&E Ch. 2	FM&E Ch. 3	FM&E Ch. 4	FM&E Ch. 5	FM&E Ch. 6	FM&E Ch. 7
Matter and Energy (PME) IV.1 All students will measure and describe the things around us:																			
1. Describe and compare objects in terms of mass, volume, and density.	X	X	X	X	X	X							X	X					
2. Explain when length, mass, weight, density, area, volume or temperature are appropriate to describe the properties of an object or substance.	X	X	X	X	X	X							X	X				X	
All students will explain what the world around us is made of:																			
3. Classify substances as elements, compounds, or mixtures and justify classifications in terms of atoms and molecules.					X	X		X	X										
4. **Describe the arrangement and motion of molecules in solids, liquids, and gases.** (Benchmarks about energy are in other strands at the middle school level.)								X											
All students will explain how electricity (and magnetism; see PMO) interact with matter:																			
5. Construct simple circuits and explain how they work in terms of the flow of current.										X	X	X							
6. Investigate electrical devices and explain how they work, using instructions and appropriate safety precautions.																			
Changes in Matter (PCM) IV.2 All students will investigate, describe and analyze ways in which matter changes:																			
Describe common physical changes in matter: evaporation, condensation, sublimation, thermal expansion and contraction.		X	X															X	
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1. Describe common chemical changes in terms of properties of reactants and products.		X	X	X	X	X													
All students will explain how visible changes in matter are related to atoms and molecules:																			
2. Explain physical changes in terms of the arrangement and motion of atoms and molecules.								X											

3. Describe common energy transformations in everyday situations.																		X	X
<u>Motion of Objects (PMO) IV.3</u> All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motions of objects:																			
1. Qualitatively describe and compare motion in two dimensions.															X	X			
2. Relate motion of objects to unbalanced forces in two dimensions.															X				
3. Describe the non-contact forces exerted by magnets, electrically charged objects, and gravity.													X	X	X				X
4. Use electric currents to create magnetic fields, and explain applications of this principle.																			
5. Design strategies for moving objects by application of forces, including the use of simple machines.															X				
<u>Waves and Vibrations (PWV) IV.4</u> All students will describe sounds and sound waves:																			
1. Explain how sound travels through different media.																	X		

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2. Explain how echoes occur and how they are used.																	X		
All students will explain shadows, color, and other light phenomena:																			
3. Explain how light is required to see objects.																			
4. Describe ways in which light interacts with matter.																			
All students will measure and describe vibrations and waves:																			
5. Describe the motion of vibrating objects.																	X		
All students will explain how waves and vibrations transfer energy:																			
6. Explain how mechanical waves transfer energy.																	X		