

MST-PBL Curriculum

Draft

| UNIT TITLE | CORE TOPICS (Key Concepts & Real World Contexts) | SCIENCE BENCHMARKS | MATH DISTRICT BENCHMARKS |
|----------------|---|--------------------|---|
| REVIEW OF MATH | Review | | <p>1-3: Use exponents to represent repeated multiplication. Make conjectures about exponents in powers of 10</p> <p>1-4: Evaluate numerical and variable expressions by using the order of operations.</p> <p>1-5: Apply the distributive property to calculations, variable expressions, and geometric relationships.</p> <p>2-2: Evaluate numerical and algebraic expressions using positive and negative numbers in everyday situations.</p> <p>2-3: Convert numbers between decimal and scientific notation. Use scientific notation to estimate and compute.</p> <p>2-9: Estimate and evaluate rational and irrational square roots and cube roots in everyday contexts.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-3: Use number lines and inequality symbols to display and compare real-world data.</p> <p>3-4: Use histograms, frequency tables, and stem-and-left plots to display and interpret data.</p> <p>3-5: Display and compare the medians, quartiles, ranges, and extremes of data sets.</p> <p>5-3: Use algebra tiles to solve equations with variables on both sides. Use these equations to model situations.</p> <p>5-4: Explore how to rewrite simple inequalities. Solve and graph inequalities, and use them to model situations.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>5-6: Use reciprocals to solve equations.</p> <p>6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates.</p> <p>6-3: Model and solve problems with proportions.</p> <p>7-5: Use the strategy of dimensional analysis with rates and conversion factors to solve everyday problems.</p> <p>8-3: Investigate the slopes of horizontal and vertical lines. Write and graph equations for such lines.</p> <p>8-4: Write an equation for a line using two points or the slope and one point. Use equations to solve problems.</p> <p>9-2: Explore, simplify, and multiply square roots. Solve equations and problems involving square roots.</p> |

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All students will ask questions that help them learn about the world:

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| WHAT IS SCIENCE? | <p>KC: Questions often build on existing knowledge. RWC: Any in the sections on Using Scientific Knowledge.</p> | <p>C1: Ask questions that can be investigated empirically.</p> | |
| <p>All students will design and conduct investigations using appropriate methodology and technology:</p> | | | |
| | <p>KC: Types of scientific knowledge—hypothesis, theory, observation, conclusion, law, data, generalization. Aspects of field research—hypothesis, design, observations, samples, analysis, conclusion. Aspects of experimental research—hypothesis, design, variable, experimental group, control group, prediction, analysis, conclusion. Investigations are based on questions about the world (see C h-1). RWC: Any suggested in Using Scientific Knowledge benchmarks for which students would design and/or conduct investigations.</p> <p>KC: Uncertainty, error, range, tolerances, accuracy, precision. RWC: Designing an experiment that uses quantitative data.</p> | <p>C2: Design and conduct scientific investigations.</p> <p>C3: Recognize and explain the limitations of measuring devices.</p> | |

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All students will investigate and describe what makes up weather and how it changes from day to day, from season to season and over long periods of time.

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| <p>ATMOSPHERE AND WEATHER</p> | <p>KC: Average yearly temperatures; ice ages, volcanic dust in atmosphere, greenhouse effect, global air circulation, effects of latitude, effects of landforms, ocean currents. RWC: Evidence of long-term climate changes, global warming, El Nino, La Nina</p> | <p>EAW1: Explain how interactions of the atmosphere, hydrosphere and geosphere create climates and how climates change over time.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps. 1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications. 2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous. 2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths. 3-1: Explore how to display and interpret real-world data using matrices, spreadsheets, and graphs. 3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data. 3-4: Use histograms, frequency tables, and stem-and-leaf plots to display and interpret data. 3-5: Display and compare the medians, quartiles, ranges, and extremes of data sets. 3-6: Choose an appropriate type of graph to display a given data set and explain that choice. 3-7: Recognize when data displays give a misleading impressions of a set of data. 4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions. 5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> |
| <p>All students will explain what causes different kinds of weather:</p> | | | |
| | <p>KC: Air movement—air masses, fronts, pressure systems, prevailing winds, jet stream. RWC: Reports of local weather patterns influenced by the jet stream and prevailing winds.</p> | <p>EAW2: Describe patterns of air movement in the atmosphere and how they affect weather conditions.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps. 1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications. 2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous.</p> |

