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

Standard #	Standard	# of Activities Aligned
(d)(1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:		
127.785.d1A	(1A) demonstrate knowledge of how to dress appropriately, speak politely, and conduct oneself in a manner appropriate for the profession	19
127.785.d1B	(1B) show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome	18
127.785.d1C	(1C) present written and oral communication in a clear, concise, and effective manner;	19
127.785.d1D	(1D) demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and	19
127.785.d1E	(1E) demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.	19
(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	(2A) ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	18
127.785.d2B	(2B) apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems	18
127.785.d2G	(2G) develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and	18
(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	(3A) identify advantages and limitations of models such as their size, scale, properties, and materials;	18
(d)(4) The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:		
127.785.d4A	(4A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;	18
127.785.d4B	(4B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	18
127.785.d4C	(4C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.	18
(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	(5A) 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;	18
127.785.d5B	(5B) 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	18
127.785.d5C	(5C) research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a STEM field	18
(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	(8A) communicate visually by sketching and creating technical drawings using established engineering graphic tools, techniques, and standards;	18
127.785.d8C	(8C) prepare written documents such as memorandums, emails, design proposals, procedural directions, letters, and technical reports using the formatting and terminology conventions of technical documentation;	18
127.785.d8D	(8D) 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;	18
127.785.d8E	(8E) evaluate the quality and relevance of sources and cite appropriately; and	18

127.785.d8F	(8F) defend a design solution in a presentation.	18
(d)(9) 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.d9B	(9B) recognize that engineers are guided by established codes emphasizing high ethical standards;	18
(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	(10A) identify and define an engineering problem;	18
127.785.d10B	(10B) formulate goals, objectives, and requirements to solve an engineering problem;	18
127.785.d10C	(10C) determine the design parameters associated with an engineering problem such as materials, personnel, resources, funding, manufacturability, feasibility, and time;	18
127.785.d10D	(10D) establish and evaluate constraints pertaining to a problem, including health, safety, social, environmental, ethical, political, regulatory, and legal;	18
127.785.d10H	(10H) predict performance, failure modes, and reliability of a design solution; and	18
127.785.d10I	(10I) prepare a project report that clearly documents the designs, decisions, and activities during each phase of the engineering design process.	18
(d)(11) The student manages an engineering design project. The student is expected to:		
127.785.d11A	(11A) 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;	18
127.785.d11B	(11B) develop a plan and project schedule for completion of a project;	18
127.785.d11C	(11C) work in teams and share responsibilities, acknowledging, encouraging, and valuing contributions of all team members;	18
127.785.d11D	(11D) compare and contrast the roles of a team leader and other team member responsibilities;	18
127.785.d11E	(11E) identify and manage the resources needed to complete a project;	18

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MISSION TO MOON TO PREPARE FOR MARS RESEARCH CHALLENGE	
Purpose: Research and develop the nine stages of a sustainable long term human presence on the Moon in preparation for a round-trip human mission to Mars of (30 - 500 days) scientific community of astronauts. **Objective:** Create a cohesive, technically sound video presentation aligned with true industry requirements, facilitated by a team of NASA's Johnson Space Center industry professionals.	
Research and Prototype Focus Objectives	**TEKS**
Expeditions to Lunar Surface	
Research and design a prototype of either an autonomous Cargo Lunar Lander OR a lunar Polar Exploration Rover. Driving questions: What is our mission for an expedition to the lunar surface? What do we need before we travel to the Moon? How will we do it? Presentation Subtopics include: Overall science goals, Precision landing, Lunar cargo and payloads, In-situ resource utilization experiments (geology, fuel, water, mining ores, etc.)	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)
Option 1. Cargo Lunar Lander prototype includes: Autonomous precision landing systems, Laser retro-reflector array, Navigation Doppler Lidar for precise velocity and range sensing, Video and camera systems, Payloads to test chemical response of lunar regolith during landing, Advanced photovoltaic energy transfer systems, Magnetometer, Near-infrared volatiles mass spectrometer. Option 2. Polar Exploration Rover prototype includes: Ability to rove across the lunar surface, Autonomous driving, Miniaturized sensors, Spectrometer to hunt for water ice, Minimum of two moveable and threaded drilling devices (different types of drill heads), Casing or other material to allow for hole stabilization while drilling, Battery and/or solar power for operations, Extreme environmental resistance.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)

