

Our Lady of the Lake Roman Catholic School
Yearly Course Outline
PLTW/Science
Sixth Grade
2023–2024

Teacher’s Name: Kristi Spell

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Teacher’s Room Number: [###]

Course Description

Design and Modeling: Design and modeling provides students opportunities to apply the design process to creatively solve problems. Students are introduced to the unit problem in the first activity and are asked to make connections to the problems through the lessons in the unit. Students learn and utilize methods for communicating design ideas through sketches, models and mathematical models. Students work in teams to identify design requirements, research the topic, and engage stakeholders.

Automation and Robotics: Automation and Robotics allows students to trace the history, development, and influence of automation and robotics as they learn about mechanical systems, energy transfer, machine automation, and computer control systems. Students use the VEX Robotics platform to design, build, and program real-world objects such as traffic lights, toll booths, and robotic arms.

Flight and Space: The exciting world of aerospace comes alive through Flight and Space. Students explore the science behind aeronautics and use their knowledge to design, build, and test an airfoil. Custom-built simulation software allows students to experience space travel.

Integrated Science: The 6th grade science program also introduces students to the basic concepts of life, earth, and physical science. This program integrates a wide range of hands-on experiences, critical thinking opportunities and real-world applications.

Instructional Materials

Pearson Interactive Science Custom Integrated Edition

PLTW Gateway Online Resources

Methods of Assessment and Distribution

All test, quiz, and homework grades will be posted on PowerSchool (www.ollpowerschool.org). Please check for postings frequently. Each quarter, four test- and four quiz-weighted assessments will be administered.

1st & 2nd Quarters

(Exams taken)

50% Tests

20% Exams

20% Quizzes

10% Homework

3rd & 4th Quarters

(No Exams taken)

60% Tests

---% Exams

30% Quizzes

10% Homework

Grading Scale

A: 100-94

B: 93-86

C: 85-78

D: 77-70

U: 69 and below

Tentative Course Calendar

**** Dates and course content are subject to change at discretion of teacher or administration. ****

Week	Standards	Objectives (The learner will . . .)	Instructional Materials	Assessments
1st Quarter				
Week 1 Aug. 14-18 8/18 Summer reading due	6-MS-Science and Engineering Practices 1-8	*Review lab safety procedures and understand the basic lab safety rules. *Understand and practice procedures. *Design and conduct investigations to demonstrate understanding of lab safety.	Technology: General Lab Safety Video Amoeba Sisters Flinn Scientific Lab Safety Video Worksheet: Flinn Scientific Lab Safety Procedures Handout	Quiz 1 – Flinn Scientific Lab Safety Quiz
Week 2 Aug. 21-25	6-MS-PS1-1 6-MS-LS1-1 6-MS-LS1-2 6-MS-Science and Engineering Practices 1-8	*Participate in an instant design challenge to create an optimal solution to a given problem and apply what they learn to understand the importance of using the design process. *Apply an iterative process to solve a problem or create an 1. Ruler 2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper 1. Ruler 2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper opportunity that can be justified. *Create a physical model or prototype. *Collaborate effectively on a diverse and multi-disciplinary team. *Describe the role, connections between disciplines, and impact of engineering, biomedical science, and computer science on society.	Materials: 1. Ankle foot orthosis supplies 2. Instant design challenge Rubric 3. Design process reflection table 4. Gateway Notebook	Quiz 2: Foot Orthosis Initial Sketch Test 1: Ankle Foot Orthosis Instant Design Challenge
Week 3 Aug. 28-01	6-MS-Science and Engineering Practices 1-8	*Persistently apply an iterative process to solve a problem or create an opportunity that can be justified.	Resources: Activity 1.2 Rubric Materials: 1. Ruler	Test 1: Foot Orthosis Design Challenge

