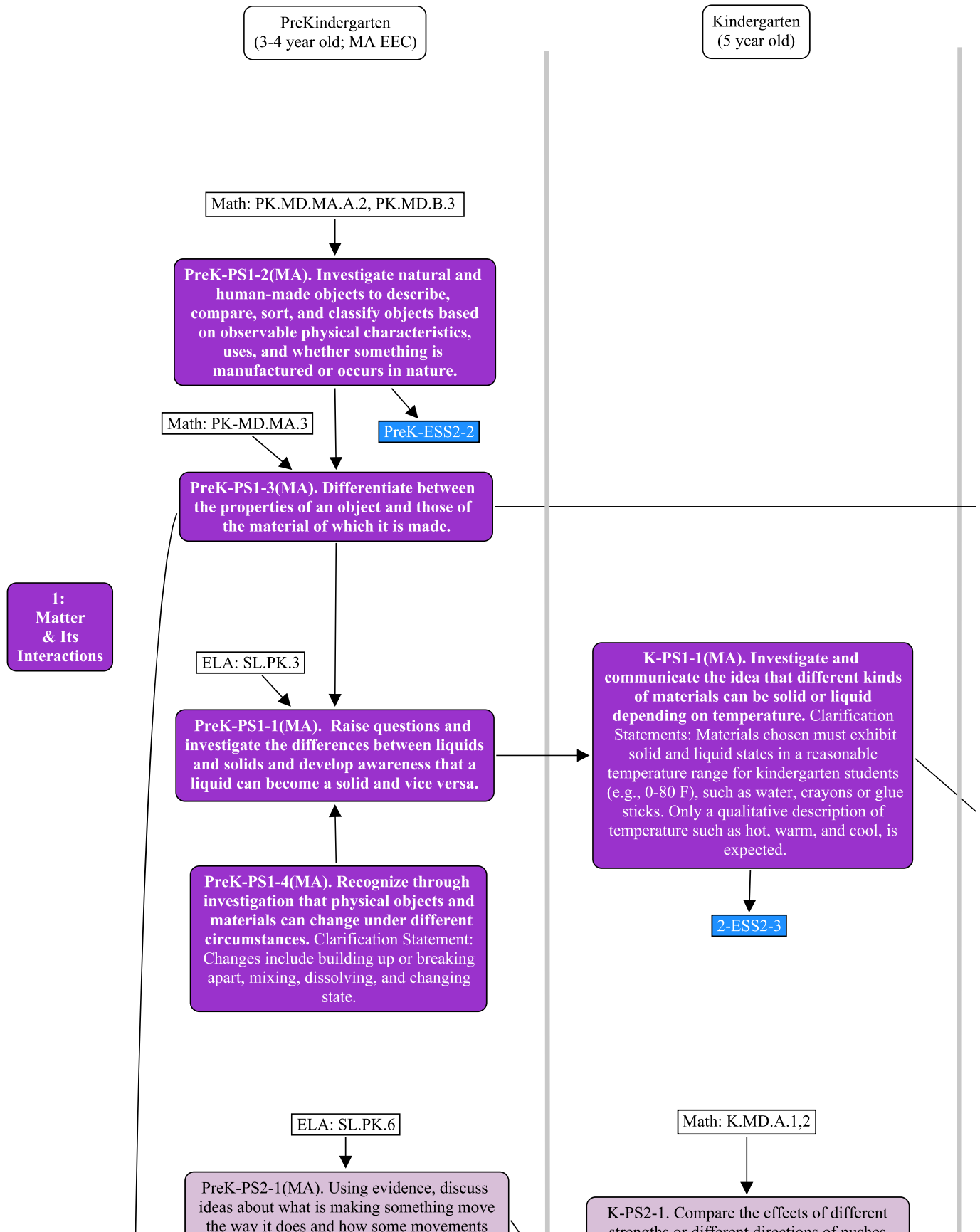
