

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

# 2023 Western Colorado Elementary Science Fair

# Student Guided Packet



**Testable Question:**

- How does \_\_\_\_\_ affect \_\_\_\_\_?
- What is the effect of \_\_\_\_\_ on \_\_\_\_\_?

**Example Questions:**

- [How does the amount of water affect how tall a sunflower grows?](#)
- [What is the effect of water amount on how tall a sunflower grows?](#)
- How does the time of day affect how many birds are in the trees?
- What is the effect of the type of ball on how high it will bounce?
- What is the effect of type of nail polish on how resistant it is to chipping?
- What is the effect of battery type on how long it can light a bulb?
- How does the temperature affect how active lizards are in the desert?
- How does the amount of yeast affect the height of a loaf of bread?
- What is the effect of the type of shoe on how high someone can jump?
- How does the type of surface cleaner affect the amount of bacteria killed?
- How does the type of bubble gum affect the size of the bubble blown?
- What is the effect of the type of cloth on how well it prevents particles from traveling when a person coughs?
- What is the effect of the number of fins on how fast a fish can swim?
- How does the type of water affect its taste?
- What is the effect of the volume of water on the velocity it travels in a river?

My testable question is...

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**Purpose:**

- Why is your question important to answer? How will it impact humans and society?

- Sentence Starters:

- Researching this topic is important, because...
- This research can be applied to...
- Finding an answer to this question will impact society, because...
- This research can be used by scientists for...
- For example...

- Example:

Researching this topic is important, because plants are an important part of our ecosystem, and scientists need to understand the factors that will help them grow. Finding an answer to this question will impact society, because the seeds of sunflowers are commonly eaten by humans and animals. This research can be applied to sunflower farms, to increase their production of sunflower seeds.

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**Independent Variable:**(Cause, the thing you are changing and testing)

Example: Amount of water

**Dependant Variable:** (Effect, the thing you are measuring)

Example: height, how tall the sunflower is

**Constants:** (What stays the same)

Example: Type of sunflower, amount of soil, type of water, amount of sunlight,  
Temperature, amount of plants per pot

**Hypothesis (educated guess):**

- (If IV, then DV, because... prior knowledge or background research):

Example: If a sunflower is given more water, then it will grow taller, because plants need water to grow.

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**Materials:**

- What materials do you need to conduct this investigation?

Example:

- 4 plant pots (1 liter)
- 4 sunflower seeds
- Potting soil (6 cups per pot)
- Tap water
- 1 Ruler

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**Procedure:**

- Write out detailed steps for what you will need to do to conduct your investigation. (This is similar to a cooking recipe, so be sure to be as detailed as possible!)
  - Example:
    1. Collect all required materials.
    2. Place 6 cups of potting soil into each of the 4 pots.
    3. Plant 1 seed per pot based on the seed packet's directions.
    4. Water the plant every other day with tap water with the following amounts:  
Pot #1: 0 cups, Pot #2:  $\frac{1}{4}$  cup, Pot #3:  $\frac{1}{2}$  cup, Pot #4:  $\frac{3}{4}$  cup
    5. Measure the height of each plant every other day for 4 weeks (28 days).  
Record the data in the data table.

