

CHALLENGE QUESTIONS & THE ENGINEERING DESIGN PROCESS



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PROBLEM TO BE SOLVED	RELATED RESOURCES
COMMUNICATIONS TECHNOLOGY	
How can you create a professional-looking news broadcast using green screen technology and video editing techniques?	
How can you design a visually appealing and impactful magazine cover that effectively communicates a chosen theme or message?	TAS1O/TGJ1O: Magazine Cover :: OCTE
How can you design a compelling and visually engaging movie poster that effectively captures the essence of a film and appeals to its target audience?	
How can you use audio recording and editing techniques to produce an engaging podcast episode?	TGJ3M: Creating a Podcast :: OCTE
How can you create an engaging and informative social media campaign that raises awareness about a relevant social issue?	TGJ4M: Campaign Public Service Announcement :: OCTE
How can you use stop motion animation techniques to create a captivating short story?	TGJ2O: Animation :: OCTE
How can you create a simple yet impactful logo that effectively represents a fictional business and appeals to its target audience?	TAS1O/TGJ1O: Personalized Stickers :: OCTE
How can you create a compelling video PSA that raises awareness about a school-wide issue and inspires positive change?	

COMPUTER TECHNOLOGY	
Create and design a new digital game for senior citizens	TEJ3M / TEJ4M: Game Development Using Microcontrollers :: OCTE
Use a microbit to move something in multiple directions	TAS1O/TAS2O/TEJ2O: Understanding What The Micro:bit Can Drive :: OCTE
Thinking about your home. Create a floor plan that would utilize how we use technology in our homes more efficiently	TAS2O / TEJ2O: Home Networking :: OCTE
CONSTRUCTION TECHNOLOGY	
Are you able to design and construct a simple birdhouse that withstands outdoor weather conditions?	
How can you design a model of a functional tiny home using recycled materials?	TAS2O/TCJ2O/TDJ2O: Design a Tiny House :: OCTE
How can you safely construct a simple wooden toolbox using only hand tools?	TCJ1O / TCJ2O: Making a Wood Box Joint :: OCTE
What is the best way to join two pieces of wood together for a strong, stable connection?	TCJ1O / TCJ2O: Making a Wood Box Joint :: OCTE
What is the strongest bridge design that you can create only using 50 popsicle sticks and 5 glue sticks?	
GREEN INDUSTRIES	
Design a Pedestrian Friendly Roadway for one of the roads around your school	Green Streets - Toronto What is green Infrastructure?

How can we design a farm layout that maximizes crop yields while minimizing environmental impact?	Beef Farming Apple Farm Activity
How can you design a vertical farming system that conserves water and space?	Exploration of Hydroponic Farming ZipGrow Hydroponic Farming
What crops would be most suitable for vertical systems?	Exploration of Hydroponic Farming ZipGrow Hydroponic Farming
What technologies could be integrated into a greenhouse to optimize plant growth?	Past Present and Future of Green Houses Role of Technology in Agriculture Presentation
How can we design a composting system that efficiently converts organized waste into nutrient-rich soil?	ABCs of Composting Production of Compost in Ontario
What plant species should be included in a garden to attract bees, butterflies and other pollinators?	How to Attract Pollinators Build Pollinator Garden - Canada Pollinator Garden - Guelph
What strategies can be implemented to prevent soil erosion, protect wildlife habitats, and maintain water quality in logging areas?	Soil Erosion Forest Sustainable Practices
How can we implement robotics into agriculture?	Podcast on Robotics Lesson in Agriculture
HAIRSTYLING AND AESTHETICS	
Design a complete haircare routine for clients with different hair textures and types.	
Design a new hairstyling tool to make styling/cutting/curling hair more efficient.	
Design a hairstyle that could last through a	TXJ2O: Global Updo's :: OCTE

full day of outdoor activities (exposed to wind, humidity, etc.) without losing its shape.	
Imagine a client's hair color has faded after just a week. How would you analyze the cause and adjust your process or products to improve the longevity of hair color in future applications?	TXJ3E: Colour Theory :: OCTE
After testing a new styling technique on a client, you notice some areas of the hair did not achieve the desired result. How would you adjust your method to ensure a more even outcome next time?	TAS1O/ TXJ1O: Properties of the Hair and Scalp :: OCTE
Create a nail design connected to a particular theme	TAS10/TXJ10: Nail Design :: OCTE
HEALTH CARE	
Create a project that you can bring to a long-term care facility	TAS1O / TAS2O: Building Empathy through Experiential Learning Projects with Long-Term Care homes :: OCTE
Create an app or a prototype a device that will help people monitor their weight	TPJ1O: Analyzing Weight :: OCTE
Create a new piece of workout equipment that is accessible to all people	TPJ2O: Lifestyle and Recreation :: OCTE
Thinking about technology - what might you design that would help a health care worker to do their job better	TAS1O/TAS2O/TPJ1O/TPJ2O: Robotics and Emerging Technologies in Broad Based Technology :: OCTE
HOSPITALITY AND TOURISM	
Design and create a cupcake that represents a heritage site in your city	
Create a themed table setting using 3 colours	
Create a menu for a particular culture	TAS1O / TFJ1O: Menu Design :: OCTE