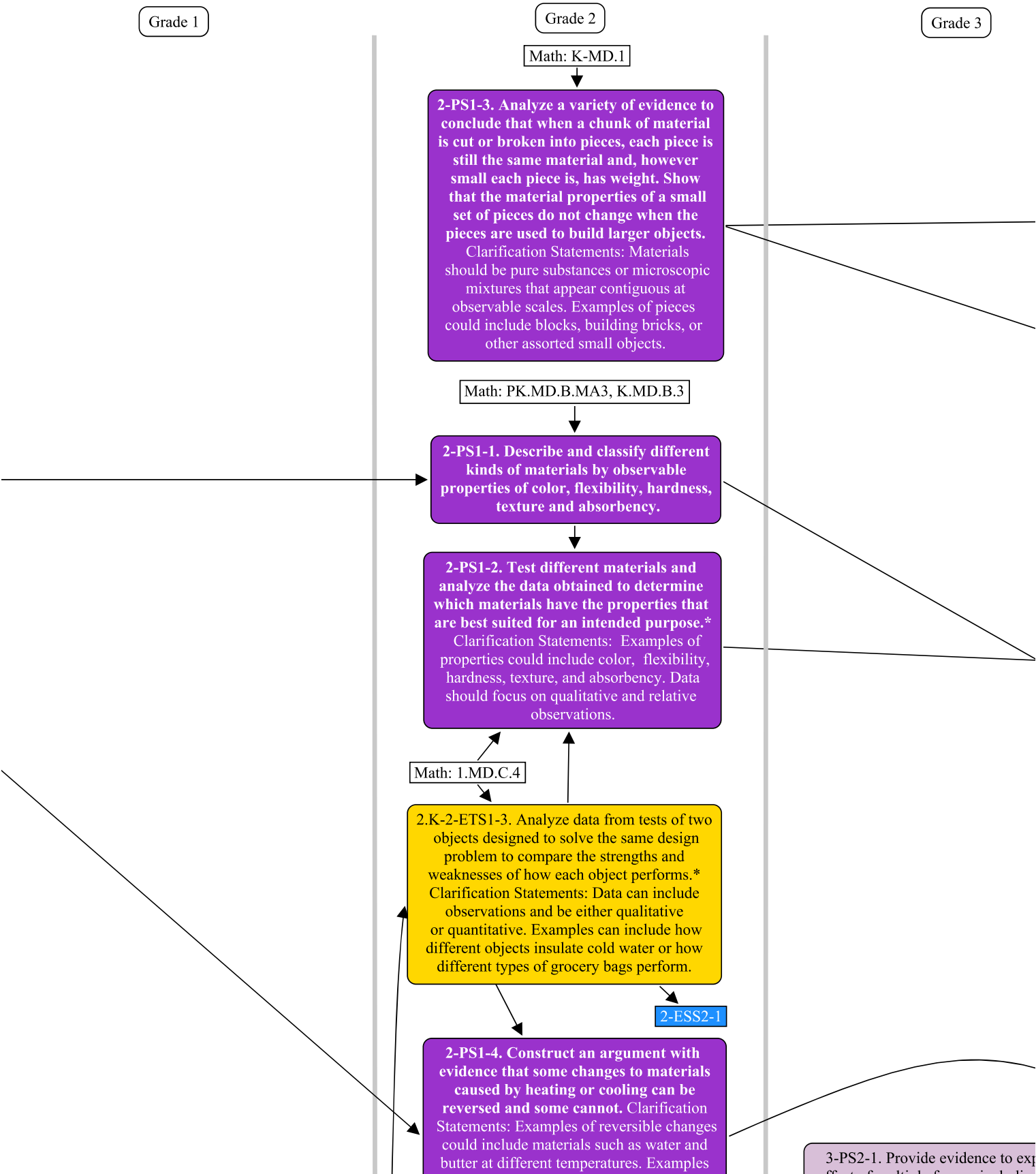