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| | <p>KC: Weather patterns—cold front, warm front, stationary front, air mass, high and low pressure systems. Storms—thunderstorms, lightning and thunder, tornadoes, hurricanes, winds, blizzards. Water cycle—buoyancy, thermal expansion, convection. See PCM m-1 (thermal expansion) and PME m-1 (density).</p> <p>RWC: Observable daily weather patterns; examples of weather reports from TV, radio, newspapers, including representations on weather maps. Reports of local weather patterns influenced by the jet stream and prevailing winds.</p> | <p>EAW3: Explain and predict general weather patterns and storms.</p> | <p>2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impressions of a set of data.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> |
| <p>All students will analyze relationships between human activities and the atmosphere:</p> | | | |
| | <p>KC: Air pollution—car exhaust, industrial emissions, smog. Related effects—breathing problems, acid rain, global warming, deforestation, ozone depletion. See EG h-4 (resource use).</p> <p>RWC: Examples of human activities that affect the atmosphere, including use of aerosol spray cans, discharge from smoke stacks, car exhaust, burning leaves and wood in stoves and fireplaces, climate change, global warming; actions, including turning off lights, turning down heat, tuning-up cars, filling tires, driving at a consistent speed, mandating higher fuel efficiencies, energy savings from recycling.</p> | <p>EAW4: Explain the impact of human activities on the atmosphere and explain ways that individuals and society can reduce pollution.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications.</p> <p>2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous.</p> <p>2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impressions of a set of data.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> |

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All students will analyze effects of technology on the earth's surface and resources:

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| GEOSPHERE | <p>KC: Valuable materials—minerals, metallic ores, iron, copper, aluminum, fuels, Types of resources—renewable, nonrenewable. Conservation, limits, recycling, costs for developing more remote supplies. Manufacturing, refining, mining. Recycling processes—melting, shredding, dissolving.</p> <p>RWC: Manufacturing processes—steel mills, auto assembly lines, paper making; local recycling center for materials, such as: glass, plastic, aluminum, steel cans, motor oil, examples of technical and social means for slowing the depletion of earth's resources, such as developing more fuel-efficient cars and mandating their use; disposal in landfills and incinerators.</p> <p>KC: Understanding of limitations of knowledge and technology (see R h-2), side effects of resource use (see PME h-1, risk/benefit analysis). Also see R h-5 (new technologies), EAW h-4 (air pollution).</p> <p>RWC: Industries for mining, energy production, manufacturing, transportation, housing. Resources including fossil fuels, metals, wood, water.</p> | <p>EG3: Explain how common objects are made from earth materials and why earth materials are conserved and recycled.</p> <p>EG4: Evaluate alternative long range plans for resource use and by-product disposal in terms of environmental and economic impact.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications.</p> <p>2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous.</p> <p>3-1: Explore how to display and interpret real-world data using matrices, spreadsheets, and graphs.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-4: Use histograms, frequency tables, and stem-and-leaf plots to display and interpret data.</p> <p>3-5: Display and compare the medians, quartiles, ranges, and extremes of data sets.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impressions of a set of data.</p> <p>4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions.</p> <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> <p>6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>8-1: Model linear growth and decay using tables, graphs, and the slope-intercept form of an equation for a line.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> |

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| DENSITY | | | <p>9-4: Use lengths and areas to find theoretical and experimental geometric probabilities.</p> <p>9-5: Use models to find the surface areas of prisms, cylinders and pyramids. Find surface areas of everyday objects.</p> <p>9-6: Find the volumes of prisms and cylinders. Solve problems using volume formulas.</p> <p>9-8: Find and compare corresponding lengths, areas, and volumes of similar figures using ratios.</p> |

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All students will measure and describe the things around us:

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| <p>MATTER</p> | <p>KC: Risk/benefit analysis. RWC: Herbicides, refrigerants, fertilizers, detergents.</p> <p>KC: Properties—state, reactivity, metal/non-metal, conductivity. RWC: Highly reactive metals (such as potassium, sodium), less-reactive metals (such as calcium), highly reactive nonmetals (such as chlorine, fluorine, and oxygen), almost completely nonreactive gases (such as helium and neon); relationships on the Periodic Table of Elements.</p> | <p>PME1: Analyze properties of common household and agricultural materials in terms of risk/benefit balance.</p> <p>PME2: Identify properties of common families of elements.</p> | <p>1-3: Use exponents to represent repeated multiplication. Make conjectures about exponents in powers of 10.</p> <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>3-1: Explore how to display and interpret real-world data using matrices, spreadsheets, and graphs.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-3: Use number lines and inequality symbols to display and compare real-world data.</p> <p>3-4: Use histograms, frequency tables, and stem-and-leaf plots to display and interpret data.</p> <p>3-5: Display and compare the medians, quartiles, ranges, and extremes of data sets.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impressions of a set of data.</p> <p>4-1: Use coordinate systems to solve real-world problems about locations in different settings.</p> <p>4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions.</p> <p>4-6: Recognize graphs and everyday relationships that represent functions. Identify control variables and dependent variables. Graph functions.</p> <p>4-7: Explore ways to represent functions. Use tables, equations, and technology to graph some basic functions.</p> <p>2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths.</p> <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> |

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All students will explain what the world around us is made of:

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| MATTER | <p>KC: Parts of atoms—nucleus, electron cloud. Subatomic particles—proton, neutron, electron. Electrical charges—positive, negative, neutral. Each element has a unique number of protons. See PMO m-3 (electric force).</p> <p>RWC: All elements.</p> | <p>PME3: Explain how elements differ, in terms of the structural parts and electrical charges of atoms.</p> | <p>1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications.</p> <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>2-2: Evaluate numerical and algebraic expressions using positive and negative numbers in everyday situations.</p> <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> |

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All students will explain how visible changes in matter are related to atoms and molecules:

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| CHANGES IN MATTER | <p>KC: Atom, molecule, ion, bond, reactant, product; conservation of mass; rate of reaction—temperature, surface area, concentration; specific chemical reactions—burning paper or wood, rusting iron, formation of sugars during photosynthesis. See PME h-3 (structure of the atom). RWC: Examples of chemical changes—see PME m-2.</p> <p>KC: Atom, molecule, mass. RWC: Common physical and chemical changes, including matter cycles in ecosystems.</p> <p>KC: Nucleus, nuclear change, force that holds nucleus together, nuclear energy. Stable and unstable isotopes. Properties—mass, element, radioactivity. See PME h-3 (structure of the atom). RWC: Nuclear power plants, nuclear energy from sun, natural radioactive decay, use of radiation and radioactive isotopes in medicine.</p> | <p>PCM1: Explain chemical changes in terms of the breaking of bonds and the rearrangement of atoms to form new substances.</p> <p>PCM2: Explain why mass is conserved in physical and chemical changes.</p> <p>PCM3: Contrast nuclear fission, nuclear fusion, and natural radioactivity.</p> | <p>1-5: Apply the distributive property to calculations, variable expressions, and geometric relationships. 2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous. 2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations. 5-2: Simplify variable expressions. Solve equations that involve opposites, like terms, or the distributive property. Write and solve equations for real-world situations. 5-3: Use algebra tiles to solve equations with variables on both sides. Use these equations to model situations. 6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates. 6-2: Explore how likely it is that an event will happen, both experimentally and theoretically. 6-3: Model and solve problems with proportions. 6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error. 7-5: Use the strategy of dimensional analysis with rates and conversion factors to solve everyday problems.</p> |

All students will explain how changes in matter are related to changes in energy and how living things and human technology change matter and transform energy:

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|-------------------|---|---|---|
| CHANGES IN MATTER | <p>KC: Potential energy, kinetic energy, heat, light, electrical energy, chemical energy, sound; temperature changes. Original sources of energy: sun, radioactivity. Conservation of energy, conservation of mass/energy; $E=mc^2$. See PCM m-4 (common energy transformations), PCM h-3 (nuclear changes). RWC: Common physical, chemical and nuclear changes, including changes of state, burning, electrical decomposition of water, photosynthesis, cellular respiration, fireworks and dynamite, nuclear power, stars.</p> | <p>PCM4: Describe energy transformations involved in physical, chemical and nuclear changes, and contrast their relative magnitudes.</p> | <p>2-9: Estimate and evaluate rational and irrational square roots and cube roots in everyday contexts. 2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations. 5-5: Learn to rewrite formulas to make them easier to use. 5-6: Use reciprocals to solve equations. 5-8: Solve pairs of two-variable equations using substitution. Solve real-world problems using systems of equations. 5-3: Use algebra tiles to solve equations with variables on both sides. Use these equations to model situations. 7-5: Use the strategy of dimensional analysis with rates and conversion factors to solve everyday problems.</p> |
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| | | | <p>8-1: Model linear growth and decay using tables, graphs, and the slope-intercept form of an equation for a line.</p> <p>8-2: Use linear combinations and the standard form of an equation for a line to model everyday situations. Graph these equations. Find the intercepts of a line.</p> <p>8-3: Investigate the slopes of horizontal and vertical lines. Write and graph equations for such lines.</p> <p>9-2: Explore, simplify, and multiply square roots. Solve equations and problems involving square roots.</p> <p>10-3: Draw a parabola from its equation. Use algebra to find a parabola's intercepts. Solve problems with these methods.</p> <p>10-4: Explore and use the rules of exponents.</p> <p>10-8: Solve quadratic equations and real-world problems by factoring, graphing, and using the quadratic formula.</p> |
| <p>CHANGES IN MATTER</p> | <p>KC: Mechanisms of heat transfer—convection, conduction, radiation. Conservation of energy, efficiency. Changes in matter related to heat transfer—changes in temperature, volume, pressure. See PCM m-1 (thermal expansion), EAW h-3 (convection).</p> <p>RWC: Convection currents, lake turnover, wind, hot frying pans, heating and cooling buildings, heat lamps, sunlight heating the earth, greenhouse effect, fires for warming.</p> | <p>PCM5: Explain changes in matter and energy involving heat transfer.</p> | <p>2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>5-6: Use reciprocals to solve equations.</p> <p>5-8: Solve pairs of two-variable equations using substitution. Solve real-world problems using systems of equations.</p> <p>6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-3: Model and solve problems with proportions.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>7-5: Use the strategy of dimensional analysis with rates and conversion factors to solve everyday problems.</p> |

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| INEQUALITIES | | | <p>5-4: Explore how to rewrite simple inequalities. Solve and graph inequalities, and use them to model situations.</p> <p>8-5: Solve problems by finding the point where two lines intersect. Recognize systems of equations with no solutions.</p> <p>8-6: Explore the graphs of inequalities in a coordinate plane. Use graphs of inequalities in everyday situations.</p> <p>8-7: Solve real-world problems by writing and graphing systems of linear inequalities.</p> |

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All students will explain how electricity (and magnetism; see PMO) interact with water:

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| <p>ELECTRICITY AND MAGNETISM</p> | <p>KC: Single path, multiple paths, switches, fuses, circuit breakers, power supply, batteries, household current, motors, bulbs, circuit diagrams.</p> <p>RWC: Basic household wiring, automobile wiring, flashlights, tree lights, power lines; electrical conductivity testing.</p> <p>KC: Current flow and direction, magnetic fields. See PMO m-4 (magnetism from electricity).</p> <p>RWC: Generators, alternating current, direct current.</p> | <p>PME4: Explain how current is controlled in simple series and parallel circuits.</p> <p>PME5: Describe how electric currents can be produced by interacting wires and magnets, and explain applications of this principle.</p> | <p>6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-3: Model and solve problems with proportions.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> <p>7-5: Use the strategy of dimensional analysis with rates and conversion factors to solve everyday problems.</p> <p>7-2: Use direct variation models to represent real-world situations and to make predictions. Find the slope of a line.</p> <p>2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>5-6: Use reciprocals to solve equations.</p> <p>5-8: Solve pairs of two-variable equations using substitution. Solve real-world problems using systems of equations.</p> |

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All students will describe how things around us move, explain why things move as they do, and demonstrate and explain how we control the motion of objects:

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| MOTION OF OBJECTS | <p>KC: Electrical and/or mechanical components of complex machines.</p> <p>RWC: Machines, such as bicycles, automobiles, pumps, electrical motors.</p> | <p>PMO1: Analyze patterns of force and motion in the operation of complex machines.</p> | <p>2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous.</p> <p>2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths.</p> <p>2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations.</p> <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> <p>5-3: Use algebra tiles to solve equations with variables on both sides. Use these equations to model situations.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>6-1: Write ratios in simplest form. Solve everyday problems with ratios. Compare unit rates.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-3: Model and solve problems with proportions.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> <p>6-7: Investigate right triangle ratios. Use these ratios and technology to model and solve real-world problems.</p> <p>7-1: Explore three relationships that involve constant ratios. Apply these relationships in everyday settings.</p> <p>7-3: Experiment to find pi. Find circumferences of circles and arc lengths in geometric and real-world shapes.</p> <p>7-6: Explore the area of a circle. Use the formulas for the areas of circles and sectors to solve problems.</p> <p>9-1: Investigate the relationship among the lengths of the sides of a right triangle and use this relationship to solve problems. Use inductive and deductive reasoning.</p> |

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| | | | <p>8-1: Model linear growth and decay using tables, graphs, and the slope-intercept form of an equation for a line.</p> <p>8-2: Use linear combinations and the standard form of an equation for a line to model everyday situations. Graph these equations. Find the intercepts of a line.</p> <p>8-3: Investigate the slopes of horizontal and vertical lines. Write and graph equations for such lines.</p> <p>8-4: Write an equation for a line using two points or the slope and one point. Use equations to solve problems.</p> <p>8-5: Solve problems by finding the point where two lines intersect. Recognize systems of equations with no solutions.</p> |
| <p>All students will relate motion to energy and energy conversions:</p> | | | |
| <p>MOTION OF OBJECTS</p> | <p>KC: Types of energy—electrical energy, kinetic energy, gravitational potential energy, potential energy in springs, chemical potential energy, heat energy, radiation. Energy transformations—see PCM m-4. Efficiency. See PME h-4 (conservation of energy) and PCM h-4 (energy in physical and chemical changes).</p> <p>RWC: Simple and complex machines, roller coasters, swings, pendulums, elevators, automobiles, fans, motors.</p> | <p>PMO2: Explain energy conversions in moving objects and machines.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications.</p> <p>2-8: Solve equations by undoing operations and simplifying. Model and solve problems with equations.</p> <p>2-9: Estimate and evaluate rational and irrational square roots and cube roots in everyday contexts.</p> <p>3-2: Analyze data sets to identify typical values, outliers, and ranges. Use equations with data.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impression of a set of data.</p> <p>4-1: Use coordinate systems to solve real-world problems about locations in different settings.</p> <p>4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions.</p> <p>4-6: Recognize graphs and everyday relationships that represent functions. Identify control variables and dependent variables. Graph functions.</p> <p>4-7: Explore ways to represent functions. Use tables, equations, and technology to graph some basic functions.</p> |

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| | | | <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> <p>5-8: Solve pairs of two-variable equations using substitution. Solve real-world problems using systems of equations.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> <p>7-3: Experiment to find pi. Find circumferences of circles and arc lengths in geometric and real-world shapes.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> <p>10-1: Explore reflections in the real world and in a coordinate plane. Draw the mirror image of an object.</p> |

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| <p>PARABOLAS AND FACTORING</p> | | | <p>10-2: Use technology to explore the graphs of parabolas and how they are transformed by different operations.</p> <p>10-5: Use algebra tiles to factor and multiply algebraic expressions. Use factors to find x-intercepts.</p> <p>10-6: Multiply two binomials. Use a formula to find the line of symmetry of a parabola.</p> <p>10-7: Use algebra tiles to factor trinomials. Use the vertex, line of symmetry, and intercepts to graph a parabola.</p> <p>10-8: Solve quadratic equations and real-world problems by factoring, graphing, and using the quadratic formula.</p> |

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All students will describe sounds and sound waves:

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| WAVES | <p>KC: Properties of sounds—pitch, volume. Characteristics of sound waves—frequency, amplitude, velocity.</p> <p>RWC: Common sounds that vary in pitch and volume—see PWV e-1.</p> | <p>PWV1: Relate characteristics of sounds that we hear to properties of sounds waves.</p> | <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>6-7: Investigate right triangle ratios. Use these ratios and technology to model and solve real-world problems.</p> <p>8-2: Use linear combinations and the standard form of an equation for a line to model everyday situations. Graph these equations. Find the intercepts of a line.</p> <p>8-3: Investigate the slopes of horizontal and vertical lines. Write and graph equations for such lines.</p> <p>7-2: Use direct variation models to represent real-world situations and to make predictions. Find the slope of a line.</p> <p>7-4: Recognize the characteristics of a direct variation graph or equation. Graph lines with negative slopes.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> |

