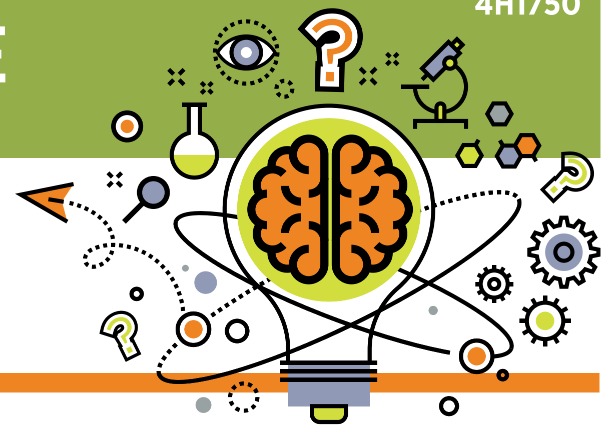
# TEACHING SCIENCE

...when you don't know diddly-squat

4H1750



# Can you make a wind-powered car?

## Purpose:

The purpose is **not** to teach specific content, but to teach the process of science – asking questions and discovering answers. This activity encourages young people to try to figure things out for themselves rather than just read an answer on the internet or in a book. As a leader, try not to express your opinion, but let the youth engage in arguments based on evidence.

## Time required:

20 minutes or multiple days depending on the interest and questions the youth have

## Materials:

- ❑ Small toy cars (one per participant)
- ❑ Paper (printer, newspaper, old folders or any type)
- ❑ Scissors
- ❑ Tape
- ❑ Stopwatch (or phone with a stopwatch app)
- ❑ A flat level surface (table, tiled or hardwood floor)
- ❑ Fan (optional)

### *SCIENCE PRACTICE:* Asking questions and defining problems

1. Ask the youth: *Can you make a car powered by the wind? How would you make it? What would you consider in your design process?*

### *SCIENCE PRACTICE:* Developing and using models

2. Create a model of a wind-powered car using a toy car and create a "sail" using the paper and the tape.

### *SCIENCE PRACTICE:* Planning and carrying out investigations

3. Have the youth blow on the sails to drive their cars through the course they will create. It can be down a hallway, around a chair or any design they want to make. Encourage the youth to make the course as simple or complicated as they want. Discuss with youth: *What would be the advantages of using a simple course? What would be the advantages of using a complicated course? Why would using both help you determine the best sail for your car? How much of the vehicle's speed is from the driver's lung power versus the sail design? For an accurate testing of the design, should the same person drive every vehicle or different people drive them? How many trials does it take to get in an accurate reading?*

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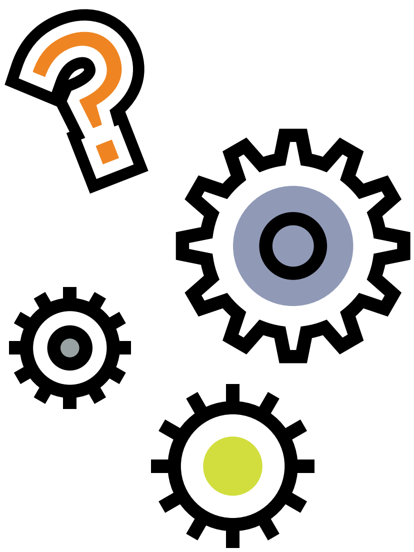
**Note:** Have the youth test their cars on the course(s). Encourage them to modify their design and test again. Let them try out each other's designs.

*SCIENCE PRACTICE:*
**Using mathematics and computational thinking**

4. Create a chart listing the drivers, vehicles, the courses and time taken to complete the courses like the one following. You can have each person run more than one trial, and use several different sail and car designs.

**Sail Car Statistics**

| Driver | Vehicle | Course (if using multiple courses) | Time to complete course |
|---|---|---|---|
| | | | |
| | | | |
| | | | |



You do not need all the answers to teach science. You simply need an inquisitive mind and to be willing to carry out an investigation.

*SCIENCE PRACTICE:*
**Analyzing and interpreting data**

5. *Did a person's lung power have an impact on the vehicle's speed? How do you know? How much of the speed through the course was the result of the driver's lung power compared to the vehicle design? How do you know? Is there one design that seems better for speed? Is there one that seems better for maneuverability?*

*SCIENCE PRACTICE:*
**Constructing explanations and designing solutions**

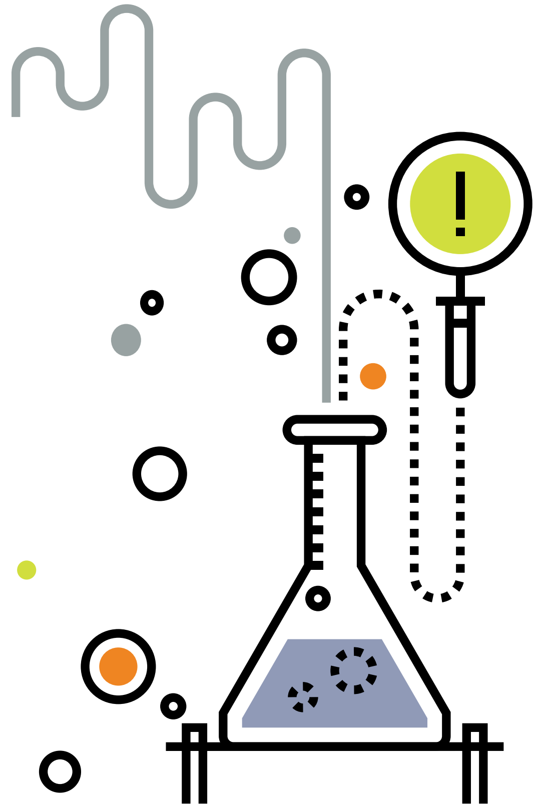
6. *Did you run into any problems with your vehicle? Did it always go in a straight line? Did the sail stay attached to the car? Did the same sail shape do the best on different vehicles? Is there a limit to how big of a vehicle could be powered by the wind?* Have youth try to improve the vehicle design and improve their speed or maneuverability on the course.

*SCIENCE PRACTICE:*
**Engaging in argument from evidence**

7. *Was there one design that seemed better for speed? Explain why you think it was better. Was there one that seems better for maneuverability? Explain why you think it was better. Do you think wind-powered cars could be used to transport people? Why or why not? Could adding sails to motor-powered vehicles improve their performance or gas mileage? How could you test this?*

*SCIENCE PRACTICE:*
**Obtaining, evaluating, and communicating information**

8. *What did you learn in this experiment that might be helpful for automotive engineers? How about for bicycle design?*



## Other thoughts:

- *Could what you learned in this experiment be expanded to electricity-generating wind turbines?*
- *What other materials could you use in your design?*
- *If you use a fan instead of human lung power, how would it change the test?*
- *Does a big person have more lung capacity than a smaller person and thus able to make the cars go faster?*
- *Does a person who plays a wind musical instrument or play sports have more lung capacity than those who don't?*
- *Do you think season of the year might have an impact on lung capacity?*

## Science & Engineering Practices:

These eight Science and Engineering Practices come from *A Framework for K–12 Science Education* (National Research Council, 2012, p. 42). These research-based best practices for engaging youth in science are connected to in-school science standards that all children must meet.

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

## Reference


National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Academies Press.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