# 2016 MA STE PreK-5 *Phy.*

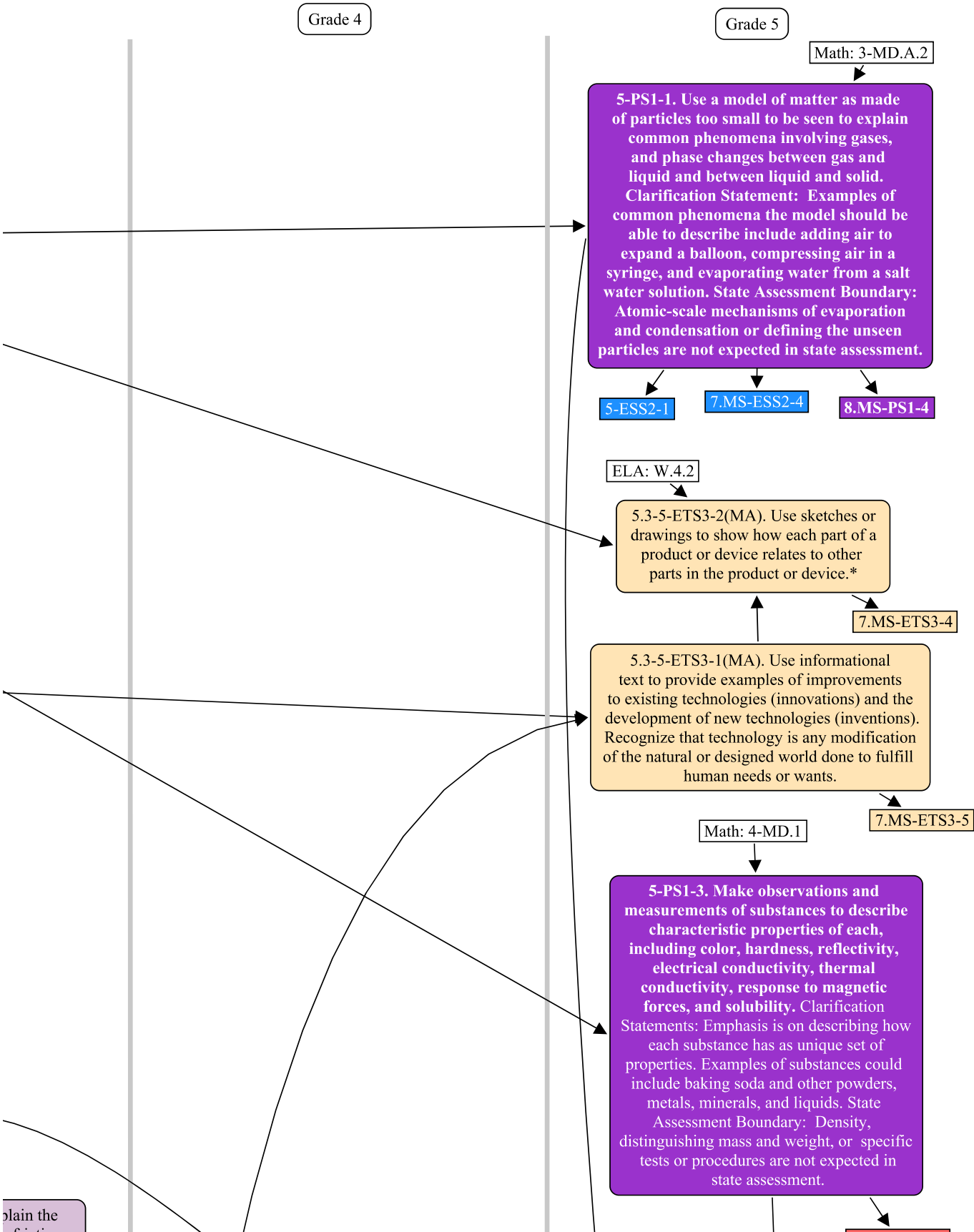


# Physical Science and Technology/Engineering Standards

Please direct comments, suggested edits, and questions to: [mathsciencetech@doe.mass.edu](mailto:mathsciencetech@doe.mass.edu).  
The standards and strand maps are available at: [www.doe.mass.edu/stem/review.html](http://www.doe.mass.edu/stem/review.html)  
(\*) denotes integration of technology/engineering through a practice or core idea.



# rand Map (April 2016)



2:  
Motion  
and  
Stability:  
Forces  
and  
Interactions

3:  
Energy

can be controlled.

ELA: PK.SL.5

PreK-PS2-2(MA). Through experience, develop awareness of factors that influence whether things stand or fall. Clarification Statement: Examples of factors in children's construction play include using a broad foundation when building, considering the strength of materials, and using balanced weight distribution in a block building.

strengths or different directions of pushes and pulls on the motion of an object. Clarification Statements: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. Comparisons should be on different relative strengths or different directions, not both at the same time. Non-contact pushes or pulls such as those produced by magnets are not expected.

