

3Berks County Intermediate Unit K-12 Benchmarks for *Science and Technology*

3.1. Unifying Themes <u>CORRELATION MATRIX</u>- Figure Two			
3.1.K. GRADE K	3.1.1. GRADE 1	3.1.2. GRADE 2	3.1.3. GRADE 3
<i>Pennsylvania’s public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to . .</i>			
<p>B. Use classroom models to role play.</p> <ul style="list-style-type: none"> • Use common objects as models (e.g. grocery items, stuffed animals, blocks). <p>Correlates to 3.3.K</p>	<p>A. Identify parts of a system.</p> <ul style="list-style-type: none"> • Describe simple systems (e.g., parts of body, parts of plants). <p>Correlates to 3.2.1; 3.4.1 & 3.7.1</p> <ul style="list-style-type: none"> • <i>Identify and describe what parts make up a system</i> <p>Correlates to 3.2.1, 3.3.1 & 3.5.1</p> <p>C. Observe and identify patterns in nature.</p> <ul style="list-style-type: none"> • Observe patterns of growth (e.g. in plants and animals). <p>Correlates to 3.2.1, 3.4.1& 3.5.1</p>	<p>A. Identify parts of natural/human-made system.</p> <ul style="list-style-type: none"> • <i>Identify system parts that are natural and human-made.</i> <p>Correlates to 3.2.2; 3.3.2 & 3.7.2</p> <ul style="list-style-type: none"> • Distinguish between natural and human-made objects. <p>Correlates to 3.6.2</p> <p>B. Identify different types of models and their uses.</p> <ul style="list-style-type: none"> • Explore classroom models (e.g., globes, maps). <p>Correlates to 3.3.2</p> <ul style="list-style-type: none"> • <i>Identify different types of models.</i> <p>Correlates to 3.5.2</p>	<p>A. Explain the purpose of individual parts of human-made systems.</p> <ul style="list-style-type: none"> • Identify human-made systems (e.g., technology, construction, manufacturing, transportation). <p>Correlates to 3.2.3; 3.3.3; 3.4.3; 3.6.3 & 3.7.3</p> <ul style="list-style-type: none"> • Explain how the parts of human-made systems work together. <p>Correlates to 3.5.3</p> <p>B. Know models as useful simplifications of objects or processes.</p> <ul style="list-style-type: none"> • Use models for prediction (e.g., dinosaur skeleton to predict type of dinosaur and lifestyle). • <i>Identify and apply models as tools for prediction and insight.</i> <p>Correlates to 3.6.3</p> <p>C. Illustrate patterns that regularly occur and reoccur in nature.</p> <ul style="list-style-type: none"> • Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, lunar phases). <p>Correlates to 3.2.3, 3.3.3 & 3.5.3</p>

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3.1. Unifying Themes <u><i>CORRELATION MATRIX</i></u> - Figure Two			
3.1.K. GRADE K	3.1.1. GRADE 1	3.1.2. GRADE 2	3.1.3. GRADE 3
<p>D. Develop an awareness of size.</p> <ul style="list-style-type: none"> • Identify and classify objects as bigger or smaller in relation to a given object. <p>Correlates to 3.2.K & 3.3.K</p>	<p>E. Observe changes in systems.</p> <ul style="list-style-type: none"> • Observe changes in systems (e.g., moon, plant growth). <p>Correlates to 3.2.1 & 3.3.1</p>	<p>D. Develop an awareness of scale.</p> <ul style="list-style-type: none"> • Identify scale on different scientific tools (e.g., ruler, thermometer, etc.). <p>Correlates to 3.2.2 & 3.4.2</p> <ul style="list-style-type: none"> • <i>Identify the use of scale as it relates to the measurement of distance, volume, and mass.</i> <p>E. Recognize change in systems.</p> <ul style="list-style-type: none"> • <i>Describe change to objects caused by heat, cold, light or chemicals.</i> <p>Correlates to 3.2.2; 3.3.2 & 3.4.2</p>	<p>E. Examine change through measurement.</p> <ul style="list-style-type: none"> • <i>Examine and explain change by using time and measurement.</i> <p>Correlates to 3.2.3; 3.5.3 & 3.6.3</p>