All students will explain shadows, color, and other light phenomena:

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| WAVES | <p>KC: Characteristics of light—brightness, amplitude, colors of spectrum (red, orange, yellow, green, blue, indigo, violet), wavelength, frequency (see PWV h-3). Ways that objects interact with light—emission, reflection, absorption, transmission, scattering (see PWV m-4).</p> <p>RWC: Colored light-reflecting objects, such as books, clothes, color photographs; colored light-transmitting objects, such as stained glass, cellophane; colored light-emitting objects, such as television, neon lights. Scattering of light by the atmosphere.</p> | <p>PWV2: Explain how we see colors of objects</p> | |
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All students will measure and describe vibrations and waves:

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| <p>WAVES</p> | <p>KC: Mechanical waves, electromagnetic waves—see PWV h-4. Colors of light. Properties of waves—frequency, amplitude, wavelength, wave velocity, energy. Units of measurement—hertz or cycles per second, micrometers, meters, meters per second.</p> <p>RWC: Examples of mechanical and electromagnetic waves—see PWV h-4. Colors of light, frequencies of radio and TV transmission.</p> | <p>PWV3: Describe waves in terms of their properties.</p> | <p>5-6: Use reciprocals to solve equations.</p> <p>1-3: Use exponents to represent repeated multiplication. Make conjectures about exponents in powers of 10.</p> |
| <p>WAVES</p> | <p>KC: Types of waves—mechanical: sound, ultrasound, water waves, shock wave; electromagnetic: radio waves, microwaves, radiant heat, infrared radiation, visible light, ultraviolet radiation, x-rays. Properties of waves—see PWV h-3. See PCM m-4 (energy transformations).</p> <p>RWC: Examples of mechanical waves—sound, ultrasound, ocean waves, wave tanks, earthquakes, seismic waves; examples of electromagnetic waves, such as light, radio and television signals, heat lamps, microwave transmitters, radar, ultraviolet radiation in sunlight, x-ray machines, CAT-scans, gamma rays from radioactive decay.</p> | <p>PWV4: Describe different types of waves and their technological applications.</p> | <p>2-3: Convert numbers between decimal and scientific notation. Use scientific notation to estimate and compute.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> |

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| GEOMETRY | | | <p>1-6: Explore how a square can be cut into congruent polygons in different ways.</p> <p>1-7: Explore perimeters and symmetries of four-sided figures. Use writing to explore ideas and to communicate.</p> <p>2-5: Investigate geometric ideas using manipulatives. Apply angle relationships, including angles formed by intersecting lines, in circles, and in triangles.</p> <p>2-6: Write expressions for measures of geometric figures. Simplify these expressions by multiplying, use the distributive property, and group like terms.</p> <p>2-7: Use algebra tiles to solve equations by balancing. Use equations to model and solve problems about areas and angle measures.</p> <p>4-1: Use coordinate systems to solve real-world problems about locations in different settings.</p> <p>4-2: Explore coordinate geometry. Find areas of right triangles and other polygons drawn on a coordinate plane.</p> <p>4-3: Translate figures on a coordinate plane. Recognize translational symmetry in everyday objects.</p> <p>4-4: Rotate figures on a coordinate plane and on polar graph paper. Recognize rotational symmetry in geometric figures and everyday objects.</p> <p>4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions.</p> <p>4-6: Recognize graphs and everyday relationships that represent functions. Identify control variables and dependent variables. Graph functions.</p> <p>4-7: Explore ways to represent functions. Use tables, equations, and technology to graph some basic functions.</p> <p>5-7: Use manipulatives to explore formulas for the area of a parallelogram, a triangle, and a trapezoid. Use these area formulas to solve problems.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> <p>6-6: Enlarge or reduce a figure without changing its shape.</p> <p>6-7: Investigate right triangle ratios. Use these ratios and technology to model and solve real-world problems.</p> |

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| | | | <p>7-1: Explore three relationships that involve constant ratios. Apply these relationships in everyday settings.</p> <p>7-3: Experiment to find pi. Find circumferences of circles and arc lengths in geometric and real-world shapes.</p> <p>7-6: Explore the area of a circle. Use the formulas for the areas of circles and sectors to solve problems.</p> |