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Research and Prototype Focus Objectives	TEKS
Flying to Lunar Orbit	
Research and design a prototype of a human rated capsule capable of travelling to the Moon. Must have a cutaway section so inside can be viewed. Driving questions: How do we go? How do we go to lunar orbit safely? Where are we going on lunar surface? Presentation Subtopics include: Rationale and risk assessment; Interplanetary spacecraft design to lunar orbit (propulsion, timelines, and communication systems); Prototype in-space propulsion to reduce time for lunar mission; Entry, descent, and landing site for human lunar mission.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving (10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)
Human rated capsule prototype includes: Propulsion system and control (fuel and oxidizer); Electrical energy system (represented in blue); Water, waste, and oxygen recycling system (represented in red); Environmental Control system and CO_2 scrubber system; Crew quarters; Radiation protection; Waste Management System; Photography/Earth Observation portal; Guidance, Navigation and Control system; Communication and radar system	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)

Research and Prototype Focus Objectives	TEKS
Living in Lunar Orbit	
Research and design a prototype of a Habitation and Logistics Outpost (HALO) or a Power and Propulsion Element (PPE). Driving questions: How do we survive? What are the dangers? What are our physical and psychological needs? Presentation Subtopics include: Microgravity issues; Nutrition and exercise, and interpersonal relationships; Space weather and radiation hazards; Science goals during deep space transit to the Moon.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)

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Option 1. HALO prototype includes: Autonomous docking ports, Power distribution system, Command and control systems, Design for initial autonomous operations, Safe haven for emergencies, Space suit storage, Crew quarters. Option 2. PPE prototype includes: Solar electric propulsion, Electrical power system, Autonomous navigation and trajectory systems, Navigate to different orbits, Fuel storage	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)
Research and Prototype Focus Objectives	**TEKS**
Traveling to Lunar Surface	
Research and design a prototype of a Human Lunar Landing System capable of descending to and ascending from the lunar surface or a Lunar Terrain Vehicle. Driving questions: How do we go to and from lunar surface? Where are we going on the Moon? How do we communicate in transit to surface? Presentation Subtopics include: Spacecraft design for descent to surface and ascent from surface (propulsion and timelines); Entry, descent, and landing site on lunar surface; Communication in transit to and on surface; Analog mission to Lunar surface	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)
Option 1. Human Landing System (HLS) prototype includes: Compact life support system; Autonomous docking to lunar Gateway or human rated capsule; Staged from lunar Gateway orbit; Deployable; Compact operating and propulsion system; Electrical energy system; Radiation protection; Guidance, navigation and control system. Option 2. Lunar Terrain Vehicle (LTV) prototype includes: Unpressurized (unenclosed), Transport crew around site, Ability to explore and conduct experiments in lunar south pole, Staged on lunar surface prior to crew arrival, Electronic vehicle energy storage and management, Autonomous driving, Extreme environmental resistance	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)

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Research and Prototype Focus Objectives	TEKS
Living on Lunar Surface	
Research and design a prototype of a Lunar Foundation Surface Habitat (FSH). Driving questions: How do we build a surface habitat? What do we need? How do we mitigate lunar hazards? Presentation Subtopics include: Lunar surface hazards (Micrometeoroid & radiation shielding, and dust mitigation); Launching pad; Pilot plants; Pressure and temperature mitigation	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11) (A,B,C,D,E)
The Lunar Foundation Surface Habitat (FSH) prototype includes: Biomedical station for testing and evaluation of human beings; Geological station for testing rock samples and evaluating rock specimens (Mass spectrometer, Chemical analysis of rocks, Atmospheric sensors for analyzing atmospheric content, Radiation Assessment Detector, Laser-Induced Remote Sensing that has the ability to capture high-resolution images); Engineering station set-up for maintenance and repairs of rovers, equipment, etc; Plant growing area with automatic watering and lighting system; Communications; Power; Airlock; Waste disposal	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)

Research and Prototype Focus Objectives	TEKS
Exploring Lunar South Pole	
Research and design a prototype of a lunar spacesuit helmet AND glove that can sustain life support, but incorporates requirements for mobility, functionality, and comfort. Driving questions: How do we survive during Extravehicular Activities (EVAs), or spacewalks? What are the dangers? What science can we collect during a spacewalk? Presentation Subtopics include: Advanced space suit requirements; Lunar surface hazards; Lunar (1/6) gravity issues; Lunar atmosphere and surface hazards…	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)