		<p>*Sketch and/or interpret perspective, isometric, and multi-view drawings with adequate attention to standards and critical annotations.</p>	<p>2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper</p>	
<p>Week 4 <i>Sept. 04-08</i> 9/4 No School</p>	<p>6-MS-Science and Engineering Practices 1-8</p>	<p>*Differentiate between two-dimensional and three-dimensional models including the strength and weaknesses of each one. *Sketch and/or interpret perspective, isometric, and multi-view drawings with adequate attention to standards and critical annotations.</p>	<p>Resources: Activity 1.2 Rubric 1. Ruler 2. $\frac{3}{4}$ -cubic-inch linking cubes. 3. Basic classroom or household object 4. Isometric graph paper 5. Cartesian graph paper</p>	<p>Test 2: Design Process Test</p>
<p>Week 5 <i>Sept. 11-15</i></p>	<p>6-MS-Science and Engineering Practices 1-8</p>	<p>*Introduce U.S. Customary and metric systems. *Use a ruler to measure accurately. *Read dimensions on a sketch.</p>	<p>Materials: Activity 1.3 Measuring Matters Skimmer Activity Various Building Materials Ruler Engineering Notebook</p>	<p>Quiz 3: Measuring using metric/standard units</p>
<p>Week 6 <i>Sept. 18-22</i></p>	<p>6-MS-Science and Engineering Practices 1-8</p>	<p>*Identify the proper tool to use to measure and dimension with accuracy and precision. *Measure and present values appropriate to standards of accuracy and precision. *Understand why accurate dimensioning, and thorough documenting are necessary for both mechanical dissection and creative problem</p>	<p>Materials: US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper</p>	<p>Quiz 4: Measuring with a dial caliper quiz</p>
<p>Week 7 <i>Sept. 25-29</i> Spirit Week 9/29 Fun Run Kickoff</p>		<p>*Define and apply statistical concepts of center and spread. *Read and interpret a box and whisker graph. *Construct a box and whisker graph to visually represent data. *Consider how statistical analysis can inform the design process.</p>	<p>Materials: US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper</p>	<p>Test 3: Measuring Matters Skimmer Activity with Conclusion Questions</p>

		and creative problem		
Week 8 Oct. 02-06 10/4 – 6th Grade Retreat	6-MS-Science and Engineering Practices 1-8	*Use a dial caliper to measure a 3D object. *Add dimensions to a Multiview sketch.	Materials: US Customary and metric ruler Engineering Design Notebook 3D Linking Cubes Dial Caliper	Test 4: Activity 1.5 Test
Week 9 Oct. 09-13 10/13 ½ day (Fun Run)	Exams	Exams	Exams	Exams
2nd Quarter				
Week 10 Oct. 16-20	6-MS-Science and Engineering Practices 1-8	*Perform a mechanical dissection of an object to understand its design. *Use sketching to document and communicate designs with accuracy.	Materials: Activity 1.6 Project Information *PLTW Website *Foam puzzle cube *Camera *Isometric graph paper *Dial Caliper	Test 1: Project 1.6 Investigate the Inside
Week 11 Oct. 23-27 10/27 Fun Run Reward Day	6-MS-Science and Engineering Practices 1-8	*Use the proper tool to measure with accuracy and precision. *Add or interpret dimensions on a sketch following the guidelines of dimensioning.	Materials: Activity 1.6 Project Information *PLTW Website *Foam puzzle cube *Camera *Isometric graph paper *Dial Caliper	Test 2 - Investigate the Inside Test
Week 12 Oct. 30-03	6-MS-Science and Engineering Practices 1-8	*Demonstrate creativity and courage to take risks in proposing designs and describe the value of unique attributes or approaches. *Analyze problems or artifacts when developing solutions. *Create a physical model or prototype. *Demonstrate the ability to manage multiple resources throughout a project. (11 days)	Materials: Isometric graph paper CAD Application Fabrication Materials Puzzle Cube Design Brief Project 2.4 Rubric Puzzle Cube Data Sheet	Quiz 1: Activity 2.1 Project Tinkercad 3-D Printed Keychain
Week 13 Nov. 06-10	6-MS-Science and Engineering Practices 1-8	*Demonstrate creativity and courage to take risks in proposing	Materials: Isometric graph paper	Quiz 2: Tinkercad and Solid Modeling Quiz

11/6 No School (Formation Day) 11/7 Virtual (Senior Day) 11/10 Virtual (OLL Festival)		designs and describe the value of unique attributes or approaches. *Analyze problems or artifacts when developing solutions. *Create a physical model or prototype. *Demonstrate the ability to manage multiple resources throughout a project. (11 days)	CAD Application Fabrication Materials Puzzle Cube Design Brief Project 2.4 Rubric Puzzle Cube Data Sheet		
Week 14 <i>Nov. 13-17</i>	6-MS-Science and Engineering Practices 1-8	*Follow a design process to effectively develop a design solution. *Use a CAD application to create a 3D model of a design solution. *Create a prototype to test a solution. *Construct a box and whiskers graph to visually represent and analyze data.	Materials: Activity 2.4 Project Information Sheets 27 plastic linking cubes Isometric graph paper Dial Caliper Stopwatch Prototype supplies	Test 3: Activity 2.4: Puzzle Cube Design Challenge	
Week 15 <i>Nov. 27-30</i>	6-MS-Science and Engineering Practices 1-8	*Describe the purpose of automation and robotics and its effect on society. *Summarize ways that robots are used in today's world and the impact of their use on society. *Describe positive and negative effects of automation and robotics in terms of safety and economics. *Provide examples of STEM careers and the need for those professionals in our society.	Resources: *Activity 1.2 What do We Use Robotics For Lesson 1 Key Terms Crossword *Automation and Robotics Presentation Teacher Notes *Vex structure and motion pieces *Storage Bags	Quiz 3: VEX Robotics Safety Quiz Quiz 4: Types of Robots Presentation	
Thanksgiving Holidays <i>Nov. 21-25</i>					<i>Nov. 2</i>
Week 16 <i>Dec. 04-08</i>	6-MS-PS2-3 6-MS-PS 2-5 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Calculate gear ratios, *Explain the relationship between torque and speed in a gear train. *Analyze the speed, torque, and movement through a gear train. *Identify the four types of movement in mechanisms.	Materials: Activity 2.1 Study Guide Nearpod Mechanisms Toy Box Presentation		
Week 17 <i>Dec. 11-15</i>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-world examples of the use of mechanisms.	Resources: Activity 2.2 Project Pages VEX kits	Test 4: Activity 2.1 Test	

