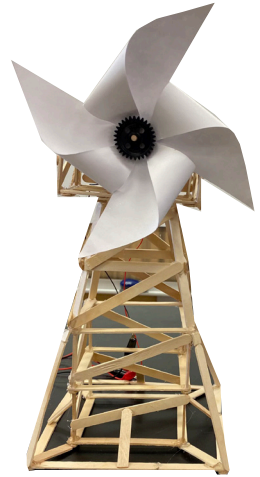
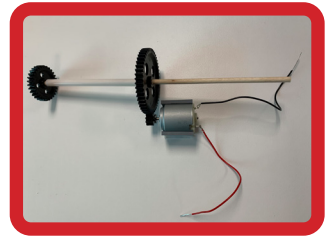


# WIND



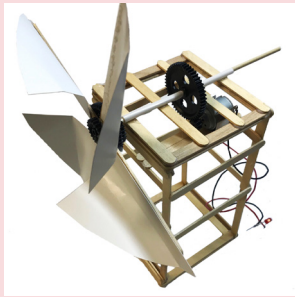
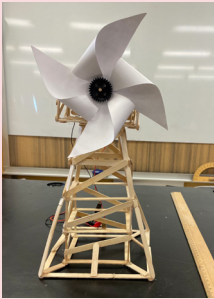
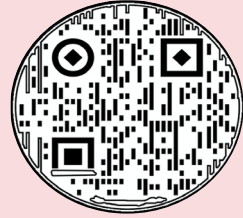
### How to build a wind turbine:

1. Design your base - you want your base to be simple, solid and stable.
2. Build your base!
  - What type of glue should you use? *Hot glue dries quickly and will help get your construction done faster. Wood or white glue bond much stronger but take longer to set. You choose!*
3. Prepare your spindle - slide the largest gear to the middle of the wooden dowel and place a medium-sized gear near the end. Cut the plastic straw to fit in between the gears - this will allow you to glue the spindle to your base (*via the plastic straw*) without impacting the ability of the wood dowel to rotate freely.
4. Place the motor into the motor holder.
5. Attach the smallest gear to the motor (*you will have to use one of the small black connector pieces to do this*).
6. Strip the ends of the red and black wires (*using scissors*) and wrap them tightly around the metal hubs on the motor.
7. Attach your spindle and motor to your structure - ensure the largest gear (*on the spindle*) and the smallest gear (*on the motor*) are lined up so they spin together.
8. Build your blades - use popsicle sticks to attach your blades to the gears at the end of the spindle. Experiment with different materials (*regular paper, card stock, cardboard, etc.*) to design blades that will catch as much wind as possible.
9. **Test your wind turbine!**
  - Blow a fan towards your wind turbine or take it outside.
  - Connect the stripped ends of the red and black wires to the mini **LED lights** to see if your wind turbine can light the lights.
  - Connect the stripped ends of the red and black wires to the **multimeter** to measure the output of your wind turbine. To set your multimeter:
    - ◇ Place the black multimeter lead into the 'COM' port and the red multimeter lead into the 'VΩmA' port
    - ◇ Set the multimeter dial to measure voltage at 20 range



### Keep in mind:

1. These pictures are only ideas of how your turbine can look - experiment with different structural designs, blade shapes and lengths to optimize the output of your wind turbine
2. Scan this QR code to see one of these wind turbines in action!



### What is going on with wind energy in Alberta?

Built in 1993, Cowley Ridge (located near Pincher Creek) was Canada's first commercial wind farm. Now, Alberta has over 900 wind turbines, and wind energy is the fastest growing form of renewable electricity generation in the province. Wind power currently makes up about 11% of Alberta's electricity generation (2021).



### What are some cool features of modern-day wind turbines?

- They adjust their position according to the direction the wind is coming. This maximizes the amount of wind that's hitting the blades.
- Wind turbines are around 80m tall, where wind speeds are highest since there are no buildings, hills or trees causing obstructions.
- Each blade is around ~40m long (that's the length of about 4 school buses!) - These large blades are able to capture the wind as efficiently as possible.
- Techniques to limit bird and bat mortality have been implemented at some wind farms, including ultrasonic boxes to deter bats, painting the blades black so they're more visible to birds, and using radar imagery to detect groups of bats and birds that are nearby and shutting off the wind turbines to allow them to safely fly through.



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