

MASCOUTAH COMMUNITY SCHOOL DISTRICT #19

Teacher: _____

Grade: 7th

Subject: PLTW: Design and Modeling

Year: 2018 - 2019

Week	Content	Skills	Assessments	Standards
WEEK 1	Activity 1.1 Design Process	<ul style="list-style-type: none"> • Describe and/or analyze moments within a problem-solving process where persistence, iteration, and the positive role of failure played an important role in gaining understanding about a problem or unexpected observation. • Apply an iterative process to solve a problem or create an opportunity that can be justified. • Create a physical model or prototype. • Collaborate effectively on a diverse and multi-disciplinary team. • Communicate effectively for specific purposes and settings. • Document a process according to professional standards. • Describe the role, connections between disciplines, and impact of engineering, biomedical science, and computer science on society. 	<ul style="list-style-type: none"> • Foot Orthosis Prototype • Design Process Reflection Table • Activity 1.1 Conclusion 	<p>Common Core State Standards for English Language Arts</p> <p>7th Grade</p> <p>7.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.</p> <p>7.SL.1.b - Speaking and Listening Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>7.SL.1.c - Speaking and Listening Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</p> <p>7.SL.1.d - Speaking and Listening Acknowledge new information expressed by others and, when warranted, modify their own views.</p> <p>7.SL.4 - Speaking and Listening Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>Common Core State Standards for Mathematics</p> <p>6.RP.3 - Ratios and Proportional Relationships Use ratio and rate reasoning</p>

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				<p>to solve real-world and mathematical problems, that is, by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>6.RP.3.b - Ratios and Proportional Relationships Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</p> <p>6.RP.3.d - Ratios and Proportional Relationships Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>6.NS.1 - The Number System Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?</p>

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				<p>6.NS.2 - The Number System Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.3 - The Number System Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.G.1 - Geometry Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real world and mathematical problems.</p> <p>7.NS.3 - The Number System Solve real-world and mathematical problems involving the four operations with rational numbers.</p> <p>7.G.2 - Geometry Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique</p>

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				<p>triangle, more than one triangle, or no triangle.</p> <p>7.G.4 - Geometry Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.6 - Geometry Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>8.G.9 - Geometry Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>Next Generation Science Standards</p> <p>NGSS.MS-ETS1-2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>NGSS.P2 - Science and Engineering Practices Developing and using models</p> <p>NGSS.P3 - Science and Engineering Practices Planning and carrying out investigations</p> <p>NGSS.P5 - Science and Engineering Practices Using mathematics and computational thinking</p> <p>NGSS.P6 - Science and Engineering Practices Constructing explanations (for</p>

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				science) and designing solutions (for engineering) NGSS.P8 - Science and Engineering Practices Obtaining, evaluating, and communicating information
Week 2 & 3	Activity 1.2 A Picture Is Worth A Thousand Words Activity 1.3 How Big Was That Fish	<ul style="list-style-type: none"> • Recognize perspective, thumbnail, isometric, and multiview sketches. • Recognize that isometric drawings of an object are used to provide information that a perspective drawing may not be able to show. • Summarize the reasoning for using sketching as a communication tool. • Create a rapid, accurate sketch to communicate ideas. • Identify the proper tool to use to measure and dimension with accuracy and precision. • Identify the conversion factor needed to express a quantity in different units. • Identify the appropriate equation for area and volume problems. • Differentiate between two-dimensional and three-dimensional models including the strengths and limitations of each. • Summarize the reasoning for using sketching as a communication tool. 	<ul style="list-style-type: none"> • Isometric Sketches • Multiview Sketches • Multiview Sketches with Dimensions • Activity 1.2 Conclusion • Activity 1.3 Conclusion 	<p>Common Core State Standards for English Language Arts 7th Grade</p> <p>7.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.</p> <p>7.SL.1.b - Speaking and Listening Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>7.SL.1.c - Speaking and Listening Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</p> <p>7.SL.1.d - Speaking and Listening Acknowledge new information expressed by others and, when warranted, modify their own views.</p> <p>7.SL.4 - Speaking and Listening Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact,</p>