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Unifying Themes <u><i>CORRELATION MARTIX</i></u> - Figure Two			
3.1.4. GRADE 4	3.1.5. GRADE 5	3.1.6. GRADE 6	3.1.7. GRADE 7
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to . . .</i>			
<p>A. Know that natural and human-made objects are made up of parts.</p> <ul style="list-style-type: none"> • Identify and describe what parts make up a system. <p>Correlates to 3.2.4; 3.3.4; 3.5.4; 3.6.4 & 3.7.4</p> <ul style="list-style-type: none"> • Identify system parts that are natural and human-made (e.g., ball point pen, simple electrical circuits plant anatomy). <p>Correlates to 3.5.4 & 3.6.4</p> <ul style="list-style-type: none"> • <i>Describe the purpose of analyzing systems.</i> <p>Correlates to 3.4.4</p> <ul style="list-style-type: none"> • <i>Know that technologies include physical technology systems (e.g., construction, manufacturing, transportation), informational systems and biochemical-related systems.</i> <p>Correlates to 3.6.4 & 3.8.4</p> <p>B. Know models as useful simplifications of objects or processes.</p> <ul style="list-style-type: none"> • Identify different types of models. <p>Correlates to 3.6.4</p> <ul style="list-style-type: none"> • Identify and apply models as tools for prediction and insight. <p>Correlates to 3.3.4 & 3.4.4</p> <ul style="list-style-type: none"> • Apply appropriate simple modeling 	<p>A. Identify/Explore parts of a natural/human-made system.</p> <ul style="list-style-type: none"> • Describe the component parts of a natural system (e.g. nervous, skeletal, reproductive) <p>Correlates to 3.2.5; 3.3.5; 3.4.5 & 3.7.5</p> <ul style="list-style-type: none"> • Use technology (microscopes and software) to develop an awareness of order in a system. <p>Correlates to 3.2.5 & 3.6.5</p> <ul style="list-style-type: none"> • Describe a system as a group of related parts that work together to achieve a desired result (e.g., digestive system). <p>Correlates to 3.7.5</p> <p>B. Identify parts of models.</p> <ul style="list-style-type: none"> • Identify parts of different models (e.g., body systems, cells, atoms, and molecules). <p>Correlates to 3.4.5</p> <ul style="list-style-type: none"> • Identify and describe different 	<p>A. Identify/explore parts of a natural/human-made system.</p> <ul style="list-style-type: none"> • Identify systems that are closed (e.g., the water cycle). <p>Correlates to 3.2.6; 3.3.6; 3.5.6; 3.6.6 & 3.7.6 & 3.8.6</p> <ul style="list-style-type: none"> • Identify the input and output of systems. <p>Correlates to 3.2.6 & 3.4.6</p> <ul style="list-style-type: none"> • Construct flow charts to show input and output of a system. • <i>Distinguish between system inputs, system processes and system outputs.</i> <p>Correlates to 3.2.6 & 3.4.6</p> <ul style="list-style-type: none"> • <i>Distinguish between open loop and closed loop systems.</i> <p>B. Describe the use of models as an application of scientific or technological concepts.</p> <ul style="list-style-type: none"> • Use models to demonstrate scientific concepts (i.e., circuits to demonstrate the flow of a charge). • <i>Explain systems by outlining a system's relevant parts and its</i> 	<p>A. Explain the parts of a simple system and their relationship to each other.</p> <ul style="list-style-type: none"> • <i>Describe a system as a group of related parts that work together to achieve a desired result (e.g., digestive system).</i> <p>Correlates to 3.2.7; 3.3.7; 3.4.7, 3.6.7; 3.7.7 & 3.8.7</p> <ul style="list-style-type: none"> • <i>Explain the importance of order in a system.</i> <p>Correlates to 3.2.7 & 3.4.7,</p> <ul style="list-style-type: none"> • Distinguish between system inputs system processes and system outputs. • Distinguish between open loop and closed loop systems. • Apply systems analysis to solve problems. <p>Correlates to 3.8.7</p> <p>B. Describe the use of models as an application of scientific or technological concepts.</p> <ul style="list-style-type: none"> • Identify and describe different types of models and their function. • Apply models to predict specific results and observations (e.g., population growth, effects of

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Unifying Themes CORRELATION MARTIX- Figure Two

