Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science and Technology Education	Course:	PLTW Gateway to Technology (DSF)	Unit 7 Title:	Science of Technology Nanotechnology	Grade Level(s):	7-8
Assessed Trimester:	Trimester 2	Pacing:	3 Days	Date Created:	6/16/2014	Last Revision Date:	

Course Understandings: *Students will understand that:*

- In the United States, we use both standard and metric systems of measurement
- Three-dimensional computer modeling uses descriptive geometry, geometric relationships and dimensioning to communicate an idea or solution to a technological problem
- Engineers use a design process to create solutions to existing problems
- Different chemical properties affect invention and innovation in going from concept to production.
- Nanotechnology is an emerging field with many new applications.
- Physics control our world and set constraints for motion and mechanism. •
- Various forces affect flight.
- There is a relationship between airfoils and bernoulli's principle.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Science

Engineering Design

- MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS.ETS1.2)
- Standard: 6.1.2.1: Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive. Benchmark:
 - **6.1.2.1.3:** Trade-offs in Technologies- Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.
 - 6.1.2.1.4: Learning from Failures- Explain the importance of learning from past failures, in order to inform future designs of similar products or systems.

Literacy in Science and Technical Subjects: Reading and Writing:

Conventions of Standard English

6. 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. (AS.L.6)

Technological Literacy

• **Standard:** Students will develop an understanding of the characteristics and scope of technology.

Benchmark:

F. New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology. (1.6-8.F)

- H. Technology is closely linked to creativity, which has resulted in innovation. (1.6-8.H)
- **Standard:** Students will develop an understanding of the role of society in the development and use of technology. Benchmark:
 - D. Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies. (6.6-8.D)
- Standard: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving. Benchmark:

G. Invention is a process of turning ideas and imagination into devices and systems. Innovation is the process of modifying an existing product or system to improve it. (10.6-8.G)

Tra	nsfer		
 Students will be able to independently use their learning to: (product, high order reasoning) Students will apply strategies to test and evaluate abstract topics such as nanotechnology-based products Meaning 			
 Unit Understanding(s): Students will understand that: Nanotechnology is building innovative tools to study and manipulate objects at the nanometer scale (one billionth of a meter). Properties of materials, such as strength, color, and resistance to damage can be changed by nanotechnology. Molecules can be arranged using nanotechnology in a way that they do not normally occur in nature. Scanning Probe and Atomic Force microscopes are used to see and move individual atoms. Engineers, designers, and engineering technologists are needed in high demand for the development or future technology to meet societal needs and wants. Nanotechnology will have an impact on many areas, including but not limited to electronics and computing, materials, manufacturing, energy, environment, health, medicine, national security, and space exploration 	Essential Students will keep considering: • What is nanotechnology? • How many meters are in a nanometer? • Why do we want to make or study such small thi • How will nanotechnology affect my life? • What tools are necessary to "see" and manipula		
Acqu	isition		

Knowledge - Students will:	Skills - Students will:
 Identify facts regarding nanotechnology including properties of materials at nanoscale. 	 Identify and apply conversions from one unit of
 Describe the relative size of a nanometer. 	
 Describe how nano-products are used in society today. 	
 Identify tools and processes used to see and manipulate matter at the nanoscale. 	
 Identify examples of nanotechnology-enhanced products. 	
Reasoning - Students will:	
 Discuss the impact that nanotechnology has on their lives today and will have in the future. 	

Common Misunderstandings	Essential Vocabulary
 Nanotechnology does not affect my life. 	Molecule
	Nanometer
	Nanotechnology

Question(s):

ings?

ate at the nanoscale?

measure to another as scale changes.