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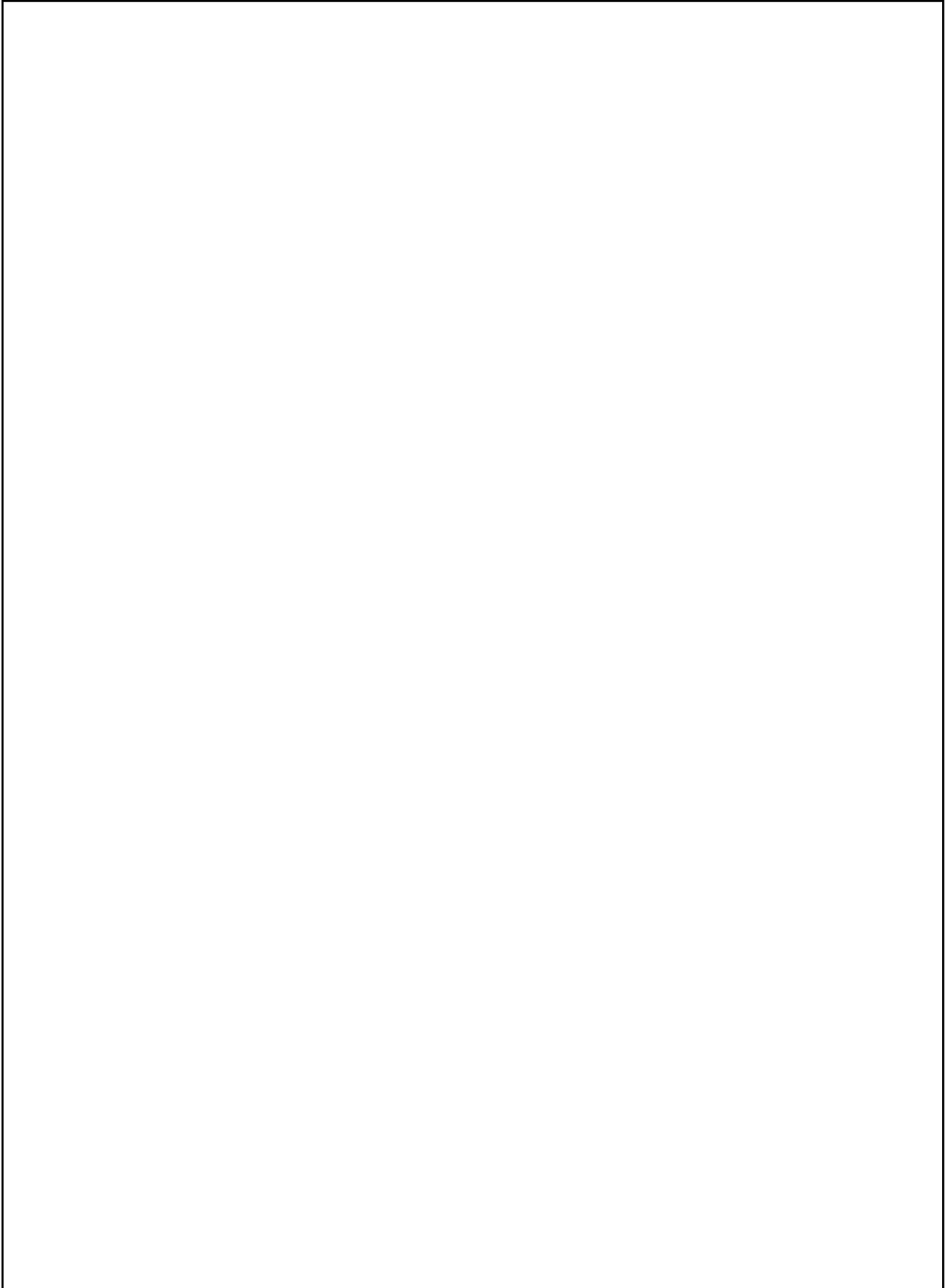


**Data Table:**

- Create a data table for you to record your observations and data.

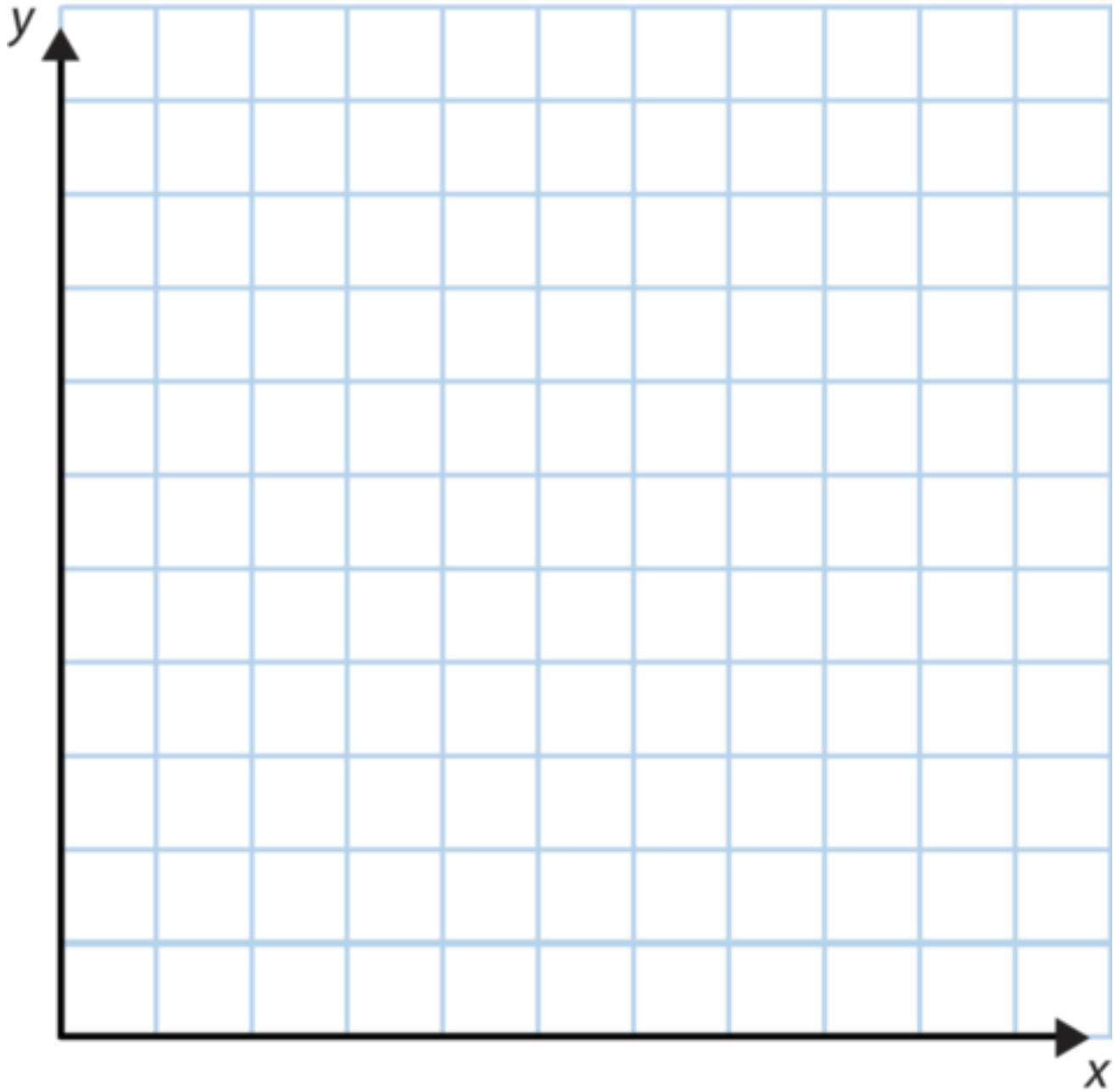
- Example:

Day	Plant Height (cm)	Day	Plant Height (cm)
0	Plant #1: 0 Plant #2: 0 Plant #3: 0 Plant #4: 0	16	Plant #1: 0 Plant #2: 2.0 Plant #3: 2.3 Plant #4: 2.5
2	Plant #1: 0 Plant #2: 0 Plant #3: 0 Plant #4: 0	18	Plant #1: 0 Plant #2: 2.4 Plant #3: 2.7 Plant #4: 2.6
4	Plant #1: 0 Plant #2: 0 Plant #3: 0 Plant #4: 0	20	Plant #1: 0 Plant #2: 3.0 Plant #3: 3.2 Plant #4: 3.0
6	Plant #1: 0 Plant #2: 0.5 Plant #3: 0.5 Plant #4: 0.5	22	Plant #1: 0 Plant #2: 3.5 Plant #3: 3.8 Plant #4: 3.2
8	Plant #1: 0 Plant #2: 0.7 Plant #3: 0.7 Plant #4: 0.8	24	Plant #1: 0 Plant #2: 3.9 Plant #3: 4.5 Plant #4: 3.5
10	Plant #1: 0 Plant #2: 0.8 Plant #3: 0.8 Plant #4: 1.0	26	Plant #1: 0 Plant #2: 4.3 Plant #3: 4.9 Plant #4: 3.5
12	Plant #1: 0 Plant #2: 0.9 Plant #3: 1.0 Plant #4: 1.2	28	Plant #1: 0 Plant #2: 4.6 Plant #3: 5.6 Plant #4: 3.5
14	Plant #1: 0 Plant #2: 1.3 Plant #3: 1.5 Plant #4: 2.0		



**Graphs:**

- The IV should be on the X-axis and DV on the Y-axis. Be sure all numbers are written with a constant interval.



**Analysis and Conclusion:**

- This paragraph summarizes your findings and results.
  - Sentence Starters:
    - The data shows...
    - Observations during the experiment were...
    - Based on the data, the hypothesis was...
    - Possible sources of error are...
    - If this experiment were repeated, \_\_\_\_\_ would be changed, because...
  - Example:
    - The data shows that the sunflower that received  $\frac{1}{2}$  cup of water every other day grew the tallest, and the plant that did not receive any water did not grow. The second tallest was the plant that received  $\frac{1}{4}$  cup of water, followed by the plant that got  $\frac{3}{4}$  cup of water every other day. Observations during the experiment showed plant #4 was the tallest, until day 18, when plant #3 became the tallest. Based on the data, the hypothesis was partially correct because the plants that received more water grew taller, until a certain amount of water and time. Possible sources of error include variations of temperature throughout the day and season. If this experiment were repeated, the amount of days would be extended beyond 28, because the sunflowers did not develop flowers this early. By extending the days of data collection, it would provide more information on the plant.