K-PS3-1. Make observations to determine that sunlight warms materials on Earth's surface. Clarification Statements: Examples of materials on Earth's surface could include sand, soil, rocks, and water. Measures of temperature should be limited to relative measures such as warmer/cooler.

K-PS3-2. Use tools and materials to design and build a model of a structure that will reduce the warming effect of sunlight on an area.\*

of irreversible changes could include cooking an egg, freezing a plant leaf, and burning paper.

effect of multiple forces, including on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object. Clarification Statement: Descriptions of force magnitude should be qualitative and relative. Force due to gravity is appropriate but only as a force pulling objects down. State Assessment Boundary: Quantitative force magnitude is not included in state assessment. State assessment is limited to one variable at a time: mass, size, or direction of force.

8.

3-PS2-3. Conduct an investigation to determine the nature of the forces between two magnets based on their orientation and distance relative to each other. Clarification Statement: Focus should be on forces produced by magnetic objects that are manipulated.

8.N

3-PS2-4. Define a simple design problem that can be solved by using interactions between magnets.\* Clarification Statement: Examples of problem include constructing a latch to keep a door shut and creating a device to keep moving objects from touching each other.

7

Math: 2.MD.D.10

2-PS3-1(MA). Design and conduct an experiment to show the effects of friction on the relative temperature and speed of objects that rub against each other. Clarification Statement: Examples could include an object sliding on rough vs. smooth surfaces. Observations of temperature and speed should be qualitative.

Math: PK.MD.MA.3

1-PS4-3. Conduct an investigation to determine the effect of the angle of incidence on the angle of reflection.

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MS-PS2-2

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MS-PS2-2

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MS-PS2-5

6.MS-ETS2-1

5-PS1-4. Conduct an experiment to determine whether the mixing of two or more substances results in new substances with new properties.

8.MS-PS1-2

Math: 5.G.A.2

5-PS1-2. Measure and graph the weights of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight of matter is conserved. Clarification Statement: Assume that reactions with any gas production are conducted in a closed system. State Assessment Boundary: Distinguishing mass and weight is not expected in state assessment.

8.MS-PS1-5

ELA: W.1

5-PS2-1. Support an argument with evidence that the gravitational force exerted by Earth on objects is directed toward the Earth's center. State Assessment Boundary: Mathematical representation of gravitational force are not expected in state assessment.

6.MS-PS2-4

7.MS-ESS2-4

ELA: W.4.8,9

4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. State Assessment Boundary: Accounting for mass, quantitative measures of changes in the speed of an object, or any precise or quantitative definition of energy is not expected in state assessment.

ELA: 1.SL.3

7.MS-PS3-1

4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide. Clarification Statement: Changes in energy can include a change in the object's motion, position, and the generation of heat and/or sound. State Assessment Boundary: Analysis of forces or quantitative measurements of energy are not expected in state assessment.

7.MS-PS3-5

4-PS3-2. Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents. State Assessment Boundary: Quantitative measurements of energy are not expected in state assessment.

4-ESS3-1

5-LS1.1

6.MS-PS1-6

7.MS-ESS2-4

7.MS-PS3-6(MA)

4-PS3-4. Apply scientific principles of energy and motion to test and refine a device that converts motion energy to electrical energy or uses stored energy to cause motion or produce light or sound.\* Clarification Statement: Sources of stored

5-LS2-1

5-PS3-1. Use a model to describe that the food animals digest (a) contains energy that was once energy from the sun, and (b) provides energy and materials for body repair, growth, motion, body warmth, and reproduction. Clarification Statement: Examples of models could include diagrams and flow charts. State Assessment Boundary: Details of photosynthesis or respiration are not expected in state assessment.

7.S-LS2-7(MA)

8.MS-LS1-7

PreK-PS4-2(MA). Connect daily experience and investigations to demonstrate the relationships between the size and shape of shadows, the objects creating the shadow, and the light source.

**PreK-LS1-4(MA)**

PreK-PS4-1(MA). Investigate sounds made by different objects and materials and discuss explanations about what is causing the sounds. Through play and investigations, identify ways to manipulate different objects and materials that make sound to change volume and pitch.

4:  
Waves

