Grade, Subject/Course: 7th grade, Technology and Engineering	
Unit: Material Processing	**___x__ Essential _____ Important _____ Compact**
Big Idea: How do you turn an idea into a product?	
PA Core Content Standards/Anchors (or National Standards): 3.5.6-8.A Students who demonstrate understanding can research information from various sources to use and maintain technological products or systems. 3.5.6-8.D Students who demonstrate understanding can analyze how the creation and use of technologies consumes renewable, non-renewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges. 3.5.6-8.F Students who demonstrate understanding can analyze examples of technologies that have changed the way people think, interact, live, and communicate. 3.5.6-8.J Students who demonstrate understanding can use tools, materials, and machines to safely diagnose, adjust, and repair systems. 3.5.6-8.M Students who demonstrate understanding can 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. 3.5.6-8.P Students who demonstrate understanding can evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. 3.5.6-8.Q Students who demonstrate understanding can apply a technology and engineering design thinking process. 3.5.6-8.R Students who demonstrate understanding can develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants. 3.5.6-8.S Students who demonstrate understanding can illustrate the benefits and opportunities associated with different approaches to design. 3.5.6-8.T Students who demonstrate understanding can create solutions to problems by identifying and applying human factors in design. 3.5.6-8.U Students who demonstrate understanding can evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design. 3.5.6-8.V Students who demonstrate understanding can refine design solutions to address criteria and constraints. 3.5.6-8.X Students who demonstrate understanding can defend decisions related to a design problem.	**Interdisciplinary Standards (if applicable):** **Math:** CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools. CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations. **Reading and Writing:** CC.3.5.6-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. CC.3.5.6-8.D. 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. CC.3.6.6-8.G. 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). CC.3.5.6-8.I Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. CC.3.6.6-8.H Draw evidence from informational texts to support analysis, reflection, and research.

3.5.6-8.Y Students who demonstrate understanding can compare, contrast, and identify overlap between the contributions of science, technology, engineering, and mathematics in the development of technological systems. 3.5.6-8.BB Students who demonstrate understanding can demonstrate how knowledge gained from other content areas affects the development of technological products and systems. 3.5.6-8.II Students who demonstrate understanding can predict outcomes of a future product or system at the beginning of the design process. 3.5.6-8.KK Students who demonstrate understanding can explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations. 3.5.6-8.JJ Students who demonstrate understanding can apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.	
Essential Questions: ● What steps are involved in technological design and problem solving when creating inventions and innovations? ● What tools and materials could be used to make your project? ● What factors influence a design?	**Understandings:** Students will know that… ● How tools and materials can influence innovations and inventions. ● There are different ways to make a project. ● Environmental and economic concerns shape a project. ● The design process transforms ideas into practical solutions. ● Tools are selected for their appropriate use and safety concerns.
Knowledge: Students will know… ● How to measure with a ruler. ● What an orthographic drawing is and why it is used. ● How to create a 3D model on the computer. ● How the 3D printer works. ● How the hand tools and power tools operate. ● How to evaluate a project for quality.	**Do/Skills:** Students will be able to… ● Measure using mm and inches to ¼ of an inch. ● Create an orthographic drawing with overall dimensions. ● Safely use hand tools and power tools to create a project. ● Evaluate their project in terms of quality.

Vocabulary:	**Core Resources:**
Empathize, Define, Ideate, Prototype, Test, Assess Computer Aided Drafting Computer Aided Manufacturing Orthographic Projection Extruder Router Square	3D Model Lesson Plan Creating your 3D model in Tinkercad Shelf lesson plan Saws Safety Handout Sander Safety Handout Shelf task list
Common Assessment(s): Prototype Design Planning Sheet Orthographic Projection Shelf Design Brief and Rubric Saw Safety Quiz Sander Safety Quiz	**Supplemental Resources:** https://www.iteea.org/EbD.aspx