Week 18 <i>Dec. 18-20</i> 12/20 ½ day	Exams	Exams	Exams	Exams
Christmas Holidays <i>Dec. 21-05</i>				
3rd Quarter				
Week 19 <i>Jan. 08-12</i>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-word examples of the use of mechanisms.	Resources: Activity 2.2 Project Pages VEX kits	Quiz 1: Activity 2.2 Mechanical Build Questions
Week 20 <i>Jan. 15-19</i> 1/15 No School	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Build and test models of mechanisms. *Describe the function of different mechanisms. *Identify real-word examples of the use of mechanisms.	Resources: Activity 2.2 Project Pages VEX kits	Test 1: Activity 2.2: Types of Mechanisms Test
Week 21 <i>Jan. 22-26</i> 1/25 – Social Studies Fair	6-MS-PS4-1 6-MS-PS4-2 6-MS-ESS3-4 6-MS-Science and Engineering Practices 1-8	*Apply knowledge of gear ratios and mechanisms to design, build, and test design solutions. *Use sketching to communicate ideas. *Collaborate within a team.	Resources: Project 2.3: Wind Turbine Construction Project Resources VEX Kits	Quiz 2: Wind Turbine Project Build
Week 22 <i>Jan. 29-02</i> Catholic Schools Week, 2/2 Pep Rally	6-MS-Science and Engineering Practices 1-8	*Use the characteristics for a specific mechanism to evaluate its purpose and applications. *Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. (12 Day Activity)	Resources: Project 2.4 pull Toy Construction Grading Rubric Various Vex Parts	Test 2: Project 2.4 Pull Toy/Survival Challenge
Week 23 <i>Feb. 05-09</i> 2/9 ½ day (Grandparents Day)	6-MS-Science and Engineering Practices 1-8	*Use the characteristics for a specific mechanism to evaluate its purpose and applications. *Apply knowledge of mechanisms to solve a unique problem for speed, torque, force, or type of motion. (12 Day Activity)	Resources: Project 2.4 pull Toy Construction Grading Rubric Various Vex Parts	Quiz 3: Testbed Coding Quiz
Mardi Gras Holidays Feb. 12-16				
Week 24 <i>Feb. 19-23</i>	6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8	*Design, build, wire, and program both open-and closed-loop systems. *Use motors and sensors appropriately to solve robotic problems. (12 day activity)	Resources: *Vex Parts *Computer with ROBOTC program installed.	Quiz 4: Sensors and Motors Quiz

			<p>*Computer with a CAD software installed</p> <p>*Problem Sheets</p> <p>*Activity 3.4 Programming Lab Sheets</p> <p>*Activity 3.4 Automation Task Check Off</p>	
<p>Week 25 <i>Feb. 26-01</i></p>	<p>6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8</p>	<p>*Design, build, wire, and program both open-and closed-loop systems.</p> <p>*Use motors and sensors appropriately to solve robotic problems. (12 day activity)</p>	<p>Resources:</p> <p>*Vex Parts</p> <p>*Computer with ROBOTC program installed.</p> <p>*Computer with a CAD software installed</p> <p>*Problem Sheets</p> <p>*Activity 3.4 Programming Lab Sheets</p> <p>*Activity 3.4 Automation Task Check Off</p>	<p>Test 3: Activity 3.3 Automation Through Programming Project</p>
<p>Week 26 <i>Mar. 04-08</i></p>	<p>6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8</p>	<p>*Design, build, wire, and program both open-and closed-loop systems.</p> <p>*Use motors and sensors appropriately to solve robotic problems. (12 day activity)</p>	<p>Resources:</p> <p>*Vex Parts</p> <p>*Computer with ROBOTC program installed.</p> <p>*Computer with a CAD software installed</p> <p>*Problem Sheets</p> <p>*Activity 3.4 Programming Lab Sheets</p> <p>*Activity 3.4 Automation Task Check Off</p>	
<p>Week 27 <i>March 11-15</i></p>	<p>6-MS-PS2-3 6-MS-PS3-1 6-MS-Science and Engineering Practices 1-8</p>	<p>*Design, build, wire, and program both open-and closed-loop systems.</p> <p>*Use motors and sensors appropriately to solve robotic problems. (12 day activity)</p>	<p>Resources:</p> <p>*Vex Parts</p> <p>*Computer with ROBOTC program installed.</p> <p>*Computer with a CAD software installed</p>	<p>Test 4: Robot C Review Test</p>

