

<b>Project Lead the Way: Introduction to Engineering, (IED)</b>			<b>Grades 9-12</b>
<b>Standards</b>		<b>Benchmarks</b>	<b>Activities/Examples</b>
1. Students will develop an understanding of the characteristics and scope of technology.	M	Most development of technologies these days is driven by the profit motive and the market.	Students will learn engineering design ethics
2. Students will develop an understanding of the core concepts of technology.	R	Requirements are the parameters placed on the development of a product or system.	Students will learn engineering design ethics
	X	Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	Reverse Engineering, student will perform reverse engineering on a product, and draw and document each part to construct a three-dimensional model.
3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	I	Technological ideas are sometimes protected through the process of patenting.	Reverse Engineering, student will perform reverse engineering on a product, and draw and document each part to construct a three-dimensional model.
			Students will learn engineering design ethics.
	J	Technological progress promotes the advancement of science and mathematics.	Student will draw a multiview/orthographic drawing using the computer program "Inventor."
			Student will design and draw a puzzle cube using the computer program "inventor." Students will design and build a package for the completed puzzle cube to be stored in.
		Students will learn dimensioning, advanced modeling skills, and advanced designs.	
5. Students will develop an understanding of the effects of technology on the environment.	L	Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.	Students will learn engineering design ethics.
6. Students will develop an understanding of the role of society in the development and use of technology.	I	The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.	Students will learn engineering design ethics.

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	J	A number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads contribute to shaping the design of and demand for various technologies	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
8. Students will develop an understanding of the attributes of design.	H	The design process includes defining a problem, brainstorming, researching an degenerating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	Design Process will be taught and students will perform it on each project in class.
	I	Design problems are seldom presented in a clearly defined form.	Introduction to technical sketching and drawing. Students will sketch multiview and pictorial drawings.
			Student will draw a multiview/orthographic drawing using the computer program “inventor.”
			Students will learn dimensioning, advanced modeling skills, and advanced designs.
K	Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.	Student will build a puzzle cube. Students will learn engineering design ethics.	
9. Students will develop an understanding of engineering design.	J	Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.	Student will draw a multiview/orthographic drawing using the computer program “Inventor.”
			Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.

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	K	A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
			Student will build a puzzle cube.
			Reverse Engineering, student will perform reverse engineering on a product, and draw and document each part to construct a three-dimensional model.
	L	The process of engineering design takes into account a number of factors.	Students will learn dimensioning, advanced modeling skills, and advanced designs. Students will learn engineering design ethics.
10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	L	Many technological problems require a multidisciplinary approach.	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
			Students will learn engineering design ethics.
11. Students will develop the abilities to apply the design process.	N	Identify criteria and constraints and determine how these will affect the design process.	Design Process will be taught and students will perform it on each project in class. Introduction to technical sketching and drawing. Students will sketch multiview and pictorial drawings.
			Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
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	O	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.

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	P	Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
	Q	Develop and produce a product or system using a design process.	Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
			Student will build a puzzle cube.
	R	Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	Student will draw a multiview/orthographic drawing using the computer program “inventor.”
			Student will design and draw a puzzle cube using the computer program “inventor.” Students will design and build a package for the completed puzzle cube to be stored in.
			Students will learn dimensioning, advanced modeling skills, and advanced designs.
			Reverse Engineering, student will perform reverse engineering on a product, and draw and document each part to construct a three-dimensional model.
12. Students will develop the abilities to use and maintain technological products and systems.	O	Operate systems so that they function in the way they were designed.	Student will build a puzzle cube.

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**Grades 9-12**

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17. Students will develop an understanding of and be able to select and use information and communication technologies.	P	There are many ways to communicate information, such as graphic and electronic means.	Students will learn dimensioning, advanced modeling skills, and advanced designs.
	Q	Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.	Students will apply knowledge and processes that communicate measurements, symbols, and graphic images. All of the assignments will have these elements in them.
20. Students will develop and understanding of and be able to select and use construction technologies.	L	The design of structures includes a number of requirements.	Reverse Engineering, student will perform reverse engineering on a product, and draw and document each part to construct a three-dimensional model.