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		<ul style="list-style-type: none"> Apply dimensions on a multiview sketch following the guidelines of dimensioning. 		<p>adequate volume, and clear pronunciation.</p> <p>Common Core State Standards for Mathematics</p> <p>6.RP.3 - Ratios and Proportional Relationships Use ratio and rate reasoning to solve real-world and mathematical problems, that is, by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>6.RP.3.b - Ratios and Proportional Relationships Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</p> <p>6.RP.3.d - Ratios and Proportional Relationships Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>6.NS.1 - The Number System Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is</p>

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				<p>2/3. (In general, $(a/b) \div (c/d) = ad/bc$.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?</p> <p>6.NS.2 - The Number System Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.3 - The Number System Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.G.1 - Geometry Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real world and mathematical problems.</p> <p>7.NS.3 - The Number System Solve real-world and mathematical problems</p>

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				<p>involving the four operations with rational numbers.</p> <p>7.G.2 - Geometry Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</p> <p>7.G.4 - Geometry Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.6 - Geometry Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>8.G.9 - Geometry Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>Next Generation Science Standards NGSS.MS-ETS1-2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. NGSS.P2 - Science and Engineering Practices Developing and using models</p>

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				<p>NGSS.P3 - Science and Engineering Practices Planning and carrying out investigations</p> <p>NGSS.P5 - Science and Engineering Practices Using mathematics and computational thinking</p> <p>NGSS.P6 - Science and Engineering Practices Constructing explanations (for science) and designing solutions (for engineering)</p> <p>NGSS.P8 - Science and Engineering Practices Obtaining, evaluating, and communicating information</p>
<p>Week 4</p>	<p>Activity 1.4 Investigate The Inside</p>	<ul style="list-style-type: none"> • Analyze and describe design functionality by observation of an artifact. • Measure and present values appropriate to standards for accuracy and precision. • Sketch and/or interpret perspective, isometric, and multiview drawings with adequate attention to standards and critical annotations. • Collaborate effectively on a diverse and multi-disciplinary team. • Document a process according to professional standards. 	<ul style="list-style-type: none"> • Dissection Directions • Multiview Drawing of Puzzle Piece • Multiview Sketch showing modifications • Activity 1.4 Conclusion 	<p>Common Core State Standards for English Language Arts</p> <p>7th Grade</p> <p>7.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.</p> <p>7.SL.1.b - Speaking and Listening Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>7.SL.1.c - Speaking and Listening Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</p>

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				<p>7.SL.1.d - Speaking and Listening Acknowledge new information expressed by others and, when warranted, modify their own views.</p> <p>7.SL.4 - Speaking and Listening Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>Common Core State Standards for Mathematics</p> <p>6.RP.3 - Ratios and Proportional Relationships Use ratio and rate reasoning to solve real-world and mathematical problems, that is, by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>6.RP.3.b - Ratios and Proportional Relationships Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?</p> <p>6.RP.3.d - Ratios and Proportional Relationships Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>6.NS.1 - The Number System Interpret and compute quotients of fractions, and solve</p>

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				<p>word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.)</p> <p>How much chocolate will each person get if 3 people share $1/2$ lb of chocolate equally? How many $3/4$-cup servings are in $2/3$ of a cup of yogurt? How wide is a rectangular strip of land with length $3/4$ mi and area $1/2$ square mi?</p> <p>6.NS.2 - The Number System Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.3 - The Number System Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.G.1 - Geometry Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism.</p>

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				<p>Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real world and mathematical problems.</p> <p>7.NS.3 - The Number System Solve real-world and mathematical problems involving the four operations with rational numbers.</p> <p>7.G.2 - Geometry Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</p> <p>7.G.4 - Geometry Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.6 - Geometry Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>8.G.9 - Geometry Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p>

