Sail Car CORIculum

The classic engineering design challenge is an engaging CORI project designed to harness the power of wind.

Objective:
Students will be able to go through the Cori Design Process to design and build a vehicle powered by wind.

Grades Levels: 2nd - 6th Grade
Lesson Duration: 3-4 hours
Build Time: 45 - 75min

Additional Materials Recommended	
- Hot glue guns - Gluesticks - Scissors - Rulers - Pencils - Wind source - table/floor fan - Measuring tape (optional)	- Stop Watch (optional) - Other materials to build a sail (optional): - Aluminum foil - Plastic Saran wrap - Cotton Fabric - Wax paper - Tape with color (optional) - Helpful to lay down a track for sail cars to follow - Art supplies (optional) - Decorate your sail car

Vocabulary To Explore	Definition
Mast	a tall upright post, spar, or other structure on a ship or boat, in sailing vessels generally carrying a sail or sails.
Kinetic Energy	energy which a body possesses by virtue of being in motion.

| Wheel & Axle	a simple machine consisting of a wheel attached to a smaller axle so that these two parts rotate together in which a force is transferred from one to the other.
Wind Farm	a group of wind turbines in the same location used to produce electricity
Renewable Energy	energy from a source that is not depleted when used, such as wind or solar power.
Point of Sail	a sailing craft's direction of travel under sail in relation to the true wind direction over the surface
Distance	an amount of space between two things or people.

Cori Design Process Lesson Plan

Cori Design Process Lesson Plan
The Cori Design Process provides our learners the experience of what engineers, architects, scientists, and makers do everyday. At Cori, we thrive on structuring design challenges and projects that intentionally nurture skills (i.e. critical thinking) and build creative confidence.

For a shorter learning experience (60 - 90min), use the following Cori Sail Car Coach's Corner card found HERE.

For a multi-day learning experience, please follow the lesson plan below.
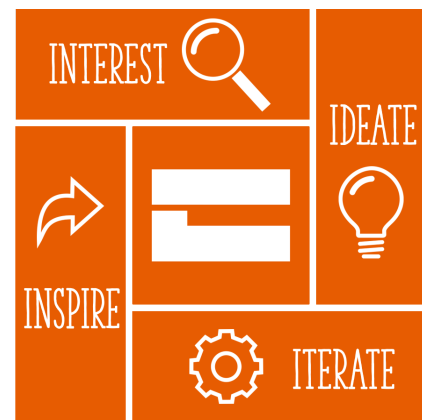
Sail Car Challenge Storyline
The world has turned upside down and electricity and gas have become difficult for the everyday person to acquire. And wind is the new currency for power. People have turned to horses and ever decreasing public transportation to get around. You did your research and found out that wind used to power many vehicles in the past. How can I harness the power of wind again to power my vehicle?

Phase 1: Interest (20-30min)

1. Hook your students with a Cori Sail Car design challenge competition that will push your designers to create the best sail car in the class. Teachers can also create a minimum benchmark for each criteria for

evaluating the finished projects. Create a sail car competition that focuses on one or more of the following criteria:

    a. Travels the furthest
    b. Travels the fastest
    c. Travels the most accurately on a straight line

2. Share the fastest sail car video recorded in the world, the Greenbird, which reached speeds of 126mph. Here is a YouTube video to show the sail car in action: https://youtu.be/TRFRQXPtXTs
3. (Optional) Give your students research time with one or more of the following guiding prompts:

    a. Have students use their device and search for wind-powered vehicles. What do students notice about the designs?
    b. How did the various sail cars change throughout history?
    c. What were the most effective sail car designs in your research?
    d. Have your students research the International Land and Sand yachting Federation website: https://www.fisly.org, and ask them what they notice about their designs?

1. Share the design challenge parameters from the Cori suggested materials list and instructions provided.

Phase 2: Ideate (30min)

1. Explain there are instructions available to create a base sail car design to function. However, encourage students to tweak and add new elements to the design to make it uniquely their own.
2. Have your students draw and sketch out their initial designs on paper and have them share with another student or group of students.
3. Explain aerodynamics. Aerodynamics describes how air moves around objects. Drag is a force that tries to slow moving objects down. To optimize the speed of a moving object such as a sail car, we need to reduce the amount of drag. The object's shape has the biggest impact on its drag. How can you tweak the cockpit design to give the sail car less drag?

A streamlined shape would reduce the drag and optimize speed performance.

◄——— More drag   Less drag ———►

Cube   Sphere   Half-sphere   Streamlined
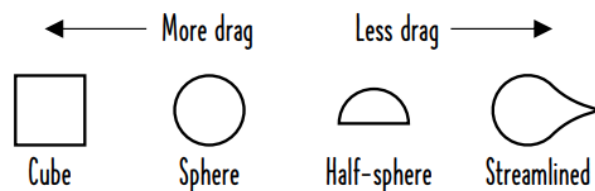
Phase 3: Iterate (45 - 75min)

1. Make sure students are given proper safety instructions prior to starting.
2. Provide students a creative space to build their sail car and have all the tools/materials readily available.
3. Explain the competition in detail. Show the wind source and track that the sail cars will be tested on. This would be a great time to show an example sail car in use.
4. Build TIME! Walk around and offer guidance as needed.
5. Have students test out their initial designs with printer paper first. For each run, have students record distance, speed and/or accuracy.
6. (Optional) Now that students have tested their original sail design, challenge them with a new sail design to see if it moves their sail car faster. Try other materials available in your classroom such as aluminum foil, fabric, saran wrap and/or wax paper.

Phase 4: Inspire (30 - 45min)

1. (Optional) Once you have found your optimal design, decorate your sail car with paint, markers, and/or other art supplies available in your classroom. Make it uniquely your own creative design.
2. (Optional) It is race day and a great opportunity to celebrate all the designs from your class. It is also a great time to add other elements to the competition like
   a. Best artistic designs
   b. Most innovative design
   c. Best effort during the four phases
3. (Optional) Have a recording device available to film each sail car in action.
4. Set up your wind source and track for recording the final results. Have each student and/or group present their design before placing it in front of the wind source. Once the sail car is in position, turn on the wind source and record the results. Have your measuring tape and/or stop watch ready to record results.
5. Celebrate your winners and congratulate all the designs. For students who didn't make the baseline requirements you set forth, encourage them to improve their design and test again.
6. Final reflection question: Describe your final results and ask what you would do differently next time if you had an opportunity to start over?

Contact us at support@coricreate.com if you have any questions or comments.

www.coricreate.com