§127.785 Engineering Design and Problem Solving TEKS Overview
Texas High School Aerospace Scholars Virtual Curriculum

Standard Designation	Standard	# of Aligned Activities
	d(1) *The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:*	
127.785.d1A	(A) demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession;	**1**
127.785.d1B	(B) show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome;	**7**
127.785.d1C	(C) present written and oral communication in a clear, concise, and effective manner;	**17**
127.785.d1D	(D) demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and	**15**
127.785.d1E	(E) demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.	**15**
	d(2) *The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:*	
127.785.d2A	(A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	**19**
127.785.d2B	(B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems;	**12**
127.785.d2C	(C) use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards;	**3**
127.785.d2D	(D) use appropriate tools such as dial caliper, micrometer, protractor, compass, scale rulers, multimeter, and circuit components;	**4**
127.785.d2E	(E) collect quantitative data using the International System of Units (SI) and United States customary units and qualitative data as evidence;	**1**
127.785.d2F	(F) organize quantitative and qualitative data using spreadsheets, engineering notebooks, graphs, and charts;	**2**
127.785.d2G	(G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and	**17**
127.785.d2H	(H) distinguish between scientific hypotheses, theories, and laws.	**1**
	d(3) *The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:*	
127.785.d3A	(A) identify advantages and limitations of models such as their size, scale, properties, and materials;	**1**

127.785.d3B	(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations;	**7**
127.785.d3C	(C) use mathematical calculations to assess quantitative relationships in data; and	**6**
127.785.d3D	(D) evaluate experimental and engineering designs.	**11**
	d(4) *The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:*	
127.785.d4A	(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;	**13**
127.785.d4B	(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	**17**
127.785.d4C	(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.	**1**
	d(5) *The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:*	
127.785.d5A	(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student;	**9**
127.785.d5B	(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content; and	**2**
127.785.d5C	(C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a STEM field.	**9**
	d(6) *The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:*	
127.785.d6A	(A) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials; and	**12**
127.785.d6B	(B) draw inferences based on data related to promotional materials for products and services.	**5**
	d(7) *The student applies knowledge of science and mathematics and the tools of technology to solve engineering design problems. The student is expected to:*	
127.785.d7A	(A) select appropriate mathematical models to develop solutions to engineering design problems;	**12**
127.785.d7B	(B) integrate advanced mathematics and science skills as necessary to develop solutions to engineering design problems;	**11**
127.785.d7C	(C) judge the reasonableness of mathematical models and solutions;	**7**
127.785.d7D	(D) investigate and apply relevant chemical, mechanical, biological, electrical, and physical properties of materials to engineering design problems;	**2**

127.785.d7E	(E) identify the inputs, processes, outputs, control, and feedback associated with open and closed systems;	**5**
127.785.d7F	(F) describe the difference between open-loop and closed-loop control systems;	**3**
127.785.d7G	(G) evaluate different measurement tools such as dial caliper, micrometer, protractor, compass, scale rulers, and multimeter, make measurements with accuracy and precision, and specify tolerances; and	**3**
127.785.d7H	(H) use conversions between measurement systems to solve real-world problems.	**1**
	d(8) *The student communicates through written documents, presentations, and graphic representations using the tools and techniques of professional engineers. The student is expected to:*	
127.785.d8A	(A) communicate visually by sketching and creating technical drawings using established engineering graphic tools, techniques, and standards;	**8**
127.785.d8B	(B) read and comprehend technical documents, including specifications and procedures;	**7**
127.785.d8C	(C) prepare written documents such as memorandums, emails, design proposals, procedural directions, letters, and technical reports using the formatting and terminology conventions of technical documentation;	**15**
127.785.d8D	(D) organize information for visual display and analysis using appropriate formats for various audiences, including technical drawings, graphs, and tables such as file conversion and appropriate file types, in order to collaborate with a wider audience;	**6**
127.785.d8E	(E) evaluate the quality and relevance of sources and cite appropriately; and	**1**
127.785.d8F	(F) defend a design solution in a presentation.	**1**
	d(9) *The student recognizes the history, development, and practices of the engineering professions. The student is expected to:*	
127.785.d9A	(A) identify and describe career options, working conditions, earnings, and educational requirements of various engineering disciplines such as those listed by the Texas Board of Professional Engineers;	**5**
127.785.d9B	(B) recognize that engineers are guided by established codes emphasizing high ethical standards;	**4**
127.785.d9C	(C) explore the differences, similarities, and interactions between engineers, scientists, and mathematicians;	**4**
127.785.d9D	(D) describe how technology has evolved in the field of engineering and consider how it will continue to be a useful tool in solving engineering problems;	**1**
127.785.d9E	(E) discuss the history and importance of engineering innovation on the U.S. economy and quality of life; and	**1**
127.785.d9F	(F) describe the importance of patents and the protection of intellectual property rights.	**1**
	d(10) *The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes. The student is expected to:*	
127.785.d10A	(A) identify and define an engineering problem;	**2**

127.785.d10B	(B) formulate goals, objectives, and requirements to solve an engineering problem;	**1**
127.785.d10C	(C) determine the design parameters associated with an engineering problem such as materials, personnel, resources, funding, manufacturability, feasibility, and time;	**9**
127.785.d10D	(D) establish and evaluate constraints pertaining to a problem, including health, safety, social, environmental, ethical, political, regulatory, and legal;	**3**
127.785.d10E	(E) identify or create alternative solutions to a problem using a variety of techniques such as brainstorming, reverse engineering, and researching engineered and natural solutions;	**2**
127.785.d10F	(F) test and evaluate proposed solutions using methods such as creating models, prototypes, mock-ups, or simulations or performing critical design review, statistical analysis, or experiments;	**2**
127.785.d10G	(G) apply structured techniques to select and justify a preferred solution to a problem such as a decision tree, design matrix, or cost-benefit analysis;	**1**
127.785.d10H	(H) predict performance, failure modes, and reliability of a design solution; and	**1**
127.785.d10I	(I) prepare a project report that clearly documents the designs, decisions, and activities during each phase of the engineering design process.	**14**
d(11) *The student manages an engineering design project. The student is expected to:*		
127.785.d11A	(A) participate in the design and implementation of a real-world or simulated engineering project using project management methodologies, including initiating, planning, executing, monitoring and controlling, and closing a project;	**5**
127.785.d11B	(B) develop a plan and project schedule for completion of a project;	**0**
127.785.d11C	(C) work in teams and share responsibilities, acknowledging, encouraging, and valuing contributions of all team members;	**2**
127.785.d11D	(D) compare and contrast the roles of a team leader and other team member responsibilities;	**1**
127.785.d11E	(E) identify and manage the resources needed to complete a project;	**4**
127.785.d11F	(F) use a budget to determine effective strategies to meet cost constraints;	**0**
127.785.d11G	(G) create a risk assessment for an engineering design project;	**1**
127.785.d11H	(H) analyze and critique the results of an engineering design project; and	**2**
127.785.d11I	(I) maintain an engineering notebook that chronicles work such as ideas, concepts, inventions, sketches, and experiments.	**21**