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				<p>Next Generation Science Standards</p> <p>NGSS.MS-ETS1-2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>NGSS.P2 - Science and Engineering Practices Developing and using models</p> <p>NGSS.P3 - Science and Engineering Practices Planning and carrying out investigations</p> <p>NGSS.P5 - Science and Engineering Practices Using mathematics and computational thinking</p> <p>NGSS.P6 - Science and Engineering Practices Constructing explanations (for science) and designing solutions (for engineering)</p> <p>NGSS.P8 - Science and Engineering Practices Obtaining, evaluating, and communicating information</p>
<p>Week 5 6 7</p>	<p>Activity 2.1 Building Blocks</p> <p>Activity 2.2 Taking Modeling to Another Dimension</p> <p>Activity 2.3 Puzzle Cube Statistical Analysis</p>	<ul style="list-style-type: none"> • Identify various models that may be used, which include but are not limited to physical models (prototypes), mathematical models, simulations, schematics, code, and 3D and 2D representations. • Develop solid models using two-dimensional geometric shapes and three-dimensional geometric objects. • Apply dimensions to drawings to communicate size and location information. 	<ul style="list-style-type: none"> • Generate Concept Sketches • 2D Coordinate Plane Interactive Challenge • 3D Coordinate Plane Interactive Challenge • Activity 2.1 Conclusion • Additive and Subtractive Models 	<p>Common Core State Standards for English Language Arts Anchor Standards</p> <p>AS.R.1 - Reading Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>AS.R.4 - Reading Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and</p>

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		<ul style="list-style-type: none"> • Apply dimensions on a multiview sketch following the guidelines of dimensioning. • Construct new solid models using with additive and subtractive solid modeling design methods. 	<ul style="list-style-type: none"> • Creating Puzzle Cube Parts • Puzzle Cube Statistics 	<p>analyze how specific word choices shape meaning or tone.</p> <p>AS.R.7 - Reading Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.</p> <p>AS.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.</p> <p>AS.SL.1 - Speaking and Listening Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.</p> <p>AS.SL.2 - Speaking and Listening Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.</p> <p>AS.L.4 - Language Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.</p> <p>AS.L.6 - Language Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary</p>

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				<p>knowledge when considering a word or phrase important to comprehension or expression.</p> <p>English Language Arts</p> <p>6–8 Literacy Standards for History/Social Studies, Science, and Technical Subjects</p> <p>6-8.RH.7 - Reading History/Social Studies Integrate visual information (in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.</p> <p>6-8.RST.3 - Reading Science/Technical Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.</p> <p>6-8.RST.4 - Reading Science/Technical Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.</p> <p>6-8.RST.7 - Reading Science/Technical Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (in a flowchart, diagram, model, graph, or table).</p> <p>Common Core State Standards for Mathematics</p> <p>6.RP.3.d - Ratios and Proportional Relationships Use ratio reasoning to convert measurement units; manipulate</p>

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				<p>and transform units appropriately when multiplying or dividing quantities.</p> <p>6.NS.6 - The Number System Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.</p> <p>6.NS.6.a - The Number System Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.</p> <p>6.NS.6.b - The Number System Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.</p> <p>6.NS.6.c - The Number System Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</p> <p>6.NS.8 - The Number System Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same</p>

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				<p>first coordinate or the same second coordinate.</p> <p>6.G.1 - Geometry Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l w h$ and $V = b h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving realworld and mathematical problems.</p> <p>6.G.3 - Geometry Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p>6.G.4 - Geometry Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.</p>

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				<p>6.SP.1 - Statistics and Probability Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question, because one anticipates variability in students’ ages.</p> <p>6.SP.2 - Statistics and Probability Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.4 - Statistics and Probability Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.5 - Statistics and Probability Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</p>

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				<p>6.G.2 - Geometry (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.</p> <p>7.G.3 - Geometry Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p> <p>7.G.4 - Geometry Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.6 - Geometry Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>7.SP.8 - Statistics and Probability Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p> <p>7.SP.8.b - Statistics and Probability Represent sample spaces for compound events using methods, such as organized lists, tables and tree diagrams. For an event described in everyday language (for example, "rolling double sixes"), identify</p>

