BLOOMFIELD PUBLIC SCHOOLS
Bloomfield, New Jersey 07003

Curriculum Guide

Technology Education
Grade 8

Prepared by:
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Introduction:

Technology Education 7 & 8 incorporates problem-based learning utilizing math, science and technology principles. The goal of the Technology Education course is to spread technological literacy, which is accomplished by providing a rich variety of hands on laboratory activities to students with many exciting new technologies. Technology Education stresses design and problem-solving abilities, and provides to the student career awareness and information about a wide variety of technology related careers. Students become more prepared to prosper in an information and technology rich society.

Technology Education 7 & 8, each is a 90-day middle school program that may be divided into four skill sets:

1. The ability to observe and recognize the use of technology around us.
2. The ability to solve practical problems by using existing technology.
3. The ability to solve practical problems by creating new technology.
4. The ability to evaluate the impact of technology on society and the environment.

Technology is the use of processes, tools, and materials to satisfy needs and wants, and to solve practical problems. Students are encouraged to explore and discover through modeling and by providing opportunities for experimentation. Technology Education is at the forefront of STEM Education: (Science, Technology, Engineering and Mathematics) Technology Education is the catalyst that permits science and mathematics principles to be applied in real world situations.

Title II-D: Enhancing Education through Technology of the No Child Left Behind (NCLB) Act requires that all students are technologically literate by the end of grade eight. Complimenting the federal law, the NJDOE's Technological Literacy Standards, specifically the 8.1 Computer and Information Literacy Standards, provide standardized criteria for technological literacy across the state. Technology Education 7 & 8 allows for the assessment of the students, at the end of eight grade that are technologically proficient in accordance with NJTAP-IN.

GRADE 8
Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	**Communication and Information Technologies**	**Grade Level**	**8**
Curriculum Area	**Technology Education**	**Time Frame**	**30 Days**
Developed By	**Terri Hughes**		

Desired Results (Stage 1)

Established Goals

NJ Core Curriculum Content Standards Technology

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools.
8.1.8.A.2 Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
8.1.8.A.3 Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
8.1.8.A.5 Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.B.1 Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web).
8.1.8.C.1 Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
8.1.8.D.1 Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
8.1.8.D.2 Demonstrate the application of appropriate citations to digital content.
8.1.8.D.3 Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8.1.8.D.4 Assess the credibility and accuracy of digital content.
8.1.8.D.5 Understand appropriate uses for social media and the negative consequences of misuse.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

8.2.8.A.2 Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3 Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2 Explain the need for optimization in a design process.
8.2.8.C.4 Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5 Explain the interdependence of a subsystem that operates as part of a system. Create a technical sketch of a product with materials and measurements labeled.
8.2.8.C.6 Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.8 Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.2 Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.

8.2.8.D.3 Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
8.2.8.D.4 Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
8.2.8.D.5 Explain the impact of resource selection and the production process in the development of a common or technological product or system.
8.2.8.D.6 Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.
8.2.8.E.1 Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
8.2.8.E.2 Demonstrate an understanding of the relationship between hardware and software.
8.2.8.E.3 Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
8.2.8.E.4 Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).

Primary Interdisciplinary Connections

9.2 Career Awareness, Exploration, and Preparation – 21st Century Life and Careers – Career Exploration

9.2.8.B.1 Research careers within the 16 Career Clusters® and determine attributes of career success.

9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

9.2.8.B.4 Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally.

9.2.8.B.5 Analyze labor market trends using state and federal labor market information and other resources available online.

9.2.8.B.6 Demonstrate understanding of the necessary preparation and legal requirements to enter the workforce.

Science and Engineering Practice 1 Asking Questions and Defining Problems

- Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

Science and Engineering Practice 2 Developing and Using Models

- Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed.

Science and Engineering Practice 3 Planning and Carrying Out Investigations

- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.

Science and Engineering Practice 6 Constructing Explanations and Designing Solutions

- Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.
- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting.

21st Century Interdisciplinary Themes:

__X__ Global Awareness **____ Financial, economic, business, and entrepreneurial literacy**
__X__ Civic Literacy **____ Health Literacy**

Transfer

Students will be able to independently use their learning to:

1. Observe and recognize the use of technology around us.
2. Solve practical problems by using existing technology.
3. Solve practical problems by creating new technology.

4. Evaluate the impact of technology on society and the environment.
5. Recognize a problem and apply critical thinking and problem-solving skills to solve the problem.