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**Works Cited:**

- List any websites or books you took information or images from.

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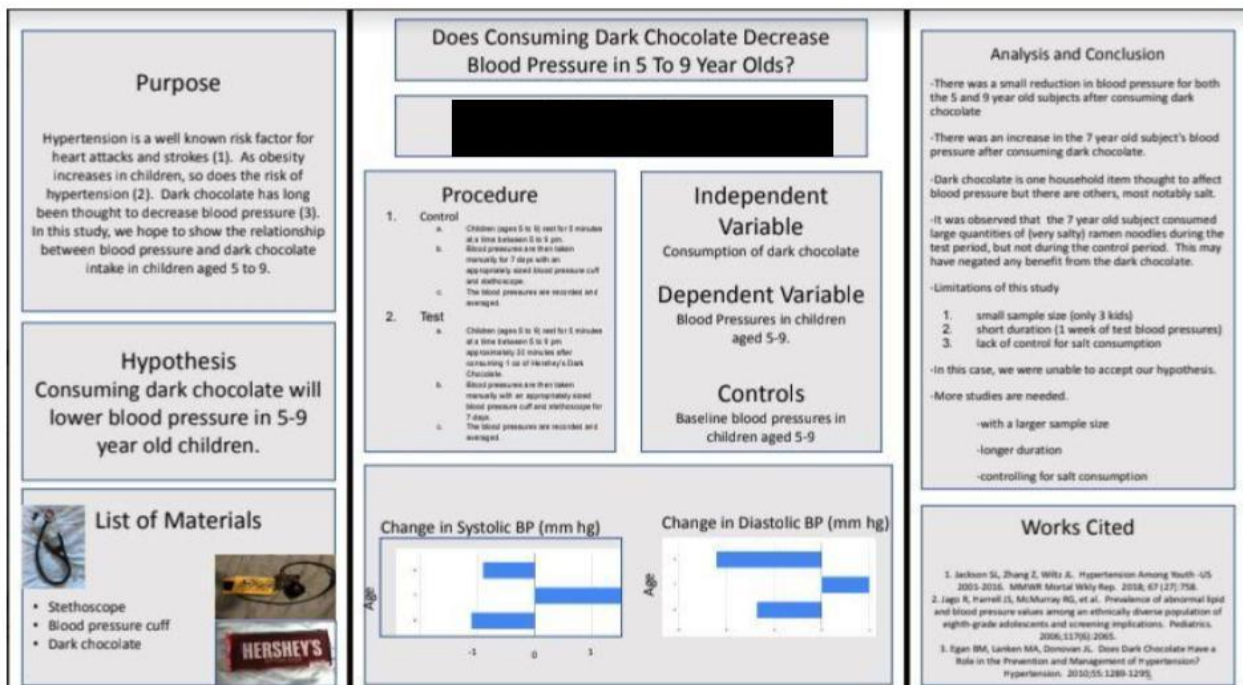
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**Poster:**

- Each section you previously wrote will need to be typed up into the digital template.
- There should be no spelling or grammar mistakes.
- All poster sections need to be placed using the diagram below.
- Images are important, and can either be photos you take from the experiment, photo data, or images that relate to your investigation.



**Purpose**

Hypertension is a well known risk factor for heart attacks and strokes (1). As obesity increases in children, so does the risk of hypertension (2). Dark chocolate has long been thought to decrease blood pressure (3). In this study, we hope to show the relationship between blood pressure and dark chocolate intake in children aged 5 to 9.

**Hypothesis**

Consuming dark chocolate will lower blood pressure in 5-9 year old children.

**List of Materials**

- Stethoscope
- Blood pressure cuff
- Dark chocolate

**Does Consuming Dark Chocolate Decrease Blood Pressure in 5 To 9 Year Olds?**

**Procedure**

- Control**
  - Children (ages 5 to 9) rest for 5 minutes at a time between 8 to 9 pm.
  - Blood pressures are then taken normally for 3 days with an appropriately sized blood pressure cuff and stethoscope.
  - The blood pressures are recorded and averaged.
- Test**
  - Children (ages 5 to 9) rest for 5 minutes at a time between 8 to 9 pm.
  - approximately 30 minutes after consuming 1 oz of Hershey's Dark Chocolate.
  - Blood pressures are then taken normally with an appropriately sized blood pressure cuff and stethoscope for 7 days.
  - The blood pressures are recorded and averaged.