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All students will compare and contrast our planet and sun to other planets and star systems:

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| SOLAR SYSTEM | <p>KC: Temperatures, colors, sizes, apparent and absolute brightness; double stars.</p> <p>RWC: Observing color and brightness of stars, observing double stars.</p> | <p>ES1: Compare our sun to other stars.</p> | <p>1-1: Interpret data in tables, graphs, and concept maps.</p> <p>1-2: Find and evaluate variable expressions for numerical, algebraic, and geometric patterns. Everyday applications.</p> <p>1-3: Use exponents to represent repeated multiplication. Make conjectures about exponents in powers of 10.</p> <p>2-1: Estimate populations, distances, and probabilities. Decide if quantities are discrete or continuous.</p> <p>2-3: Convert numbers between decimal and scientific notation. Use scientific notation to estimate and compute.</p> <p>2-4: Estimate lengths, distances on maps, and areas. Use geometric notation for lines, segments, and lengths.</p> <p>3-1: Explore how to display and interpret real-world data using matrices, spreadsheets, and graphs.</p> <p>3-6: Choose an appropriate type of graph to display a given data set and explain that choice.</p> <p>3-7: Recognize when data displays give a misleading impression of a set of data.</p> <p>4-5: Collect real-world data and analyze it. Interpret scatter plots and make predictions.</p> <p>5-1: Use spreadsheets, tables, graphs, equations, and technology to model situations and solve problems. Describe everyday situations that could be modeled by equations.</p> <p>6-2: Explore how likely it is that an event will happen, both experimentally and theoretically.</p> <p>6-3: Model and solve problems with proportions.</p> <p>6-4: Investigate and model some sampling techniques. Make estimates based on samples and margins of error.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> <p>7-3: Experiment to find pi. Find circumferences of circles and arc lengths in geometric and real-world shapes.</p> <p>9-3: Write if-then statements and their converses and determine whether they are true or false.</p> <p>9-8: Find and compare corresponding lengths, areas, and volumes of similar figures using ratios.</p> |

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All students will describe and explain how objects in the solar system move:

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| SOLAR SYSTEM | <p>KC: Stars, galaxies, Milky Way, spiral structure, speed of light, light year, travel times, big bang, red shift.</p> <p>RWC: Observations of other stars, star dusters, nebulas, and galaxies, observations of other potential planetary systems, accounts of possible travel to other star systems.</p> | <p>ES2: Describe the position and motion of our solar system in our galaxy and the overall scale, structure and age of the universe.</p> | <p>2-3: Convert numbers between decimal and scientific notation. Use scientific notation to estimate and compute.</p> <p>5-5: Learn to rewrite formulas to make them easier to use.</p> <p>6-3: Model and solve problems with proportions.</p> <p>6-5: Explore the properties of similar polygons. Model everyday situations with similar figures and scale drawings.</p> |

All students will explain scientific theories as to the origin of the solar system:

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| SOLAR SYSTEM | <p>KC: Processes of formation—coalescence from clouds of dust and gases by gravity; explosions of stars producing heavy elements; hydrogen, helium. Production of energy—fusion, radiation. Planetary systems may form during his process—heavy and light elements, hot interiors of earth-like planets. Age of the solar system.</p> <p>RWC: Nebulas considered to be star-forming regions, supernovas, nuclear fusion research.</p> | <p>ES3: Explain how stars and planetary systems form and how stars produce energy.</p> | <p>1-1: Interpret data in tables, graphs, and concepts maps.</p> |
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All students will explain how we learn about the universe:

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| SOLAR SYSTEM | <p>KC: Information—radiant energy, radio waves, light spectra, color of stars, moon and meteor samples. Devices—radio, optical and other types of telescopes, space probes, satellites, computer imaging/modeling (see PWV h-4). Problems for investigation—geology and weather of planets and moons, origins, extraterrestrial life.</p> <p>RWC: Histories of discoveries, stories of exploration, visits to observatories and planetariums; videos showing space exploration; samples of space materials, including moon rocks and meteorites; remote sensing data; SETI—Search for Extraterrestrial Life.</p> | <p>ES4: Explain how technology and scientific inquiry have helped us learn about the universe.</p> | <p>1-1: Interpret data in tables, graphs, and concepts maps.</p> |
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