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1. Communication technology impacts our culture and society. **U2.** Technology is constantly changing and requires continuous learning of new skills. **U3.** Each job, career, and profession has a set of preparation requirements, career exploration experiences, and different opportunities for personal and professional growth and satisfaction.	**Q1.** What opportunities arise from changes in communication technologies? **Q2.** What problems arise from changes in communication technologies? **Q3.** In a world of constant technological change, what skills should I learn? **Q4.** What are my responsibilities for using technology? **Q5.** What constitutes technology misuse and how can it be prevented? **Q6.** How do I decide what I want to be and how do I prepare for a career? **Q7.** How can I use technology to become a better problem solver?

Acquisition

Knowledge	Skills
Students will know…	**Students will be able to…**
K1. How to identify communication subsystems. **K2.** Different modes of communication. **K3.** The positive and negative impacts of communication technology. **K4.** The main parts of a computer system. **K5.** Several computer input and output devices. **K6.** What artificial intelligence is and identify ways in which it can be used. **K7.** Common printing processes. **K8.** The process of printing a graphic image. **K9.** The difference between photographs and line art. **K10.** The main parts of a camera. **K11.** The difference between film and digital cameras. **K12.** How images are captured on film. **K13.** How film negatives are processed. **K14.** How discs are recorded.	**S1.** Apply the systems model to communication. **S2.** Discuss different forms of communication. **S3.** Explain how communication technology has affected modes of communication. **S4.** Explore the invention and development of the telephone and its impact on society. **S5.** Create a multimedia project, including sound and images. **S6.** Understand appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics. **S7.** Practice internet fair use guidelines. **S8.** Explain why binary code is important to computer function. **S9.** Explain the interdependence of a subsystem that operates as a part of a system. **S10.** Discuss Wi-Fi, WIMAX, and distributed computing. **S11.** Explain the difference between dynamic digital printing and traditional printing. **S12.** Explain how images are captured with a digital camera. **S13.** Discuss how digital images are processed. **S14.** Explore the basic elements of photography. **S15.** Explain how radio and TV signals are transmitted. **S16.** Discuss the use of computers for animation. **S17.** Discuss features of the World Wide Web. **S18.** Recognize that computer science is important to their lives, regardless of their interests or career path. **S19.** Apply and demonstrate the design/problem solving process.

Evidence (Stage 2)

Checks for Alignment	***Evaluation Criteria*** ***Performance is judged in terms of…***	***Assessment Evidence***
U1 – U3 **Q1 – Q7** **K1 – K14** **S1 – S19**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**Transfer Task(s)** Formative • Classroom discussion • Informal observation • Graphic organizers • Handouts/worksheets • Vocabulary databases
		Summative • Self-checks • Rubrics
U1 – U2 **Q1 – Q2** **K1 – K14** **S1 – S19**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**Other Evidence** Formative • Design Portfolio
		Summative • Design Portfolio

Learning Plan (Stage 3)

Checks for alignment and best practice

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Graphic organizers to identify forms of communication, to identify modes of communication, to identify impacts of communication, to identify acronyms, to identify distributed computing projects, to identify printing processes, to list steps to produce a graphic image, to list parts of a camera, to compare film and digital cameras, to list the steps of processing an image, to list the requirements for audio and video recording systems, to compare film and digital cameras, and to list the steps in producing a video.	Introduction to Technology textbook pages 188-277.
	Create a database with vocabulary words.	Communication Systems PowerPoint. Computer Technologies PowerPoint. Graphic Communications PowerPoint. Photographic Technologies PowerPoint. Multimedia Technologies PowerPoint.
	Experiment with a cup and string to hear sound waves.	Cups and string.

	Choose a communication invention and create an advertisement.	PowerPoint, MovieMaker, iMovie, Audacity, Video Camera, Word, Website.
	Explore the inner workings of a computer.	Old computer.
	Explore Intel's Intro to Computers.	www.intel.com/education/journey
	Design and build a flash animation.	Pivot.
	Explore The Viral World.	http://www.everfi.com/
	Explore Wireless Communication.	http://www.everfi.com/
	Explore Multimedia Products.	http://www.everfi.com/
	Design, build, and test a maze that will carry a marble from the starting gate to the finish line in longest possible time.	Various materials for building a marble maze. Marbles. Portable power tools.
	Learn the basic concepts of computer science through drag and drop programming,	www.code.org
	Suggested Activities	**Suggested Resources**
	Complete a Tim Berners-Lee WebQuest.	Tim Berners-Lee WebQuest.
	View Modern Marvels-The Telephone.	Modern Marvels-The Telephone DVD.
	Take a career interest survey to measure job skills, abilities, interests, and personality. Create a business card based on the results of the survey.	http://www.nj.gov/education/aps/cccs/career/resources.htm Business card template.
	Research and build a camera obsura (pinhole camera).	Recycled Pringles container, masking tape, and aluminum foil.

