Winslow Township School District

Grade 7 Science

Unit 1: Science and Engineering Processes

Overview: This unit covers the skills that scientists and engineers need to be successful (scientific inquiry, measurement and the engineering design process), while building a classroom community to facilitate collaboration and learning for the year. Students will continue using interactive notebooking in science as a learning tool and the development of an Engineer's Portfolio. Academic Skills include team building, collaborating, modeling and prototyping.

Overview	Standards for Science	Unit Focus	Essential Questions
Unit 1 **Science and Engineering Processes**	• **MS-ETS1-1** • **MS-ETS1-2** • **MS-ETS1-3** • **MS-ETS1-4** • **WIDA 4**	• Develop writing through note-booking • Analyze scientific data and informational text • Inquiring about scientific inquiry • Applying engineering concepts to real world problems • NJSLA-S Test Preparation	• How can we set up a science interactive notebook and Engineers Portfolio to record and reflect on science and engineering practices? • How can students become part of society's science conversations by using real-world applications of science in instruction and by inviting students to discuss and debate relevant and motivating content? • How can students use Close Reading strategies to critically analyze scientific text? • How can science provide answers to your questions about the world around you? • What are the results of scientific investigation? • How does having an international system of units help scientists communicate worldwide? • How did microscopes change our ideas about living things? • What safety equipment is essential when working in the science lab?
Unit 1: Enduring Understandings	• Building on the skills from 7th Grade, Students continue using an interactive science notebook along with the engineer's design brief. • Students use scientific argumentation with exercises on writing claims, using evidence to support your claim and explaining the reasoning behind their claim. • Students will review the topics that would be covered under each of the 3 branches of science. • Students will use the steps of the scientific method to solve a problem like a scientist. • Students will demonstrate the difference between accuracy and precision. • Students will use scientific tools to take measurements and collect data • Brainstorm some potentially dangerous situations and review the appropriate safety procedures. • Students will answer the question "How do we talk and work together like engineers?" • Students will assume responsibility for continual self-improvement and develop a model and prototype using the engineering design process • Students will make modifications to their prototype using steps 4 and 5 of the engineer's design process. • Use the NJSLA-S practice test to prepare for the upcoming test		

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Curriculum Unit 1	Standards		Pacing	
			Days	Unit Days
Unit 1: **Science and Engineering Processes**	**MS-ETS1-1**	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.	6	25
	MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	5	
	MS-ETS1-3	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.	5	
	MS-ETS1-4	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.	5	
	Assessment, Re-teach and Extension		4	

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Disciplinary Core Ideas	**Indicator #**	**Indicator**
ETS1.A: Defining and Delimiting Engineering Problems The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) **ETS1.B: Developing Possible Solutions** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) **ETS1.C: Optimizing the Design Solution** Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)	**MS-ETS1-1**	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.
	MS-ET1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
	MS-ETS1-3	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.
	MS-ETS1-4	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.

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Assessment Plan	
• Exploratory activities • Warm-up activities • Class discussions • Student Participation • Teacher Observations • Scientific Method Lab Investigation and Report	•Teacher created assessment •SGO ReadWorks Benchmark Exam #2(September and May) •EDP Design Challenges/Design Journal •Google Suite for Education Assessment Tools (Google Docs, Google Slides) •SGO Content Benchmark Exam #1 (September and May)
Resources	**Activities**
• Chromebooks • Interactive notebooks • http://www.slideshare.net/dsphudson/pltw-edd-engineering-notebook • Readworks • Science World • https://newsela.com/ • https://quizlet.com • Compound Light and Digital microscopes • Virtual Labs • Edpuzzle • BrainPOP • Discover design: http://www.discoverdesign.org/design/process • Science buddies: http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml • The Engineering Design Process https://www.teachengineering.org/K12Engineering/DesignProces • What's Great about Engineering Videos http://pbskids.org/designsquad/pa rentseducators/workshop/engineering.htm NJSLA Practice Test • Design Challenges	• Set up an interactive notebook to provide documentation of their thinking, which can be used to guide instruction. • Students will have the opportunity to use various forms of expository writing- procedural writing, narrative writing, descriptive writing, labeling, as well as to create visuals, graphs, tables, diagrams and charts. • Use Close Reading strategies to read a science article and respond to the comprehension questions that accompany the passage/article. • Cite text evidence from informational text passages. • Complete a graphic organizer describing the 3 branches of science and topics that would be studied under each branch. • Use the steps of the scientific method to conduct an independent lab investigation. • Complete Microscope Madness activity by labeling the parts of the compound light and digital microscope. • Read and analyze a text passage about the history, discovery and innovations made possible by the invention of the microscope. • Focus, draw and label specimen using the compound light and digital microscopes. • Read and review safety in the science classrooms. • Complete the Flinn Safety Contract at home with parents. • Read and use Close Reading strategies to analyze an informational text passage on Lab Safety.

• Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/	
Instructional Best Practices and Exemplars	
1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations	6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 10. Manage response rates

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9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills
9.1.8.CP.1: Compare prices for the same goods or services. 9.1.8.PB.7: Brainstorm techniques that will help decrease expenses including comparison shopping, negotiating, and day-to-day expense management. 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2). 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2). 9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome. 9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation. 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal. 9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience. 9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4). 9.4.8.TL.3: Select appropriate tools to organize and present information digitally. 9.4.8.TL.6: Collaborate to develop and publish work that provides perspectives on a real-world problem. The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language. Additional opportunities to address 9.1, 9.2 & 9.4: **Philadelphia Mint** https://www.usmint.gov/learn/kids/resources/educational-standards **Different ways to teach Financial Literacy.** https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/

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Modifications for Special Education/504
Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered. • Small group instruction • Audio books/ Text-to-speech platforms • Leveled texts/Vocabulary Readers • Leveled informational texts via online • Modeling and guided practice • Read directions aloud • Repeat, rephrase and clarify directions • Extended time as needed • Break down assignments into smaller units • Provide shortened assignments • Modify testing format • Repeat directions as needed • Graphic organizers • Study Guides, Study Aids and Re teaching as needed

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Modifications for At-Risk Students
Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations • Audio books and Text-to-speech platforms • Leveled texts/Vocabulary Readers • Leveled informational texts via online • Extended time as needed • Read directions aloud • Assist with organization • Use of computer • Emphasize/highlight key concepts • Recognize success • Provide timelines for work completion • Break down multi-step tasks into smaller chunks • Provide copy of class notes and graphic organizer

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English Language Learners	Modifications for Gifted Students
All WIDA Can Do Descriptors can be found at this link: https://wida.wisc.edu/teach/can-do/descriptors ☐ Grades 6-8 WIDA Can Do Descriptors: ☐ Listening ☐ Speaking ☐ Reading ☐ Writing ☐ Oral Language Students will be provided with accommodations and modifications that may include: • Relate to and identify commonalities in Science studies in student's home country • Assist with organization • Use of computer • Emphasize/highlight key concepts • Teacher Modeling • Peer Modeling • Label Classroom Materials - Word Walls	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic. • Raise levels of intellectual demands • Require higher order thinking, communication, and leadership skills • Differentiate content, process, or product according to student's readiness, interests, and/or learning styles • Provide higher level texts • Expand use of open-ended, abstract questions • Critical and creative thinking activities that provide an emphasis on research and in-depth study • Enrichment Activities/Project-Based Learning/ Independent Study Additional Strategies may be located at the links: ❖ Gifted Programming Standards ❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy ❖ REVISED Bloom's Taxonomy Action Verbs

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Interdisciplinary Connections
ELA: **RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts. **RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). **RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. **SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. **WHST.6-8.7** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. **WHST.6-8.8** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. **WHST.6-8.9** Draw evidence from informational texts to support analysis, reflection, and research. **Math:** **7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. **7.SP.C.7** Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
Integration of Computer Science and Design Thinking NJSLS 8
8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies. 8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose. 8.1.8.DA.5: Test, analyze, and refine computational models.