

Topic	Engineering	Engineering	Engineering
Question	ALL PLAY: Using your tool box, each team needs to engineer a sturdy truck bed for transportation of a biofuel. What materials were chosen and why?	What is an engineer?	How is an engineer different from a scientist?
Answer	After 5 minutes, make a group decision: which team built the most practical design with least number of materials. This team gets a Genius Card.	Someone who solves problems using science and math.	Engineers solve problems, scientists try to understand nature.

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Name three main types of engineers.	What type of engineer would design a reactor that turns cow poop into a burnable biofuel gas?	What type of engineer would design a factory that uses acids to break wood into sugar?	ALL PLAY: An engineer needs to design a vat that mixes chemicals efficiently. First, build a chemical mixing vat by taping two sheets of paper together lengthwise and then taping the ends to form a circle (untimed). When all groups have created their vat, each team needs to design a mixing paddle from a pencil, tape, and a single sheet of paper (8.5x11 in) (5 minutes)
Mechanical, Civil, Electrical.	Bioengineer.	Chemical Engineer.	After 5 minutes, each team describes how their paddle works. Teams write down a score for how well they think the design will mix the chemicals. The team with the highest score wins a Genius Card.

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What properties does an easy-to-grow crop have?	ALL PLAY: Each team must build a self-supporting bioreactor base (a cube) using only 1 piece of paper, tape and scissors.	ALL PLAY: Water can be removed from sawdust by spinning it in a spin filter. Design and build a top that spins the longest. Each team picks 5 supplies from the toolkit. Teams test and redesign their top until the time is up. After 5 minutes, stop building and time how long each top spins.	ALL PLAY: Wood can be converted in a biofuel for jets. Using only 1 piece of paper and 5 paper clips, make a paper airplane that flies the farthest. Test and redesign it before time runs out. After 5 minutes, stop building and test each team's creation.
Examples: cost effective, less taxing on soil, soaks up CO2, good for the environment, doesn't require pesticides, etc.	The team that completes the task first gains a Genius Card.	The team with the top that spins the longest gains a Genius Card.	The airplane that lands the farthest from the starting point gains a Genius Card.

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Fermentation uses bacteria to convert one product into another. Name one non-bioenergy product created by fermentation, and one biofuel that is created by fermentation.	ALL PLAY: Chemical engineers design processes that can convert biomass into biofuel. Each team designs a process (a recipe) that will turn pancake mix into pancakes (5 minutes).		
Yogurt, cheese, bread, wine, beer, saurkrat, and more.	After 5 minutes, the most detailed and realistic process wins a Genius Card.		

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