Strategies for Differentiation

Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative Learning
Cooperative Learning	Independent Study
Learning Buddies	Internet based mini-lesson
Self-Check modifications	Choice menus
Extended time	Varied rubrics
Choice menus	Paired/Group Activity
Varied rubrics	

Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	Biotechnologies	Grade Level	8
Curriculum Area	Technology Education	Time Frame	30 Days
Developed By	Terri Hughes		

Desired Results (Stage 1)

Established Goals

NJ Core Curriculum Content Standards Technology

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

8.1.8.A.4 Graph and calculate data within a spreadsheet an present a summary of the result.
8.1.8.A.5 Create a database query, sort and create a report and describe the process, and explain the report results.
8.1.8.E.1 Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
8.1.8.F.1 Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

8.2.8.A.1 Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
8.2.8.A.2 Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
8.2.8.A.3 Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.4 Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2 Explain the need for optimization in a design process.
8.2.8.C.3 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.C.4 Identify the steps in the design process that would be used to solve a designated problem.
8.2.8.C.5 Explain the interdependence of a subsystem that operates as part of a system. Create a technical sketch of a product with materials and measurements labeled.
8.2.8.C.6 Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
8.2.8.C.7 Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle. 8.2.8.C.8 Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.
8.2.8.D.1 Design and create a product that addresses a real world problem using a design process under specific constraints.
8.2.8.D.2 Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
8.2.8.D.3 Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
8.2.8.D.4 Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.

Primary Interdisciplinary Connections

Science and Engineering Practice 1 Asking Questions and Defining Problems

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Science and Engineering Practice 2 Developing and Using Models

- Develop or modify a model—based on evidence – to match what happens if a variable or component of a system is changed.

Science and Engineering Practice 3 Planning and Carrying Out Investigations

- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.

Science and Engineering Practice 4 Analyzing and Interpreting Data

- Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships.
- Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and **characterize data, using digital tools when feasible.**

Science and Engineering Practice 5 Using Mathematics and Computational Thinking

- Apply mathematical concepts and/or processes (such as ratio, rate, percent, basic operations, and simple algebra) to scientific and engineering questions and problems.

Science and Engineering Practice 6 Constructing Explanations and Designing Solutions

- Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.
- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting.

21st Century Interdisciplinary Themes:

__X__ Global Awareness **____ Financial, economic, business, and entrepreneurial literacy**

____ Civic Literacy **____ Health Literacy**

Transfer

Students will be able to independently use their learning to:

1. Observe and recognize the use of technology around us.
2. Solve practical problems by using existing technology.
3. Solve practical problems by creating new technology.
4. Evaluate the impact of technology on society and the environment.
5. Recognize a problem and apply critical thinking and problem-solving skills to solve the problem.

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1. Biotechnologies can be positive and/or negative. **U2.** Biotechnologies have intended and/or unforeseen social and cultural consequences.	**Q1.** How do biotechnologies improve our way of life? **Q2.** How can I use technology to become a better problem solver?

Acquisition

Knowledge	Skills
Students will know…	**Students will be able to…**
K1. Disease prevention technologies. **K2.** The definition of genetic testing. **K3.** Types of imaging technologies. **K4.** Which tests are used to read electrical impulses of the human body. **K5.** Three types of surgery. **K6.** The definition of genetic engineering. **K7.** The highlights in the evolution of farming. **K8.** The roles of the USDA, FDA, and EPA in approving new agricultural technologies. **K9.** There are different kinds of artificial ecosystems. **K10.** The cloning process.	**S1.** Explain the difference between pasteurization and irradiation. **S2.** Explain how immunization works. **S3.** Explain how antibiotics work. **S4.** Explain the purpose of antibiotics. **S5.** Explain how animals are traditionally bred. **S6.** Discuss methods used in plant and animal maintenance. **S7.** Discuss genetic engineering in agriculture. **S8.** Discuss biosynthesis and pharming. **S9.** Explain the purpose of bioremediation. **S10.** Conduct research and gather, evaluate, and synthesis data to communicate discoveries. **S11.** Understand connections between technology and other fields of study. **S12.** Apply and demonstrate the design/problem solving process.