Design a food truck	TFJ1O: Food Truck :: OCTE
Find a local organization that needs your help and create a food drive for charity	TFJ3C: Raising Dough for Charities :: OCTE
Plan and organize an event that connects with the seniors in your community	TFJ: Hospitality and Tourism: Organizing Events for Seniors :: OCTE
MANUFACTURING	
Design and manufacture a personalized metal keychain using only hand tools, files, and engraving techniques.	
Can you design a metal wall hook for safety glasses using bending, drilling, and finishing processes?	
Can you cut, shape, and assemble a metal candle holder with decorative features using only a plasma cutter and angle grinder.	
Fabricate a decorative sculpture or ornament using scrap metal.	
Build a compact metal holder for all the drill bit sizes you will use in this course.	
TECHNOLOGICAL DESIGN	
Investigate patterns found in nature. Create a 3D printed designed product that includes biomimicry	Snowflake formation Science of snowflakes - ted ed video Mathematical Patterns in Nature Crystal structure patterns - ted ed video Science behind nature's patterns Fractal math in leaves

<p>Group project - Design a shoe out of recycled materials that can be worn for a distance of 10 meters. Consider function, aesthetics, and ergonomics. Additional considerations or constraints can be added. Functionally the shoe must include a sole and allow the student to walk properly.</p>	<p>Teach Engineering Design Challenge</p>
<p>Group Project - Design a freestanding paper tower that can withstand a sideload. Material constraints - 5 pieces of 8.5 x 11 paper and 500 mm of painters tape.</p> <p>Resources show similar design challenge with different criteria and constraints. As well as product design testing in a wind tunnel.</p>	<p>Western University Wind tunnel</p> <p>How Tall Buildings Tame the Wind</p> <p>1st yr engineering student paper tower design challenge</p>
<p>Design Challenge - using all recycled materials design a piece of furniture (such as a dog couch) for a pet. The size of the furniture must meet the needs of a specified animal</p>	 <p>Ex: Teach engineering Furniture Design Challenge</p>
<p>Urban Planning design challenge - Design a public washroom for a local community park. Incorporate barrier free access and an exterior design that is colourful and inviting. Consider incorporating sustainable building practices such as green roofs or solar panels.</p>	
<p>Create a spirograph that can draw various patterns. Use at least 2 gears and allow for a variety of different designs (linkage arm should be adjustable). Consider using mostly recycled or repurposed materials Level up by making it motorized.</p>	<p>Cardboard spirograph instructions</p> <p>Instructables mechanically driven spirograph</p>

<p>Design a light up name plate. Use cardboard or wood (whatever material is available). Include a switch, 2 lights wired in parallel and a low voltage power source.</p>	
<p>Design a 3D printed spinning top that has an animal theme. Level up, design in LED lights Level up, make a launcher for the spinner.</p>	<p>Tinkercad spinning top</p>
<p>TRANSPORTATION TECHNOLOGY</p>	
<p>What innovative features can you brainstorm for improving a vehicle's collision safety? Consider cost, effectiveness, and ease of implementation.</p>	
<p>What different approaches can you brainstorm for repairing a dent in a car door? Consider such things as filler, heat treatment, or paintless dent repair.</p>	
<p>Design a solution for fixing a car that has a misaligned front bumper after a minor collision. How would you define the problem in terms of functionality, safety, and appearance?</p>	
<p>Design a cost-effective repair solution for a vehicle with a cracked windshield.</p>	
<p>Design a more fuel-efficient vehicle for a delivery company. Consider cost, fuel economy, and cargo space.</p>	<p>Electric Vehicles :: OCTE</p>
<p>How might you design a vehicle that is accessible for all people?</p>	<p>Inclusive Mobility: Enhancing transportation for individuals with disabilities :: OCTE</p>
<p>How can you design an EV vehicle model?</p>	<p>EV Challenge Design Handbook :: OCTE Driven by Innovation: Unleashing the future of</p>



ENGINEERING DESIGN PROCESS

	<u>autonomous vehicles :: OCTE</u>
Create and design a lighting system for a vehicle.	<u>TAS1O / TTJ1O: Automotive Lighting :: OCTE</u>
Design and create a boat that floats and moves in water using a control system	<u>TIJ1O: Building a Programmable Boat :: OCTE</u>
Design and create a flying vehicle that will lift off of the ground	<u>Flight :: OCTE</u>