





MATERIALS PAGE

You will only have access to the following materials.

- 1) For each bolded word, underline if it is a control, and circle if it is a changing variable. Example control: Blade Material, Example changing variable: Blade Number
- 2) For variables that are controls, choose one underlined value. When a variable is a control you will only have access to the underlined values.
- 3) For the variable that is the changing variable, choose four values and write the trial letter (A, B, C, D) next to each value. Example: Cardstock (original) A

General Materials:

- | | | |
|--|---|--|
| <input type="checkbox"/> Wind turbine base | <input type="checkbox"/> Measuring tape | <input type="checkbox"/> Wind turbine protractor |
| <input type="checkbox"/> Multimeter | <input type="checkbox"/> Binder Clips | |

Blade Material:

- | | | |
|------------------------------------|--------------------------------|--|
| <input type="checkbox"/> Kleenex | <input type="checkbox"/> Paper | <input type="checkbox"/> Paper towel |
| <input type="checkbox"/> Styrofoam | <input type="checkbox"/> Metal | <input type="checkbox"/> <u>Cardstock</u> (original) |

Blade Number:

- | | | | | | |
|----------------------------|----------------------------|--|----------------------------|----------------------------|----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> <u>3</u> (original) | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |
|----------------------------|----------------------------|--|----------------------------|----------------------------|----------------------------|

Weight Number:

- | | | | | | |
|-----------------------------------|--|-----------------------------------|----------------------------|-----------------------------|-----------------------------|
| <input type="checkbox"/> <u>9</u> | <input type="checkbox"/> <u>3</u> (original) | <input type="checkbox"/> <u>6</u> | <input type="checkbox"/> 9 | <input type="checkbox"/> 12 | <input type="checkbox"/> 15 |
| <input type="checkbox"/> 18 | <input type="checkbox"/> 21 | <input type="checkbox"/> 24 | | | |

Weight Placement:

- | | | | | | |
|---|-------------------------------|-------------------------------|-------------------------------|--------------------------------|---------------------------------------|
| <input type="checkbox"/> 0 cm | <input type="checkbox"/> 1 cm | <input type="checkbox"/> 2 cm | <input type="checkbox"/> 3 cm | <input type="checkbox"/> 4 cm | <input type="checkbox"/> 5 cm |
| <input type="checkbox"/> <u>6 cm</u> (original) | <input type="checkbox"/> 7 cm | <input type="checkbox"/> 8 cm | <input type="checkbox"/> 9 cm | <input type="checkbox"/> 10 cm | <input type="checkbox"/> <u>11 cm</u> |

****Note:** if you are changing Number of Weights, you may only place your weights at **6 cm**.

Dowel Placement:

- | | | | | | |
|---------------------------------|--------------------------------------|--|--------------------------------------|--|---|
| <input type="checkbox"/> 0.5 cm | <input type="checkbox"/> <u>1 cm</u> | <input type="checkbox"/> <u>1.5 cm</u> | <input type="checkbox"/> <u>2 cm</u> | <input type="checkbox"/> <u>2.5 cm</u> | <input type="checkbox"/> <u>3 cm</u> (original) |
| <input type="checkbox"/> 3.5 cm | <input type="checkbox"/> 4 cm | <input type="checkbox"/> 4.5 cm | <input type="checkbox"/> 5 cm | <input type="checkbox"/> 5.5 cm | <input type="checkbox"/> 6 cm |

Blade Angle:

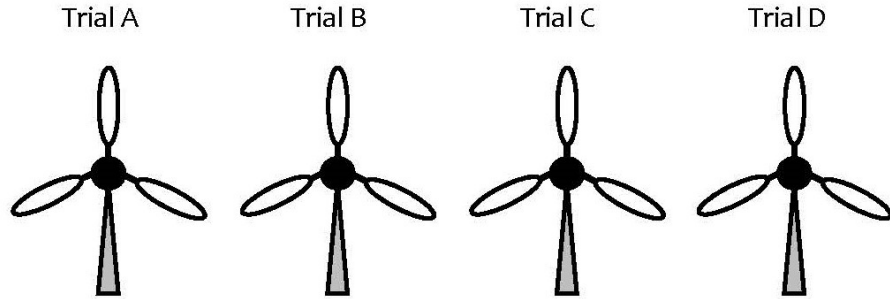
- | | | | | | |
|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|--|-------------------------------------|
| <input type="checkbox"/> 0°/180° | <input type="checkbox"/> 10° | <input type="checkbox"/> 20° | <input type="checkbox"/> <u>30°</u> | <input type="checkbox"/> <u>40°</u> (original) | <input type="checkbox"/> <u>50°</u> |
| <input type="checkbox"/> 60° | <input type="checkbox"/> 70° | <input type="checkbox"/> 110°/-70° | <input type="checkbox"/> 120°/-60° | <input type="checkbox"/> 130°/-50° | <input type="checkbox"/> 140°/-40° |
| <input type="checkbox"/> 150°/-30° | <input type="checkbox"/> 160°/-20° | <input type="checkbox"/> 170°/-10° | | | |

Fan Distance: _____

Any distance between 20 cm – 100 cm (original fan distance = 60 cm)

EXPERIMENTAL SET-UP

Write your changing variable (Ex: blade number) and the values (Ex: 4) you will use for your trials under each wind turbine.



