



Engineering is Elementary®

National Center for Technological Literacy®

Museum of Science, Boston

Engineering is Elementary

Curriculum Units Mapped to the ITEEA Standards for Technological Literacy

Key:		Designing Walls	Designing Bridges	Designing Water Filters	Designing Windmills	Making Work Easier	Designing Pollinators	Representing Sound	Designing Model Membranes	Designing Alarm Circuits	Improving a Play Dough Process	Evaluating Landscapes	Designing Plant Packages	Designing MagLev Systems	Designing Parachutes	Designing Solar Ovens	Replicating an Artifact	Cleaning an Oil Spill	Designing Submersibles	Designing Lighting Systems	Knee Braces	
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Category 1: The Nature of Technology																						
Standard 1: Students will develop an understanding of the characteristics and scope of technology.																						
Grades K-2	A. The natural world and human-made world are different.			①			②		①			①										
	B. All people use tools and techniques (technology) to help them do things.	②		②		①	②	①	①		①	①	①		①	①		①	①	②	①	
Grades 3-5	C. Things that are found in nature differ from things that are human-made in how they are produced and used.	②			①		②									①						
	D. Tools, materials, and skills are used to make things and carry out tasks.	②	②	①	①	①	②	①		②	①	①			①	①	①	①	①	②	①	
	E. Creative thinking and economic and cultural influences shape technological development.			②	①	①	①		①		①	①		②		①						

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Standard 2: Students will develop an understanding of the core concepts of technology.

Grades K-2	A. Some systems are found in nature, and some are made by humans.			②			①						②			①				
	B. Systems have parts or components that work together to accomplish a goal.			②			①						①					①		
	C. Tools are simple objects that help humans complete tasks.	②				①	②							②		①				
	D. Different materials are used in making things.	①		①	①	②	①	①	①	①	①		①		①	①	①		①	①
	E. People plan in order to get things done.	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①
Grades 3-5	F. A subsystem is a system that operates as a part of another system.					①	②													
	G. When parts of a system are missing, it may not work as planned.						①													
	H. Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time.									②					①	②				
	I. Tools are used to design, make, use, and assess technology.			②		②									①					
	J. Materials have many different properties.	①		②	①		①	①	①	①	①		①	①	①	①	①	①	①	①
	K. Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.	②			①	①		①										①		
	L. Requirements are the limits to designing or making a product or system.	①	①	①	②	②	②	②	②	②	①	②	①	②	①	①	①	①	②	①
Grades 6-8	S. Trade-off is a decision process recognizing the need for careful compromises among competing factors.											①			①	①	①		①	①

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Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.																					
Grades K-2	A. The study of technology uses many of the same ideas and skills as other subjects.	②	②	①	①	①	①	②	①	①	①	①		②	①	②		①	②		
Grades 3-5	B. Technologies are often combined.					①															
	C. Various relationships exist between technology and other fields of study.	②	②	②	②	②	①	①	①		①	①		①			①		①		①
Category 2: Technology and Society																					
Standard 4: Students will develop an understanding of the cultural, social, economic and political effects of technology.																					
Grades K-2	A. The use of tools and machines can be helpful or harmful.			①														①			
Grades 3-5	B. When using technology, results can be good or bad.			①			①						①					①			
	C. The use of technology can have unintended consequences.			①			①									①		①			
Standard 5: Students will develop an understanding of the effects of technology on the environment.																					
Grades K-2	A. Some materials can be reused and/or recycled.												①			①					
Grades 3-5	B. Waste must be appropriately recycled or disposed of to prevent unnecessary harm to the environment.			①									①			①		①			
	C. The use of technology affects the environment in good and bad ways.			①					②							①		①			

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Standard 6: Students will develop an understanding of the role of society in the development and use of technology.																						
Grades K-2	A. Products are made to meet individual needs and wants.	①	②	①	②	①	①	①	②	①	①	①	①	②	①	①				①	①	①
Grades 3-5	B. Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes.			②	①											②						
	C. Individual, family, community, and economic concerns may expand or limit the development of technologies.			①				②	②		①	①	①			①						
Standard 7: Students will develop an understanding of the influence of technology on history.																						
Grades K-2	A. The way people live and work has changed throughout history because of technology.	①			①	①										②				①		
Grades 3-5	B. People have made tools to provide food, to make clothing, and to protect themselves.															②	②			①		
Category 3: Design																						
Standard 8: Students will develop an understanding of the attributes of design.																						
Grades K-2	A. Everyone can design solutions to a problem.	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	①	
	B. Design is a creative process.	①	①	①	①	①	①	①	①	①			①	①	①	②						
Grades 3-5	C. The design process is a purposeful method of planning practical solutions to problems.	①	①	①	①	①	①	①		①	①	①	①	②	①	①	①	①	①	①	①	
	D. Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.	①	①	①	①	①		①		①		①	①		①	①	①	①		①	①	
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		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Standard 9: Students will develop an understanding of engineering design.																					
Grades K-2	A. The engineering design process includes identifying a problem, looking for ideas, developing solutions, and sharing solutions with others.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	B. Expressing ideas to others verbally and through sketches and models is an important part of the design process.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Grades 3-5	C. The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), [making, evaluating, and presenting].	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	D. When designing an object it is important to be creative and consider all ideas.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1
	E. Models are used to communicate & test design ideas & processes.	1	2	2	2	2	1	1		1		1	1	1	1			1			1
Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation.																					
Grades K-2	A. Asking questions and making observations helps a person to figure out how things work.	1	1	1	1	1	1	1	1			1	1	1	1	1		1		1	1
	B. All products and systems are subject to failure. Many products and systems, however, can be fixed.																				
Grades 3-5	C. Troubleshooting is a way of finding out why something does not work so that it can be fixed.									1											
	D. Invention and innovation are creative ways to turn ideas into real things.																				
	E. The process of experimentation, which is common in science, can also be used to solve technological problems.	1	1	1	1	1	1	1	1		1	1			1	1	1	1	1		1