3.1.4. GRADE 4	3.1.5. GRADE 5	3.1.6. GRADE 6	3.1.7. GRADE 7
<p>tools and techniques. Correlates to 3.2.4; 3.3.4; 3.4.4 & 3.5.4</p> <ul style="list-style-type: none"> Identify theories that serve as models (e.g., molecules). <p>C. Illustrate patterns that regularly occur and reoccur in nature.</p> <ul style="list-style-type: none"> Identify observable patterns (e.g., growth patterns in plants, crystal shapes in minerals, climate, structural patterns in bird feathers). <p>Correlates to 3.2.4; 3.3.4; 3.4.4 & 3.5.4</p> <ul style="list-style-type: none"> Use knowledge of natural patterns to predict next occurrences (e.g., seasons, leaf patterns, lunar phases) <p>Correlates to 3.4.4</p> <p>D. Know that scale is an important attribute of natural and human made objects, events and phenomena.</p> <ul style="list-style-type: none"> Identify the use of scale as it relates to the measurement of distance, volume and mass. 	<p>types of models and their functions.</p> <p>C. Identify patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> <i>Identify different forms of patterns and use them to group and classify specific objects.</i> <p>Correlates to 3.2.5; 3.3.5 & 3.4.5</p> <p>D. Demonstrate and describe scale as a way to compare measurements.</p> <ul style="list-style-type: none"> Create a model showing an object to scale (e.g., floor plan of classroom, scale drawing of body). 	<p><i>purpose and/or designing a model that illustrates its function.</i></p> <p>C. Identify patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> <i>Identify repeating structure patterns.</i> <p>Correlates to 3.2.6 & 3.6.6</p> <p>D. Explain scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> <i>Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications</i> 	<p>infectious organisms). Correlates to 3.2.7; 3.4.7; 3.6.7,</p> <ul style="list-style-type: none"> Explain systems by outlining a system’s relevant parts and its purpose and/or designing a model that illustrates its function. <p>Correlates to 3.2.7; 3.4.7; 3.5.7 & 3.6.7</p> <p>C. Identify patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> Identify different forms of patterns and use them to group and classify specific objects. <p>Correlates to 3.2.7; 3.3.7 & 3.4.7,</p> <ul style="list-style-type: none"> Identify repeating structure patterns. <p>Correlates to 3.5.7</p> <ul style="list-style-type: none"> <i>Identify and describe patterns that occur in physical systems (e.g., construction, manufacturing, transportation), informational systems and biochemical-related systems.</i> <p>Correlates to 3.3.7; 3.5.7,</p> <p>D. Explain scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> Apply various applications of size and dimensions of scale to scientific, mathematical, and technological applications

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Unifying Themes <u><i>CORRELATION MARTIX</i></u> - Figure Two			
3.1.4. GRADE 4	3.1.5. GRADE 5	3.1.6. GRADE 6	3.1.7. GRADE 7
<p>distance, volume and mass.</p> <ul style="list-style-type: none"> • <i>Describe scale as a ratio (e.g., pipefitting).</i> • <i>Explain the importance of scale in producing models and apply it to a model.</i> <p>E. Recognize change in natural and physical systems.</p> <ul style="list-style-type: none"> • Recognize change as fundamental to science and technology concepts <p>Correlates to 3.2.4 & 3.8.4</p> <ul style="list-style-type: none"> • Examine and explain change by using time and measurement. <p>Correlates to 3.2.4 & 3.3.4</p> <ul style="list-style-type: none"> • Describe relative motion. <p>Correlates to 3.2.4 & 3.4.4</p> <ul style="list-style-type: none"> • Describe the change to objects caused by heat, cold, light or chemicals. <p>Correlates to 3.2.4; 3.4.4; 3.5.4 & 3.6.4</p>	<p>Correlates to 3.2.5; 3.4.5 & 3.7.5</p>	<p>Correlates to 3.3.6; 3.4.6 & 3.7.6</p> <ul style="list-style-type: none"> • <i>Describe scale as a form of ratio and apply to a life situation..</i> <p>E. Describe the effects of making a change in one part of a whole system.</p> <ul style="list-style-type: none"> • <i>Describe the components of a system (e.g., body system, ecosystem, electrical circuit)</i> <p>Correlates to 3.2.6; 3.5.6 & 3.6.6.</p> <ul style="list-style-type: none"> • <i>Describe the effect of making a change in one part of a system on the system as a whole.</i> 	<p>Correlates to 3.2.7; 3.4.7 & 3.7.7</p> <ul style="list-style-type: none"> • Describe scale as a form of ratio and apply to a life situation. <p>E. Identify change as a variable in describing natural and physical systems.</p> <ul style="list-style-type: none"> • Describe fundamental science and technology concepts that could solve practical problems. <p>Correlates to 3.2.7; 3.4.7; 3.5.7 & 3.6.7</p> <ul style="list-style-type: none"> • Explain how ratio is used to describe change. <p>Correlates to 3.6.7</p> <ul style="list-style-type: none"> • Describe the components of a system (e.g., body system, ecosystem, electrical circuit). <p>Correlates to 3.2.7; 3.3.7; 3.5.7; 3.6.7 & 3.8.7</p> <ul style="list-style-type: none"> • Describe the effect of making a change in one part of a system on the system as a whole. • Describe the effect of making a change in one part of a system on the system as a whole.