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The Helmet Prototype includes: Encompass the entire head of the astronaut; Must have lights, hoses for oxygen and ventilation; Must provide water to the crew; Must have a clear visor, with an overlay to protect the astronaut's eyes; Need to have a connection point to the rest of the suit; Must have a communication system built in. The Glove Prototype includes: Must be able to be evaluated for comfort and mobility by multiple subjects; Must be able to easily grip a penny and hold on to it; Must represent temperature adjustment for inside the glove; Fingertips must be made out of a harder material and evaluated for accuracy; Outer material must be flexible, but be able to hold pressure; Fingers must have a full range of motion and be evaluated by multiple subjects.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)
Research and Prototype Focus Objectives	**TEKS**
Exploring Lunar Surface	
Research and design a prototype of a Lunar Mobile Habitat. Must have a cutaway section so inside can be viewed. Driving questions: Why are we going? What are we hoping to discover? How are we going to track our lunar discoveries? Presentation Subtopics include: Long duration trips, Laboratories and tools, Demonstrate in-situ reutilization, Science goals & analog exploration of Moon	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)
The Lunar Mobile Habitat Prototype includes: Ability to rove across lunar surface; Support a crew for long duration trips of 10s of km; Mission duration on surface from 7 to 30-45 days from base camp; Space stowage area; Photography/observation portal; Rock hammer/crusher device, tool box containing necessary tools for operation; Communications; Battery or solar power for operations	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)

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Research and Prototype Focus Objectives	TEKS
Expanding Lunar Orbit	
Research and design a prototype of Expanded Gateway Habitat OR a Sample Return Vehicle Driving questions: How do we expand Gateway to prepare for Mars mission? How will we do a Mars mission? How will we communicate in transit to Mars? Presentation Subtopics include: Expanded gateway for Mars analog mission, How to live and communicate on voyage to Mars, Risk mitigation for two years flight to and from Mars, Maximum exploration with minimum Martian surface time.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)
Option 1. The Expanded Gateway Habitat prototype includes: International habitation module that can dock to initial Gateway; Additional systems to support human Mars mission preparation; Robotic arm; Additional logistics element; Additional support systems; Model must exhibit at least three additional systems that are of the team's original design. Option 2. Sample Return Vehicle prototype includes: Two sample collection devices (different types of devices); two return device capsules; Return Propulsion System; Return vehicle, capable of landing on a rough surface; Ability to rove across the Martian surface; Mass spectrometry device that detects chemicals for drilling areas; Battery or solar power for operations; Photography/observation portal; Core sample collectors; Launchpad for sample return mission to lift-off from.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)

Research and Prototype Focus Objectives	TEKS
Expanding Lunar Surface	
Research and design a prototype of a Lunar Hopper OR a Lunar Crater Radio Telescope (LCRT). Driving questions: How do we expand lunar surface operations? What do we need for long duration Lunar missions? How do track our Lunar discoveries? Presentation Subtopics include: Advanced lunar surface power and long duration power for lunar surface mission; Mars gravity issues (38% of Earth's gravitational pull); Autonomous manufacturing, excavation, and construction; Science objectives of hopper and radio telescope	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(3)(A) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)

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Option 1. The Lunar Hopper prototype includes: Deliver science and technology payloads across lunar surface; Controlled by Artemis base camp; Ability to prospect for resources; Use locally resourced fuel; Propulsion systems; Aerial coverage and access to extreme terrain; Able to explore pits and caves; Hop over obstacles; Accelerometers. Option 2. The Lunar Crater Radio Telescope (LCRT) prototype includes: Remotely emplaced by Artemis base camp; Determine best location of far side lunar crater; Signal/noise reduction system; Lunar wall climbing robotics; Suitable depth-to-diameter ratio Reflector; Extreme environmental resistance.	127.785 Engineering Design and Problem Solving(1)(A,B,C,D,E) 127.785 Engineering Design and Problem Solving(2)(A,B,G) 127.785 Engineering Design and Problem Solving(4)(A,B,C) 127.785 Engineering Design and Problem Solving(5)(A,B,C) 127.785 Engineering Design and Problem Solving(8)(A,C,D,E,F) 127.785 Engineering Design and Problem Solving(9)(B) 127.785 Engineering Design and Problem Solving(10)(A,B,C,D,H,I) 127.785 Engineering Design and Problem Solving(11)(A,B,C,D,E)