

Tidal Power Challenge

Name: _____

Directions: You will be using the engineering design process to create water turbine blades which can produce the most power. Before you build a final design, you will test one variable and see how it affects the water turbine blades.

Choose one of the following variables to test:

- Number of blades
- Blade length
- Blade shape
- Weight distribution on the blade
- Blade angle/pitch
- Blade Material
- Anything else?

1. Which variable will you test?
2. What variables do you have to keep constant as you perform this experiment?

Scientific Method

Step 1: Identify the Problem:

What problem are you testing?

How does _____ affect the power output of water turbine blades?

Step 2: Conduct background research/Brainstorm Solutions:

List, describe, and/ or sketch and label at least 3 designs for tidal stream power generators. You may conduct research online for ideas. Remember that your design will be limited by available materials.

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Step 3: Construct a hypothesis

After choosing your target variable, write down your own hypothesis or prediction for the experiment below. For example, if the blade length increases, then the power output will also increase. You can use the “if [target variable changes], then [describe the effect on the power output]” hypothesis structure.

Step 4: Test with an experiment

This depends on the variable you are testing. First, you need to build variations of your blade design to test. Second, you can use the testing apparatus to measure the power output of your variations. Lastly, record in your data table below.

Trial	Target Variable (ex. Length (m)) _____	Voltage (mV or V)	Current (mA or A)	Power (mW or W)
	Control Blade			

- Note that voltage * current = power!

Step 6: Analyze Data & Draw Conclusions

What general trends did you observe after testing your target variable?

Step 7: Communicate Results

Explain your results, explain any changes or problems that occurred during testing and potential solutions to fix the problem to other students.

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Now, it's time to design your own version of the blades to produce the MOST power output!

Engineering & Design Process

Step 4: Generate Ideas

Design 1	Pros	Cons
Design 2	Pros	Cons
Design 3	Pros	Cons

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Step 6: Select an Idea

As a team choose one particular design to test. Explain why you choose this particular design.

Step 7: Build a Prototype

Use the provided materials to build a prototype of your model. Also, use this space to create a more detailed version of the design and list the procedures and materials used.

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Step 8: Test and retest your design as necessary

Record results in the data table below.

Trial	Design #	Voltage (mV or V)	Current (mA or A)	Power (mW or W)

- Note that voltage * current = power!