Changing Variable:

_____ : _____

Controls (variables you will hold constant):

Write the controls and the values you will use in all your trials (control/value, Ex: blade material/cardstock).

_____ /	_____ /
_____ /	_____ /
_____ /	_____ /
_____ /	

SciTrek Member Approval: _____

RESULTS

Table

Fill out the table for each of your trials. For the variables that remain constant, write the value in Trial A. Then, draw an arrow through each box indicating the variable is a control.

Underline controls, circle changing variables, and box information about data collection.

Variables	Trial A	Trial B	Trial C	Trial D	
<u>Blade Material:</u>	Paper	Kleenex	Metal	Styrofoam	
<u>Blade Number:</u>	3	→			
<u>Weight Number:</u>	3	→			
<u>Weight Placement:</u>	6 cm	→			
<u>Dowel Placement:</u>	1.5 cm	→			
<u>Blade Angle:</u> <small>(list both the actual angle and what angle you will find on the wind turbine protractor)</small>	30°	→			
<u>Fan Distance:</u>	50 cm	→			
<u>Fan Speed:</u> <small>Other Variable</small>	3 (high)	→			
Predictions	Trial A	Trial B	Trial C	Trial D	
Put an "L" in the trial that will give the least current and an "M" in the trial that will give the most current.					
Data	Trial A 2	Trial B 1	Trial C 4	Trial D 3	
Measurements:	Current:	0.3 mA	0.0 mA	2.0 mA	1.9 mA
Observation:	Other:	Blades bent	Blades ripped	Blades did not bend	Blades did not bend

The independent variable is the changing variable and the dependent variables are the final measurements/observations.

NOTES ON PRESENTATIONS

What variables affect the current a wind turbine produces?

Subgroup 1

Changing Variable:				
Current (mA):				

Summary: _____

Subgroup 2

Changing Variable:				
Current (mA):				

Summary: _____

Subgroup 3

Changing Variable:				
Current (mA):				

Summary: _____

Subgroup 4

Changing Variable:				
Current (mA):				

Summary: _____

Group 5

Changing Variable:				
Current (mA):				

