**Engineer your own Wind Turbine!**

**Project INFORMATION – SHOW YOUR PARENTS**

**Idea**: Build a wind turbine with the allowed materials and compete against your fellow classmates to have the most effective turbine.

**Materials:** \*Enough to build 3 different rotors

* Adhesive \*(hot glue, Elmer’s glue, and masking tape will be provided, if you want something else you’ll need to supply it))
* 3\* CDs (old, will be tore up! you only need the center part

(old AOL discs are great for this)

* Scissors (be carful with scissors!)
* Thick paper/ cardstock, cardboard, plastic, balsa wood, basswood for rotors

(**if it is not listed get it approved by teacher first**)

\*I highly encourage you to “***repurpose***” the materials for this!! Meaning: don’t spend money – use empty cereal boxes, old birthday cards, cleaned 2-L bottles etc.

**Background**: Congratulations! You have just graduated from college and are a full-fledged Engineer… now you must earn money… So you want to be hired by Gas City to build a Wind Turbine to power the city with clean “green” energy. BUT the mayor says he will buy only the best design. So you are now on a mission to design a small-scale model to represent your wind turbine and if you want to get hired – yours must create the most electricity. You will test your design and redesign it then “submit” with your best working design.

**Lesson Objectives:**

Students will be able to:

* Understand what engineers do and why engineering is important
* Identify the steps of the engineering design process
* Understand how and why wind turbines offer a popular source of renewable energy
* Identify arguments against the construction of wind turbines
* Construct a model wind turbine and refine the design based on tests

The degree or criterion on the basis of which satisfactory attainment of the objectives will be judged:

* Design, draw, and label 3 different turbines
* Construction of wind turbine
* Notable adjustments made during redesign process
* Appropriate recognition of why a design did or did not work

Students will demonstrate that they have learned and understood the objectives of the lesson through:

* Use of engineering design process in construction and redesign of model

***\*\*Remember show your parents this right away so you can gather the materials you need. \*\****

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**Project INSTRUCTIONS**

1. Decide what your rotor will look like.
   1. How many props will it have? (no more than 6)
   2. What angles will you set the props?
   3. What will the shape of the props be?
2. Draw each rotor design in the blueprints
3. Build ONE design.
4. Test the design, once on high – once on low. Record your data and be sure your teacher sees it on the multimeter!
   1. How to test your rotor: Carefully snap the CD center onto the testing apparatus. Turn the Fan on LOW, time 20 seconds then record your voltage and ask your teacher to record it on the board as well. Turn the Fan on HIGH, time 20 seconds then record your voltage and ask your teacher to record it on the board as well.
5. REDESIGN – repeat steps 1 – 4 for your second rotor design.
6. REDESIGN – repeat steps 1 – 4 for your third rotor design.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Designs & Data**:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Number of props | Blueprint  (draw it) | Prop shape (draw it) | Volts (V)  on LOW | Volts (V)  on HIGH |
| Rotor 1 |  |  |  |  |  |
| Rotor 2 |  |  |  |  |  |
| Rotor 3 |  |  |  |  |  |

**Analysis & Conclusion**:

Answer the following using complete sentences!

1. Which of your rotors worked best on LOW?

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1. Which of your rotors worked best on HIGH?

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1. Where they the same design? IF NOT, why do you think they were not the same?

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1. What did you do to improve on your designs?

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1. What could still be improved?

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1. What did you learn that you did not know before?

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1. Which design do you present to the Gas City Mayor?

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1. What made that design your top choice?

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