			<p>*Problem Sheets *Activity 3.4 Programming Lab Sheets *Activity 3.4 Automation Task Check Off</p>	
4th Quarter				
<p>Week 28 <i>March 18-22</i></p>	6-MS-LS2-1	<p>*Gather and synthesize information to identify skills scientists use to learn about the world. *Construct an explanation based on evidence for why scientists use a standard measurement system. *Use mathematical representations to identify the SI units of measure for length, mass, volume, density, time, and temperature.</p>	<p>Resources: Notes, supplemental readings, worksheets, diagrams, labs/lab reports, selected websites, Interactive Science Notebook</p>	<p>Quiz 1: Metric Unit Conversion Activity</p>
<p>Week 29 <i>March 25-29</i> 3/29 No School (Good Friday)</p>	6-MS-LS2-1 6-MS-LS2-2 6-MS-LS2-3	<p>*Apply scientific ideas to describe the math skills scientists use in collecting data and making measurements. *Gather and synthesize information to describe what math skills scientists use to analyze their data. *Construct a scientific explanation based on evidence for how adaptations help an organism survive. *Apply scientific ideas to describe competition and predation. *Gather and synthesize information to identify the three types of symbiosis.</p>	<p>Resources: Notes, supplemental readings, worksheets, diagrams, labs/lab reports, selected websites, Interactive Science Notebook</p>	<p>Test 1: Tools of Science Test</p>
Easter Holidays <i>March 29-05</i>				
<p>Week 30 <i>April 08-12</i></p>	6-MS-Science and Engineering Practices 1-8	<p>*Explore the history of flight and space travel. *Investigate what is currently happening in space and flight travel.</p>	<p>Resources: Explorers of the Universe Trivia Game Tracking Sheet</p>	<p>Quiz 2 – History of Space Flight Research Project Test 2: History of Flight and Space</p>
<p>Week 31 <i>April 15-19</i></p>	6-MS-Science and Engineering Practices 1-8 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS3-1	<p>*Explore how flight is possible. *Investigate Newton’s three laws of motion. *Examine the four forces of flight.</p>	<p>Resources: Activity 1.2 Study Guide Paper Glider Nearpod</p>	<p>Quiz 3: Calculating force, mass, and acceleration</p>

	6-MS-PS3-2		I-Movie	
Week 32 <i>April 22-26</i>	6-MS-Science and Engineering Practices 1-8 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS3-1 6-MS-PS3-2	*Explore how flight is possible. *Investigate Newton's three laws of motion. *Examine the four forces of flight.	Resources: Activity 1.2 Study Guide Paper Glider Nearpod I-Movie	Quiz 4: Newton's Law's Presentation
Week 33 <i>April 29-03</i> 5/3 Field Day	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance. *Compare how different types of fuel affect the distance a spacecraft travels.	Resources: Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass	Test 3: Forces of Flight Test
Week 34 <i>May 06-10</i>	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance. *Compare how different types of fuel affect the distance a spacecraft travels.	Resources: Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass	Test 3: Forces of Flight Test
Week 35 <i>May 13-17</i>	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3 6-MS-ESS3-4 6-MS-PS1-1 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-Science and Engineering Practices	*Explore lift-off. *Investigate propulsion systems. *Determine how the amount of fuel a rocket uses impacts its travel distance. *Compare how different types of fuel affect the distance a spacecraft travels.	Resources: Activity 2.1 3-2-1 Liftoff Optional Extension Activity: Fuel Mass	
Week 36 <i>May 20-24</i>	6-MS-ESS1-1 6-MS-ESS1-2 6-MS-ESS1-3	*Examine the balance of forces needed for an aircraft to orbit a body and escape space.	Resources: Activity 2.3 All Systems Go	Test 4: Rocket Propulsion Project

<p>5/20 End-of-year Mass 5/24 ½ day</p>	<p>6-MS-ESS3-4 6-MS-PS2-1 6-MS-PS2-2 6-MS-PS2-3 6-MS-PS2-4 6-MS-PS2-5 6-MS-PS3-1 6-MS-PS3-2 6-MS-PS4-1 6-MS-PS4-2 6-MS-Science and Engineering Practices 1-8</p>	<p>*Examine the layers of Earth’s atmosphere, including where human-made satellites orbit. *Explore the phases of the Apollo 11 mission. *Describe the techniques for landing a spacecraft.</p>	<p>Mapping Orbits Worksheet Optional Extension Activities: Clocking a Trip Getting a Boost</p>	
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