Summary: _____

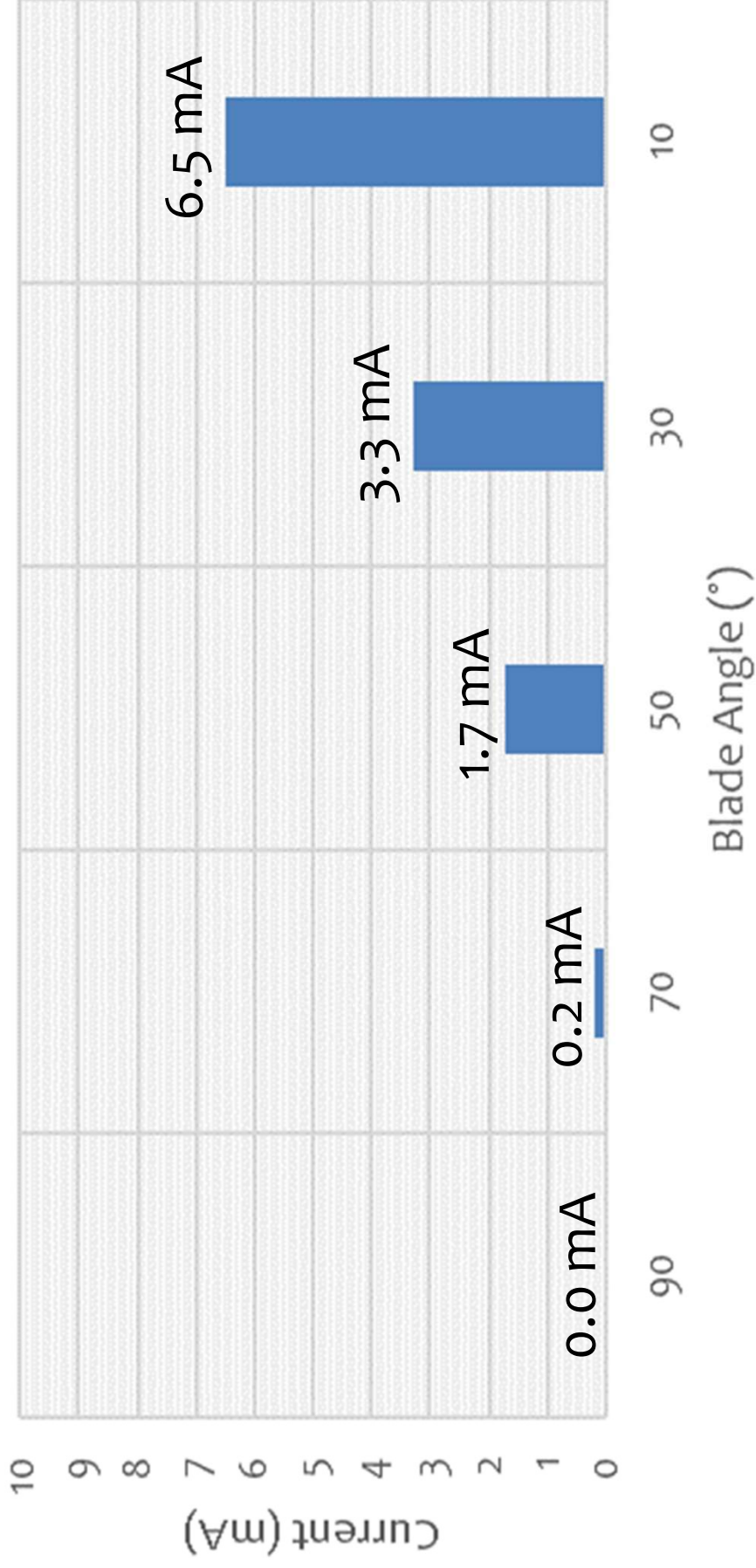
Group 6

Changing Variable:				
Current (mA):				

