Sail Car Extension Activities

Grade Level: For grades 4-5; adaptable for older students. Can be an individual assignment or completed in groups.

Background: The ability to design, test, evaluate, and improve is an important critical thinking and problem solving skill applicable to many situations beyond engineering. During the Early Engineers program students created a sail car out of recycled materials provided by the Marshall Steam Museum. This design is far from perfect and the next challenge is to determine a series of tests to evaluate the sail car and create solutions to improve its performance.

During this activity, students will:

- Design and execute a series of tests to evaluate their sail car design.
- Using the results of their tests, students will re-design or make specific changes to their sail car.
- Re-test their cars and determine whether their new design is an improvement or not, providing evidence to support their conclusions.

Student Activity Outline

Step 1: Test your Car
Design a series of tests (2-3 different tests) that will help you evaluate your sail car.
Examples: How could you test the speed of your sail car? Can you determine the fastest way to assemble the car? Can you test the cars durability or how long it will last? Will you test speed, durability, ease of assembly or something else? Record what happens during your tests.

Step 2: Re-design your Car
What could you change about the car that would make it perform better in the same tests? Would you change the materials? Would you change the design of the car? Would you change how you built it?

Step 3: Re-Test Your New Car
Perform the same tests as you did in Step 1 with your new design and record your observations.

Step 4: Draw Conclusions
Was your new design an improvement over the old one. Why or why not?

Standards
Common Core ELA: W4&5.2, W4&5.4, L4&5.1-3
NGSS: Energy: 4-PS3-4; Engineering Design: 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3
Sail Car Worksheet

Step 1: Test Your Car

Test 1
To test __________________ I will: ____________________________

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Use this space to record what happened during your test:

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Test 2
To test __________________ I will: ____________________________

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Use this space to record what happened during your test:

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
Test 3
To test __________________ I will: ________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

Use this space to record what happened during your test:
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

Step 2: Re-design Your Car
Write or draw in the space below what changes you want to make to your car to improve how it performs during your tests.
Re-Test Your New Car
Perform the same tests on your car as you did in step one. Use the space below to record your results.

Test 1
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Test 2
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Test 3
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
Draw Conclusions

Based on the results of both rounds of testing your car (old design & new design) decide whether you think your new car is an improvement or not. Make sure to give at least three examples of supporting evidence for your conclusion.

If you had to do this activity again, what would you do differently?