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Unifying Themes <u><i>CORRELATION MARTIX</i></u> - Figure Two			
3.1.4. GRADE 4	3.1.5. GRADE 5	3.1.6. GRADE 6	3.1.7. GRADE 7

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3.1. Unifying Themes			
3.1.8. GRADE 8	3.1.9. GRADE 9	3.1.10. GRADE 10	3.1.11. GRADE 11
<i>Pennsylvania’s public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to. . .</i>			
<p>A. Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.</p> <ul style="list-style-type: none"> • <i>Identify the function of subsystems within a larger system (e.g., role of thermostat in an engine, pressure switch).</i> <p>Correlates to 3.3.8 & 3.6.8</p> <ul style="list-style-type: none"> • <i>Describe the interrelationships among input, processes, outputs, feedback and control in specific systems.</i> <p>Correlates to 3.7.8</p>	<p>A. Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.</p> <ul style="list-style-type: none"> • Examine examples of system redesign (e.g., circuits, optical devices, automotive systems, compound machines). <p>Correlates to 3.3.9; 3.4.9; 3.6.9 & 3.7.9</p> <ul style="list-style-type: none"> • <i>Explain the concepts of system redesign and apply it to improve technological systems.</i> • <i>Apply the universal systems model to illustrate specific solutions and troubleshoot specific problems.</i> <p>Correlates to 3.8.9;</p> <ul style="list-style-type: none"> • <i>Analyze and describe the effectiveness of systems to solve specific problems.</i> <p>Correlates to 3.8.9;</p>	<p>A. Discriminate among the concepts of systems, subsystems, feedback and control in solving technological problems.</p> <ul style="list-style-type: none"> • Identify the function of subsystems within a larger system (e.g., role of thermostat in an engine, pressure switch). <p>Correlates to 3.3.10; 3.4.10; 3.5.10; 3.6.10 & 3.7.10</p> <ul style="list-style-type: none"> • Describe the interrelationships among inputs, processes, outputs, feedback and control in specific systems. <p>Correlates to 3.4.10; 3.6.10 & 3.7.10</p> <ul style="list-style-type: none"> • Explain the concept of system redesign and apply it to improve technological systems. <p>Correlates to 3.6.10</p> <ul style="list-style-type: none"> • Apply the universal systems model to illustrate specific solutions and troubleshoot specific problems. <p>Correlates to 3.6.10 & 3.8.10</p> <ul style="list-style-type: none"> • Analyze and describe the effectiveness of systems to solve specific problems. <p>Correlates to 3.4.10; 3.6.10 & 3.8.10</p>	<p>A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.</p> <ul style="list-style-type: none"> • <i>Analyze and describe the function, interaction and relationship among subsystems and the system itself.</i> <p>Correlates to 3.2.11 & 3.7.11</p> <ul style="list-style-type: none"> • <i>Compare and contrast several systems that could be applied to solve a single problem [e.g. pollution control devices (scrubbers, cyclone collector, electrostatic)].</i> <p>Correlates to 3.4.11 & 3.8.11</p>

