Robogals Science Challenge



Minor Challenge Set #3 STEM Field: Mechanical Engineering Level: Junior Challenge Name: Build A Wind-Powered Car Project cost: 0-20 USD Materials required: • Corrugated cardboard

- Construction paper or cardstock
- 3x Wooden skewers
- 2x Plastic straws
- 4x Plastic bottle caps
- Tape
- Scissors
- Hobby knife
- Fan (or a windy day)

Safety:

• Adult assistance is required when handling the hobby knife and scissors.

Duration:

• The hands-on time for this challenge is about half an hour to one hour, however, the time guideline is an estimation only, and students and mentors can complete the tasks around their schedules.

Introduction:

In this experiment the wind powered car will roll forward when the wind catches the sail. For this to work we need two things:

First, the wheels must be on axels parallel to each other and able to roll smoothly.

Second, the sail must be able to catch the wind. This means that there must be a source of wind and the sail must be large enough to catch enough wind to push the car forward.

Instructions:

- 1. Cut a rectangle out of the cardboard. This will be the body of the car.
- 2. Place one straw parallel to each of the short sides on the cardboard rectangle and tape them down. These will be the axles.
- 3. Use the hobby knife to cut a small x shaped hole in the middle of each of the bottle caps.
- 4. Push one of the skewers through the hole on one of the bottle caps.
- 5. Slide the skewer through one of the straws taped to the car body.
- 6. Slide a bottle cap onto the empty end of the skewer.
- 7. Repeat steps 4 through 6 for the second axel.
- 8. Check that the wheels move well, if they are too wobbly try using some glue on the joint between the wheel and axle.
- 9. Use the hobby knife to cut an x shaped hole in the centre of the cardboard.
- 10. Insert the third skewer through the hole in the cardboard.Use some tape to make sure the skewer stays straight up.

- 11. Cut out a sail from the craft paper. The larger the sail, the more easily it will catch the wind!
- 12. Carefully, poke the upright skewer through the top and bottom of the sail to hold it in place.
- 13. Put the car in front of the fan or bring it outside to see it catch the wind and driver away!



Extension:

- 1. Experiment with your car. Can you change the design to make it faster?
- 2. What happens if you make the sail larger?
- 3. What happens if you change the size of the wheels?

Reflection Questions:

- Are there any improvements you would make to this challenge?
- What real world application/s can you apply this challenge to?
- What are the key science and engineering concepts that relate to this challenge?
- Do you think a sail would be a good way to power the cars we use in our society? Why or why not?

Submission Guidelines:

• Submit a photo of your sail car. Include a short summary that addresses the reflection questions.

Note: Remember, if you want to upload pictures of your Minor Challenge that also include you, please check if it is OK with your mentor first.

 The submission form is on the Minor Challenges page: <u>https://sciencechallenge.org.au/index.php/minor-challenges/</u> Fill out the details and make sure you upload your submission.

Learn More! Resources:

• To learn more about how we use wind power check out the link below:

https://kids.britannica.com/kids/article/wind-power/574607#:~:tex t=Wind%20power%20is%20an%20alternative,machine%20calle d%20a%20wind%20turbine

Bibliography:

 Science Buddies. (n.d.). Build a Wind-Powered Car | STEM Activity. [online] Available at: https://www.sciencebuddies.org/stem-activities/wind-powered-car.