Summary: _____



Effects of Changing Blade Angle

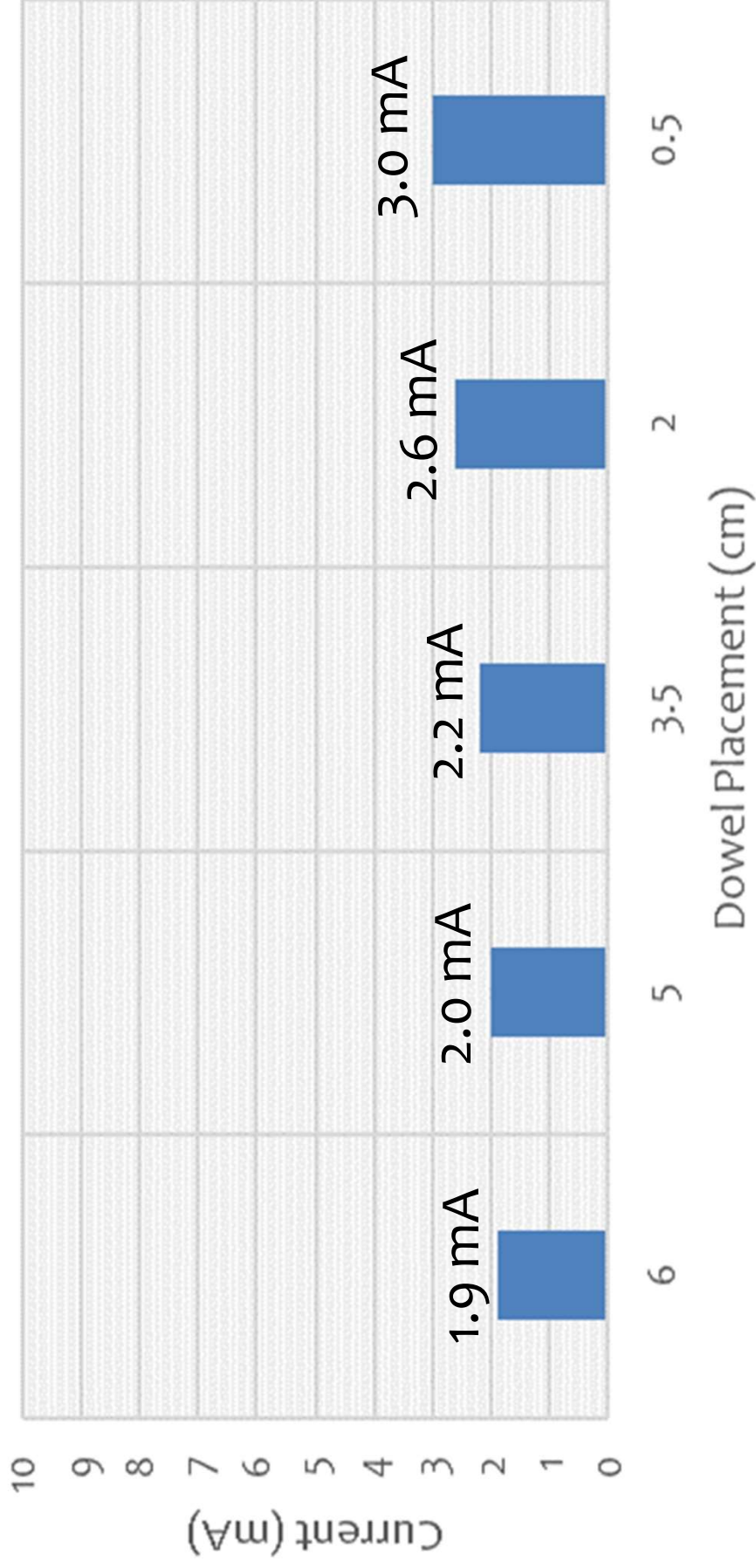


Controls:

Dowel Placement / 1 cm

Weight Number / 3

Effects of Changing Dowel Placement

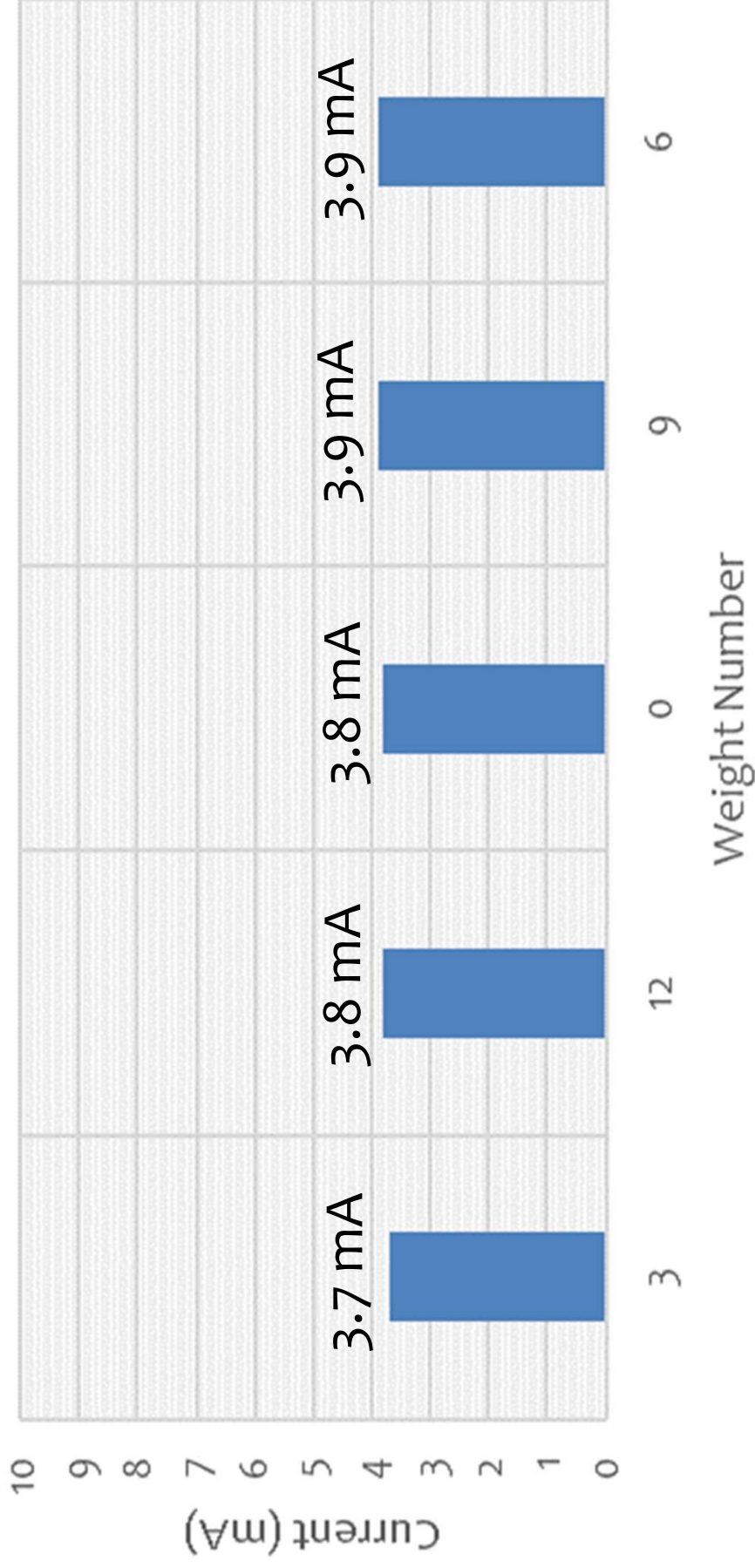


Controls:

Blade Angle / 40°

Weight Number / 3

Effects of Changing Weight Number



Controls:

Blade Angle / 40°

Dowel Placement / 1 cm