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3.1. Unifying Themes			
3.1.8. GRADE 8	3.1.9. GRADE 9	3.1.10. GRADE 10	3.1.11. GRADE 11
<p>C. Apply patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> • Examine and describe recurring patterns that form the basis of geological order and astronomical order. <p>Correlates to 3.3.8; 3.4.8 & 3.6.8</p>	<p>B. <i>Describe concepts of models as a way to predict and understand science and technology.</i></p> <ul style="list-style-type: none"> • <i>Apply mathematical models to science and technology (gas laws balancing equations, efficiency of machines, wave properties).</i> <p>Correlates to 3.5.9</p> <p>C. Apply patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> • <i>Examine and describe recurring patterns that form the basis of biological classification.</i> <p>Correlates to 3.3.9 & 3.4.9</p> <ul style="list-style-type: none"> • <i>Examine and describe recurring patterns that form the basis of biological classification, chemical periodicity, geological order and astronomical order.</i> 	<p>B. Describe concepts of models as a way to predict and understand science and technology.</p> <ul style="list-style-type: none"> • Distinguish between different types of models and modeling techniques and apply their appropriate use in specific applications (e.g., kinetic gas theory, DNA). <p>Correlates to 3.3.10; 3.5.10; 3.6.10</p> <ul style="list-style-type: none"> • Examine the advantages of using models to demonstrate processes and outcomes (e.g., blue print analysis, structural stability). <p>Correlates to 3.5.10; 3.6.10 & 3.7.10</p> <ul style="list-style-type: none"> • Apply mathematical models to science and technology. <p>Correlates to 3.4.10</p> <p>C. Apply patterns as repeated processes or recurring elements in science and technology.</p> <ul style="list-style-type: none"> • Examine and describe recurring patterns that form the basis of biological classification, chemical periodicity, geological order and astronomical order. <p>Correlates to 3.3.10 & 3.5.10</p> <ul style="list-style-type: none"> • Examine and describe stationary physical patterns. 	<p>B. Apply concepts of models as a method to predict and understand science and technology.</p> <ul style="list-style-type: none"> • <i>Explain why computer models are needed to interpret science and technology systems (e.g., use graphical analysis, graphing calculators, computer probes).</i> <p>Correlates to 3.2.11;</p> <ul style="list-style-type: none"> • Appraise the importance of computer models in interpreting science and technological systems. <p>Correlates to 3.4.11</p> <p>C. Assess and apply patterns in science and technology.</p> <ul style="list-style-type: none"> • <i>Compare and contrast structure and function relationships as they relate to patterns.</i> <p>Correlates to 3.4.11</p>

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3.1. Unifying Themes			
3.1.8. GRADE 8	3.1.9. GRADE 9	3.1.10. GRADE 10	3.1.11. GRADE 11
<p>D. Apply scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> • Convert one scale to another. <p>Correlates to 3.4.8</p> <p>E. Describe patterns of change in nature, physical and man-made systems.</p> <ul style="list-style-type: none"> • <i>Describe the effects of error in measurement.</i> <p>Correlates to 3.4.8 & 3.8.8</p>	<p>Correlates to 3.5.9</p> <ul style="list-style-type: none"> • <i>Examine and describe stationary physical patterns.</i> <p>Correlates to 3.5.9</p> <ul style="list-style-type: none"> • Examine and describe physical patterns in motion. <p>D. Apply scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> • <i>Apply dimensional analysis and scale as a ratio.</i> <p>Correlates to 3.3.9 & 3.7.9</p> <p>E. Describe patterns of change in nature, physical and man-made systems.</p> <ul style="list-style-type: none"> • <i>Describe how fundamental science and technology concepts are used to solve practical problems (e.g., momentum, Newton’s laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, atomic theory, theory of relativity, Pasteur’s Germ Theory, Galileo’s Heliocentric Solar System, gas laws, feedback systems).</i> <p>Correlates to 3.3.9 & 3.4.9</p> <ul style="list-style-type: none"> • <i>Recognize that stable systems often involve underlying dynamic changes (e.g., a chemical reaction at equilibrium</i> 	<p>Correlates to 3.4.10</p> <ul style="list-style-type: none"> • Examine and describe physical patterns in motion. <p>Correlates to 3.5.10 & 3.5.10</p> <p>D. Apply scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> • Apply dimensional analysis and scale as a ratio. <p>Correlates to 3.7.10</p> <p>E. Describe patterns of change in nature, physical and man made systems.</p> <ul style="list-style-type: none"> • Describe how fundamental science and technology concepts are used to solve practical problems (e.g., momentum, Newton’s laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, atomic theory, theory of relativity, Pasteur’s Germ Theory, Galileo’s Heliocentric Solar System, gas laws, feedback systems). <p>Correlates to 3.3.10; 3.4.10; 3.6.10 & 3.8.10</p> <ul style="list-style-type: none"> • Recognize that stable systems often involve underlying dynamic changes (e.g., a chemical reaction 	<p>D. Analyze scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> • <i>Assess the use of several units of measurement to the same problem.</i> <p>Correlates to 3.7.11</p> <p>E. Evaluate change in nature, physical systems and man-made systems.</p> <ul style="list-style-type: none"> • <i>Analyze how models, systems and technologies have changed over time (e.g., germ theory of disease, solar system, cause of fire).</i> <p>Correlates to 3.7.11</p> <ul style="list-style-type: none"> • Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry).

