MacGyver Windmills Data Sheet

Name(s): _____

The Problem:
How can I design a windmill that uses wind energy to lift the most weight or reach the greatest height?

Student Learning Objectives:
- **I can** identify the parts of a windmill and explain their function (blades, hub, shaft).
- **I can** design and build a windmill using simple materials.
- **I can** test how changing one variable (blade shape, number, angle, or material) affects windmill performance.
- **I can** collect and record data from my windmill tests.
- **I can** analyze my data and explain which design works best and why.
- **I can** redesign my windmill to improve its performance using the engineering design process.

Pre-Build Questions:
1. Which ability test will you be testing? *(Circle one)*

      Weight   Height

Design Sketch:
Draw your windmill design below and label the parts (***blades, hub, shaft, string/load cup***):

Data:

- Your 1st test should be your control. **Do not change anything on your 1st test**.
- For you next tests remember to only change one variable and note what you changed

Trial	Variables Changed: *(Blade #, Shape, Angle, Material)*	Result: (Weight or Height Lifted)	Observations / Notes
Control	X		

Analyze Your Windmill:

After testing your windmill, answer the questions below:

1. What changes did you make to your windmill design from Trial 1 to Trial 2, 3, and 4?

   _____

   _____

2. How did these changes affect the performance of your windmill?

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_____

_____

_____

3. What parts were most difficult to design and make functional?

    _____

    _____

4. How did you attach your blades?

    _____

5. Where is there friction in your design? If there was, how did you reduce friction in your windmill?

    _____

    _____

    _____

    _____

6. How did you pitch or angle the blades?

    _____

7. Were your blades changing pitch frequently?

    _____

8. Did the fan work better from the front of the blades or the side?

    _____

Redesign Your Windmill:

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Draw your improved windmill design below and label any changes you made:
(*blades, hub, shaft, string/load cup*)

Conclusion:

1. **Why do you think your windmill worked or didn't work as well as you expected?**

_____

_____

_____

2. **Which design worked best, and why?**

_____

_____

_____

3. **If you had more time, what would you change or test next?**

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Real-World Connection:

How does what you learned about windmill design relate to real wind turbines used to generate electricity today?

_____