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				<p>the outcomes in the sample space which compose the event.</p> <p>8.G.1 - Geometry Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.</p>
<p>Week 8 9</p>	<p>Activity 3.1 Let's Simulate to Elucidate</p> <p>Problem 3.2 Therapeutic Toy Design</p>	<ul style="list-style-type: none"> • Evaluate what kind of problems can be solved using modeling and simulation. • Use models and simulations to better understand a system. • Select and apply tools and technology appropriately to develop solutions, create artifacts, and/or conduct investigations to engineering, biomedical science, and computational problems/needs. • Organize, process, and analyze data to understand a real-world situation. 	<ul style="list-style-type: none"> • Activity 3.1 Conclusion • Problem 3.2 Therapeutic Toy Design Brief • Activity 3.2 Conclusion 	<p>Common Core State Standards for English Language Arts</p> <p>7th Grade</p> <p>7.W.2.a - Writing Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.</p> <p>7.W.2.d - Writing Use precise language and domain-specific vocabulary to inform about or explain the topic.</p> <p>7.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.</p> <p>7.W.10 - Writing Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for</p>

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				<p>a range of discipline-specific tasks, purposes, and audiences.</p> <p>7.SL.1.b - Speaking and Listening Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.</p> <p>7.SL.1.c - Speaking and Listening Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.</p> <p>7.SL.1.d - Speaking and Listening Acknowledge new information expressed by others and, when warranted, modify their own views.</p> <p>7.SL.2 - Speaking and Listening Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.</p> <p>Common Core State Standards for English Language Arts Anchor Standards</p> <p>AS.R.1 - Reading Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or</p>

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				<p>speaking to support conclusions drawn from the text. AS.R.4 - Reading Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.</p> <p>AS.R.7 - Reading Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.</p> <p>AS.W.3 - Writing Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.</p> <p>AS.W.4 - Writing Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>AS.W.6 - Writing Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. AS.SL.1 - Speaking and Listening Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.</p> <p>AS.SL.2 - Speaking and Listening Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. Present information, findings, and supporting</p>

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				<p>evidence such that listeners can follow the line of reasoning, and the organization, development, and style are appropriate to task, purpose, and audience.</p> <p>AS.SL.5 - Speaking and Listening Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.</p> <p>AS.L.4 - Language Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.</p> <p>AS.L.6 - Language Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p>Common Core State Standards for Mathematics</p> <p>6.RP.3.d - Ratios and Proportional Relationships Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p>

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				<p>6.NS.2 - The Number System Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.3 - The Number System Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p>6.G.3 - Geometry Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p>6.SP.4 - Statistics and Probability Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.5 - Statistics and Probability Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none"> a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

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				<p>d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</p> <p>7.NS.3 - The Number System Solve real-world and mathematical problems involving the four operations with rational numbers.</p> <p>Next Generation Science Standards</p> <p>NGSS.MS-ETS1-1 - Engineering Design Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p> <p>NGSS.MS-ETS1-2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p> <p>NGSS.MS-ETS1-3 - Engineering Design Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</p> <p>NGSS.MS-ETS1-4 - Engineering Design Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.</p>

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				<p>NGSS.P1 - Science and Engineering Practices Asking questions (for science) and defining problems (for engineering)</p> <p>NGSS.P2 - Science and Engineering Practices Developing and using models</p> <p>NGSS.P3 - Science and Engineering Practices Planning and carrying out investigations</p> <p>NGSS.P4 - Science and Engineering Practices Analyzing and interpreting data</p> <p>NGSS.P5 - Science and Engineering Practices Using mathematics and computational thinking</p> <p>NGSS.P6 - Science and Engineering Practices Constructing explanations (for science) and designing solutions (for engineering)</p> <p>NGSS.P7 - Science and Engineering Practices Engaging in argument from evidence</p> <p>NGSS.P8 - Science and Engineering Practices Obtaining, evaluating, and communicating information</p>