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3.1. Unifying Themes			
3.1.8. GRADE 8	3.1.9. GRADE 9	3.1.10. GRADE 10	3.1.11. GRADE 11
	<p style="text-align: center;"><i>has molecules reforming continuously).</i></p> <p>Correlates to 3.4.9 & 3.5.9</p> <ul style="list-style-type: none"> • <i>Describe the effects of error in measurements.</i> • <i>Describe changes to matter caused by heat, cold, light or chemicals using a rate function</i> 	<p style="text-align: center;">at equilibrium has molecules reforming continuously).</p> <ul style="list-style-type: none"> • <p>Correlates to 3.4.10</p> <ul style="list-style-type: none"> • Describe the effects of error in measurements. • Describe changes to matter caused by heat, cold, light or chemicals using a rate function. 	

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3.1. Unifying Themes			
3.12.K. GRADE 12			
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to . . .</i>			
<p>A. Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.</p> <ul style="list-style-type: none"> • Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems. <p>Correlates to 3.2.12; 3.6.12 & 3.7.12</p> <ul style="list-style-type: none"> • Apply systems analysis to predict results. <p>Correlates to 3.8.12</p> <ul style="list-style-type: none"> • Analyze and describe the function, interaction and relationship among subsystems and the system itself. <p>Correlates to 3.3.12; 3.5.12 & 3.6.12</p> <ul style="list-style-type: none"> • Compare and contrast several systems that could be applied to solve a single problem. <p>Correlates to 3.6.12 & 3.7.12</p> <ul style="list-style-type: none"> • Evaluate the causes of a system's inefficiency. <p>Correlates to 3.4.12 & 3.5.12</p>			

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3.1. Unifying Themes			
3.12.K. GRADE 12			
<p>B. Apply concepts of models as a method to predict and understand science and technology.</p> <ul style="list-style-type: none"> • <i>Evaluate technological processes by collecting data and applying mathematical models (e.g., process control)</i> <p>Correlates to 3.2.12</p> <ul style="list-style-type: none"> • <i>Apply knowledge of complex physical models to interpret data and apply mathematical models.</i> <p>Correlates to 3.4.12</p> <ul style="list-style-type: none"> • <i>Appraise the importance of computer models in interpreting science and technological systems.</i> <p>C. Assess and apply patterns in science and technology.</p> <ul style="list-style-type: none"> • <i>Assess and apply recurring patterns in natural and technological systems.</i> <p>Correlates to 3.4.12</p> <ul style="list-style-type: none"> • Compare and contrast structure and function relationships as they relate to patterns. <p>Correlates to 3.3.12</p> <ul style="list-style-type: none"> • <i>Assess patterns in nature using mathematical formulas.</i> 			

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3.1. Unifying Themes			
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<p>D. Analyze scale as a way of relating concepts and ideas to one another by some measure.</p> <ul style="list-style-type: none"> • <i>Compare and contrast various forms of dimensional analysis.</i> • Assess the use of several units of measurement to the same problem. <p>Correlates to 3.4.12</p> <ul style="list-style-type: none"> • <i>Analyze and apply appropriate measurement scales when collecting data.</i> <p>Correlates to 3.7.12</p> <p>E. Evaluate change in nature, physical systems and man made systems.</p> <ul style="list-style-type: none"> • <i>Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories).</i> <p>Correlates to 3.2.12; 3.3.12; 3.4.12; 3.6.12 & 3.8.12</p> <ul style="list-style-type: none"> • Analyze how models, systems and technologies have changed over time (e.g., germ theory of disease, 			

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3.1. Unifying Themes			
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<p>solar system, cause of fire).</p> <p>Correlates to 3.3.12</p> <ul style="list-style-type: none"> • <i>Explain how correlation of variables does not necessarily imply causation.</i> • <i>Evaluate the patterns of change within a technology (e.g., changes in engineering in the automotive industry).</i> <p>Correlates to 3.5.12; 3.6.12 & 3.8.12</p>			

¹⁷Berks County Intermediate Unit K-12 Benchmarks for *Science and Technology*