Evidence (Stage 2)

Checks for Alignment	***Evaluation Criteria*** ***Performance is judged in terms of…***	***Assessment Evidence***
U1 – U2 **Q1 – Q2** **K1 – K10** **S1 – S12**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**Transfer Task(s)** Formative • Classroom discussion • Informal observation • Graphic organizers • Handouts/worksheets • Vocabulary databases Summative • Self-checks • Rubrics
U1 – U2 **Q1 – Q2** **K1 – K10** **S1 – S12**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**Other Evidence** Formative • Design Portfolio Summative • Design Portfolio

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	**Required Resources**
	Graphic organizers to lists ways to prevent disease, to list ways to look inside the human body, to list new surgical procedures, to show ways to prevent disease, and to list artificial ecosystems.	Introduction to Technology textbook pages 290-327.
	Create a database with vocabulary words.	Medical Biotechnologies PowerPoint. Agricultural Biotechnologies PowerPoint.
	Research fast food restaurants and healthier alternatives when eating fast food.	Excel.
	Design, build, and test a safety restraint system for a model vehicle.	Various materials for building a vehicle and restraint system. Ramp.
	Design, build, and test a water filtration system.	Various materials for building a water filtration system. Dirty water.
	Suggested Activities	**Suggested Resources**
	Explore virtual surgeries.	www.edheads.org
	Clone a plant by using the tip cutting method.	Parent plant, vermiculite, rooting hormone, and container.
	Extract DNA from a lentil.	Lentils, water, salt, dish detergent, alcohol, and meat tenderizer. Blender, strainer, test tube, measuring cups and spoons.

Strategies for Differentiation

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Extended time	Varied rubrics
Choice menus	Paired/Group Activity
Varied rubrics	

Title of Unit	Manufacturing and Construction Technologies	Grade Level	8
Curriculum Area	Technology Education	Time Frame	30 Days
Developed By	Terri Hughes		

Desired Results (Stage 1)

Established Goals

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8.1.8.A.5 Create a database query, sort and create a report and describe the process, and explain the report results.
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8.2.8.A.3 Investigate a malfunction in any part of a system and identify its impacts.
8.2.8.A.5 Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
8.2.8.B.1 Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
8.2.8.B.2 Identify the desired and undesired consequences from the use of a product or system.
8.2.8.B.3 Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
8.2.8.B.5 Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.
8.2.8.C.2 Explain the need for optimization in a design process.
8.2.8.C.3 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
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- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.

Science and Engineering Practice 6 Constructing Explanations and Designing Solutions

- Apply scientific ideas or principles to design, construct, and/or test a design of an object, tool, process or system.
- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting.

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____ Civic Literacy **____ Health Literacy**

Transfer

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1. Observe and recognize the use of technology around us.
2. Solve practical problems by using existing technology.
3. Solve practical problems by creating new technology.
4. Evaluate the impact of technology on society and the environment.
5. Recognize a problem and apply critical thinking and problem-solving skills to solve the problem.

Meaning

Understandings	Essential Questions
Students will understand that…	**Students will keep considering…**
U1. Manufacturing is so widespread that almost anything that is purchased is a manufactured product. **U2.** Manufacturers use technology to create products in mass quantities. **U3.** Manufacturing requires time in arranging raw materials, equipment, personnel, quality control, and marketing.	**Q1.** What is manufacturing technology? **Q2.** How has technology changed the way products are manufactured? **Q3.** What is construction technology? **Q4.** How can I use technology to become a better problem solver?

U4. Advances in building technology has changed construction methods. **U5.** Construction of a structure follows a system. **U6.** Construction technology is used in the development of strategies for solving problems in the real world.	

Acquisition

Knowledge	Skills
Students will know…	**Students will be able to…**
K1. How to describe manufacturing systems using the universal systems model. **K2.** Several manufacturing tools and processes. **K3.** General steps in setting up and running a small factory. **K4.** About modern manufacturing and the steps that led to it. **K5.** The benefits of modern manufacturing and the negative impact some of the steps encountered. **K6.** What a virtual factory is. **K7.** The differences between CNC, CAM, and CIM. **K8.** The role of quality assurance and safety in modern manufacturing. **K9.** What the purpose of a marketing department is. **K10.** Several forms of advertising. **K11.** The difference between a wholesaler and a retailer. **K12.** The names of some important structures. **K13.** How to identify different residential dwellings. **K14.** How a building site is chosen. **K15.** The difference between the construction of large buildings and the construction of houses. **K16.** Basic methods used in building skyscrapers. **K17.** The ways in which bridges are supported. **K18.** The three main parts of a dam. **K19.** The purpose of a monument.	**S1.** Discuss how manufacturing evolved. **S2.** Explain the difference between durable and non-durable goods. **S3.** Discuss the importance of assembly lines and division of labor. **S4.** Explain the concept of added value. **S5.** Explain the function of market research, quality assurance, and just-in-time delivery. **S6.** Develop research skills by exploring Websites. **S7.** Explain the purpose of research and development. **S8.** Discuss how products are designed. **S9.** Examine the use of industrial robots and e-manufacturing. **S10.** Discuss how construction systems evolved. **S11.** Explain the purpose of different construction materials. **S12.** Discuss building codes and safety. **S13.** Discover how the strength of a column is affected by its shape. **S14.** Explain the difference between manufactured houses and site-built houses. **S15.** Explain how a house is assembled. **S16.** Explore parts of a building that goes into constructing a house. **S17.** Have an increased awareness of the geometric shapes and components that makes up a geodesic dome. **S18.** Understand the basic structural engineering concepts that underlie geodesic dome construction. **S19.** Explain why asphalt and concrete are preferred materials for roadways. **S20.** Discuss methods used to build tunnels. **S21.** Explain how construction in space if different from that on Earth. **S22.** Apply and demonstrate the design/problem solving process.