**Independent Variable**

Consumption of dark chocolate

**Dependent Variable**

Blood Pressures in children aged 5-9.

**Controls**

Baseline blood pressures in children aged 5-9

**Change in Systolic BP (mm hg)**

Age	Change in Systolic BP (mm hg)
5	-0.5
7	-0.5
9	-0.5

**Change in Diastolic BP (mm hg)**

Age	Change in Diastolic BP (mm hg)
5	-0.5
7	-0.5
9	-0.5

**Analysis and Conclusion**

- There was a small reduction in blood pressure for both the 5 and 9 year old subjects after consuming dark chocolate
- There was an increase in the 7 year old subject's blood pressure after consuming dark chocolate.
- Dark chocolate is one household item thought to affect blood pressure but there are others, most notably salt.
- It was observed that the 7 year old subject consumed large quantities of (very salty) ramen noodles during the test period, but not during the control period. This may have negated any benefit from the dark chocolate.
- Limitations of this study
  - small sample size (only 3 kids)
  - short duration (1 week of test blood pressures)
  - lack of control for salt consumption
- In this case, we were unable to accept our hypothesis.
- More studies are needed.
  - with a larger sample size
  - longer duration
  - controlling for salt consumption

**Works Cited**

- Jackson SL, Zhang Z, Wilz A. Hypertension Among Youth -US 2003-2016. *MMWR Morbidity and Mortality Weekly Report*. 2018; 67 (127): 758.
- Jago R, Marshall JL, McMurray MG, et al. Prevalence of abnormal lipid and blood pressure values among an ethnically diverse population of eighth-grade adolescents and screening implications. *Pediatrics*. 2006; 117(5): 2005.
- Egan MM, Lankin NA, Domovni AL. Does Dark Chocolate Have a Role in the Prevention and Management of Hypertension? *Hypertension*. 2010;95: 1289-1295.

<input type="checkbox"/> <b><u>PURPOSE</u></b> This section describe why your research is important and how it could impact society. Discuss how your topic could be applied to real life situations.	<input type="checkbox"/> <b><u>HYPOTHESIS</u></b> Your educated prediction before conducting your experiment.	<input type="checkbox"/> <b><u>LIST OF MATERIALS</u></b> A list of supplies used to conduct your experiment
<input type="checkbox"/> <b>TITLE</b> Your scientific testable question.	<input type="checkbox"/> <b>STUDENT NAME(S) AND SCHOOL</b>	<input type="checkbox"/> <b><u>PROCEDURE</u></b> Detailed steps of what you did during your experiment.
<input type="checkbox"/> <b>Independent and Dependent Variables</b> <b>Controls</b>	<input type="checkbox"/> <b>PHOTOS</b> Photos related to your experiment.	<input type="checkbox"/> <b><u>DATA TABLE AND/OR GRAPH</u></b> Your experiment data and graphs.
<input type="checkbox"/> <b><u>ANALYSIS AND CONCLUSION</u></b> A summary of your results and how they compare with your hypothesis. Discuss possible sources of error within your experiment. What are the next steps with this experiment? Does it need to be repeated? What would you change if repeated?	<input type="checkbox"/> <b><u>WORKS CITED</u></b> A list of websites, papers, or books used during your project.	

## Scoring:

Judges will score posters based on this following tentative scoring rubric:

**Project Title:** \_\_\_\_\_

Project Elements			Possible Score	Score
Testable question references a cause and effect relationship and a measurable change	OR	Proposed solution/invention references a specific outcome and a measurable change	10	
Purpose is clear and discusses the importance of this project/topic			15	
Hypothesis is based on background research or prior knowledge			10	
Variables and Controls are clearly defined			5	
Materials are appropriate and a detailed list is given			10	
Procedure is sequential and describes the investigation process clearly			10	
Data is clearly provided as either graphical, quantitative, or observational			10	
Analysis and Conclusion describes the trends and patterns found in the data. Clearly states acceptance or rejection of hypothesis, possible sources of error, and suggestions for further efforts			10	
Presentation <ul style="list-style-type: none"> <li>• Clear and Concise</li> <li>• Summarizes the main steps and purpose of the project</li> <li>• Presenter makes eye contact with audience or camera</li> <li>• Presenter shows a clear understanding of their project</li> </ul> Poster Visual <ul style="list-style-type: none"> <li>• The digital poster is clean, neat, and easy to read</li> <li>• It includes images related to the project topic</li> </ul>			20	
<b>Total Score</b>			<b>100</b>	

This scoring sheet has been modified from the sciencefaircentral.com resource