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Standard 13: Students will develop abilities to assess the impact of products and systems.																						
Grades K-2	A. Collect information about everyday products and systems by asking questions.										1			1		1						
	B. Determine if the human use of a product or system creates positive or negative results.						1															
Grades 3-5	C. Compare, contrast and classify collected information in order to identify patterns.										1	1		1	1						1	
	D. Investigate and assess the influence of a specific technology on the individual, family, community, and environment.															1						
	E. Examine the trade-offs of using a product or system and decide when it could be used.																					
Category 5: The Designed World																						
Standard 14: Students will develop an understanding of and be able to select and use medical technologies.																						
Grades K-2	A. Vaccinations protect people from getting certain diseases.																					
	B. Medicine helps people who are sick to get better.																					
	C. There are many products designed specifically to help people take care of themselves.																					1
Grades 3-5	D. Vaccines are designed to prevent diseases from developing and spreading; medicines are designed to relieve symptoms and stop diseases from developing.																					
	E. Technological advances have made it possible to create new devices, to repair or replace certain parts of the body, and to provide a means for mobility.																					1
	F. Many tools & devices have been designed to help provide clues about health and to provide a safe environment.																					

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Standard 15: Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.																					
Grades K-2	A. The use of technologies in agriculture makes it possible for food to be available year round and to conserve resources.																				
	B. There are many different tools necessary to control and make up the parts of an ecosystem.						①														
Grades 3-5	C. Artificial ecosystems are human-made environments that are designed to function as a unit and are comprised of humans, plants, and animals.																				
	D. Most agricultural waste can be recycled.																				
	E. Many processes used in agriculture require different procedures, products or systems.																				
Standard 16: Students will develop an understanding of and be able to select and use energy and power technologies.																					
Grades K-2	A. Energy comes in many forms.				①											①					
	B. Energy should not be wasted.				②											①					
Grades 3-5	C. Energy comes in different forms.				②											①					
	D. Tools, machines, products, and systems use energy in order to do work.				①											①					

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Standard 17: Students will develop an understanding of and be able to select and use information and communication technologies.																					
Grades K-2	A. Information is data that has been organized.							②													
	B. Technology enables people to communicate by sending and receiving information over a distance.				②			①													①
	C. People use symbols when they communicate by technology.								①												
Grades 3-5	D. The processing of information through the use of technology can be used to help humans make decisions and solve problems.							②													
	E. Information can be acquired & sent through a variety of technological sources, including print & electronic media.				②																
	F. Communication technology is the transfer of messages among people and/or machines over distances through the use of technology.								①												
	G. Letters, characters, icons, and signs are symbols that represent ideas, quantities, elements and operations.								①		①										②
Standard 18: Students will develop an understanding of and be able to select and use transportation technologies.																					
Grades K-2	A. A transportation systems has many parts that work together to help people travel.														①						
	B. Vehicles move people or goods from one place to another in water, air or space, and on land.														①	①					
	C. Transportation vehicles must be cared for to prolong use.																				
Grades 3-5	D. The use of transportation allows people and goods to be moved from place to place.														①						
	E. A transportation system may lose efficiency/fail if a part is missing/malfunctioning or a subsystem isn't working.																				

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Standard 19: Students will develop an understanding of and be able to select and use manufacturing technologies.

Grades K-2	A. Manufacturing systems produce products in quantity.					①														
	B. Manufactured products are designed.					②					①									①
Grades 3-5	C. Processing systems convert natural materials into products.														①					
	D. Manufacturing processes include designing products, gathering resources, and using tools to separate, form, and combine materials in order to produce products.																			
	E. Manufacturing enterprises exist because of a consumption of goods.																			

Standard 20: Students will develop an understanding of and be able to select and use construction technologies.

Grades K-2	A. People live, work, & go to school in buildings, which are of different types: houses... office buildings, & schools.																			
	B. The type of structure determines how the parts are put together.	①	①																	
Grades 3-5	C. Modern communities are usually planned according to guidelines.																			
	D. Structures need to be maintained.	②																		
	E. Many systems are used in buildings.																			
Grades 6-8	G. Structures rest on a foundation.										①									