Evidence (Stage 2)

Checks for Alignment	***Evaluation Criteria***	***Assessment Evidence***

	Performance is judged in terms of…	
U1 – U6 **Q1 – Q4** **K1 – K19** **S1 – S22**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**<u>Transfer Task(s)</u>** Formative • Classroom discussion • Informal observation • Graphic organizers • Handouts/worksheets • Vocabulary databases
		Summative • Self-checks • Rubrics
U1 – U6 **Q1 – Q4** **K1 – K19** **S1 – S22**	Blooms Taxonomy • Remembering • Understanding • Applying • Analyzing • Evaluating • Creating	**<u>Other Evidence</u>** Formative • Design Portfolio
		Summative • Design Portfolio

Learning Plan (Stage 3)

Checks for alignment and best practice

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Graphic organizers to categorize durable and non-durable goods, to list the manufacturing system, to list the steps of market research, to analyze product design, to identify product producing acronyms, to list steps in the distribution process, to list categories of construction, to list the ingredients of concrete, to list the advantages of prefabricated houses, to identify the things to ask before choosing a location for a house, to list the safety issues for tall buildings, to list types of bridges, and to list the differences between gasoline and electric motors.	<u>Introduction to Technology</u> textbook pages 340-435.
	Create a database with vocabulary words.	Manufacturing Systems PowerPoint. Manufacturing in the 21st Century PowerPoint. The World of Construction PowerPoint. Building a House PowerPoint. Heavy Construction PowerPoint.

	Organize and implement a team production model in small groups to assemble pens in the best time with the least amount of defects.	Pens.
	Fold index cards into different shapes (N, M, W, and 0) to discover how much of a load each one can carry until it collapse.	Index cards, rubber band, pennies.
	Build a geodesic dome to test for strength and durability.	Straws and pipe cleaners.
	Design, build, and test a structure made of paper.	Paper, masking tape, and foam core. Books for testing.
	Design, build, an test a truss bridge that measures 18" long, 4" to 6" tall, and 4" to 6" wide with a budget of $1,550,000.00	Toothpicks, structures glue, cardboard, graph paper, wax paper, foam core, sample checks, order forms, and a check register. Weights for testing.
	Suggested Activities	**Suggested Resources**
	Research the world's tallest buildings and make a list of the top five, arranged by height. Using the world map, label where each is located.	Internet. World map.
	Research some materials that construction companies use when they build a structure that is friendly to the environment. Then create a table of five green materials along with the pros and cons of each material.	https://www.youtube.com/watch?v=1X8EgthqsQ0 http://inhabitat.com/the-enovo-house/ Word.
	Explore parts of a building that go into constructing a home.	http://www.glencoe.com/sec/Tech_Ed/interactive/building_parts.html
	Complete the Technology Time Machine – Construction by Design.	Introduction to Technology pages 440-441.
	Design, build, and test a tower make out of marshmallows (joints) and spaghetti (members) with a budget of only $400.00.	Spaghetti, mini-marshmallows, fake money.
	Learn how asphalt is made and used in paving roads by creating no-bake chocolate cookies.	Cocoa powder, milk, butter, sugar, walnuts, coconut, and oats. Crock pot, wax paper, rolling pin, wooden spoon, and measuring cups and spoons.

Strategies for Differentiation

Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative Learning
Cooperative Learning	Independent Study
Learning Buddies	Internet based mini-lesson
Self-Check modifications	Choice menus
Extended time	Varied rubrics
Choice menus	Paired/Group Activity
Varied rubrics	

TEXTBOOK Resources

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