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

**Partner’s Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**St. Mark’s Experimental Design STEAM Project**

**The project includes the following components:**

**Topic Choice Worksheet: 25 points Due: 5/8 by end of class period.**

Fill out the **Experimental Design Topic Choice** worksheet with your partner.Have your teacher check it for approval after procedures have been clearly listed. Once approved, you will be ready to collect your data. After your topic is approved, you will collect your data in class. During you data collection, you will fill out a data table of your results and turn this in to your teacher when the packet is complete.

**Report—100 points Due: 5/12 by 11:59 pm to awolbach@stmarksschoolboise.com**

You will type up a report that gives the results of your experiment. See the **Report Requirements** handout for what needs to go into your paper. Much of what you need is already in your **Topic Choice** worksheet and Data Collection sheet.

**Digital Presentation – 50 points Due: 5/22 by 11:59 pm to awolbach@stmarksschoolboise.com**

You will create a digital presentation that outlines the findings of your experiment. You are free to use any digital presentation tool you would like, including Power Point, Slide Share or Prezi.

Topic Ideas: Visit the following website to provide you inspiration for an experimental design.

<http://www.sciencebuddies.org/>

<https://www.education.com/science-fair/middle-school/>

<http://learnche.mcmaster.ca/4C3/Designed_experiments_project_-_2013>

Name(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Student Designed Experiment**

**Topic**:

What is the problem or question?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use reliable sources and write about the science involved in your experiment. Do not use any personal pronouns (I, we, you…)

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**Two Sources:** (goes at the end of the report)

Record the citation for your source in ***MLA format*** below as listed below

*Lastname, Firstname. Title of Book. City of Publication: Publisher, Year of Publication. Medium of Publication.*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Independent Variable:**

**Dependent variable**:

**Hypothesis**: State your hypothesis for this experiment (If… then… statement) Make sure you state your independent and dependent variable. Do not use any personal pronouns (I, we, you…):

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Materials**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Procedure: (GET TEACHER APPROVAL BEFORE MOVING ON\_\_\_\_\_\_\_\_\_\_)**

Make a list of the steps you will follow to perform your experiment. This needs to be detailed enough for someone else to collect your data for you. Describe how to setup your materials. Give the values for your control variables and describe ***exactly*** how you control them. At least one step needs to describe ***exactly*** how you change your independent variable 10 different times. At least one step needs to describe ***exactly*** how you measure your dependent variable. **Do not use any personal pronouns (I, we, you…)**

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Diagram of Experimental Setup:**

Draw a picture of how you will setup your experiment. Make sure to label your dependent variable in the diagram. Label other parts of the setup as well.

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_

**Data Table**

|  |  |
| --- | --- |
| **Independent Variable** | **Dependent Variable** |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **(\_\_\_\_\_\_\_\_) units** | **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **(\_\_\_\_\_\_\_\_) units** |
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**Graph:** Use the attached Google Sheet instructions to create a graph for your digital presentation. Below, graph your data by hand. Don’t forget to label the axis of your graph and the title of your graph.

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_

**Conclusion**

Use your data table and graph file to answer the following questions about your science expo experiment in complete sentences

**Do not use any personal pronouns (I, we, you…)**

1. Restate the hypothesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Was the original hypothesis correct? \_\_\_\_\_\_\_ Then this is the conclusion. If not, state the true conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Give two ***specific*** examples from your data table to show your conclusion from #1 above.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Use your graph file to extrapolate (predict) the measurement for a point beyond the highest value of your independent variable. State what you find in a complete sentence.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Do the data points lie along a ***perfectly*** straight line? \_\_\_\_\_\_ If not, which data point(s) were off? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. List at least 3 mistakes in the way the experiment was performed. What should be done better if the experiment were to be done again?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**This Packet Due: 5/8/17 by end of class time. 25 Points Requirements (100 pts)**

**Spelling, Grammar, Punctuation (10 pts)**

* Spelling, grammar, and punctuations mistakes are minimal
* **NO** use of personal pronouns (I, we, me, us…)

# Appearance and Organization (5 pts)

* Typed, 12 point font, Times New Roman, double spaced, **bold** titles for each section, 1 in margins, MLA format

Title Page (5 pts) (separate page)

* Title of paper, name(s), teacher’s name(s), class period, and date

**Introduction (15 pts)**

* A description of what topic or event the experiment is about (described as if to someone who has not seen it happen before)
* Explain the science concept(s) that relate to the experiment (WHY your experiment works.This involves RESEARCH so cite your sources)
* State the independent and dependent variable chosen. State the hypothesis. Stated: “When \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is increased \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will….”

**Materials (5 pts)**

* Bulleted list of all equipment used to collect data

**Procedure (15 pts)**

* Step-by-step list of instructions on how to collect data (detailed enough that another student could collect your data just from reading your procedure)
* How to setup the experiment
* How to control all control variables (give exact values)
* How to measure the dependent variable
* How to change the independent variable (give exact values)
* Photo or nice drawing of experimental setup- with the dependent variable specifically labeled using Paint.

**Data Table and Graph (10 pts)**

* Data table
* Variables labeled in column heading
* Units (in parentheses) in column heading, NOT listed after each number
* Graph
* Variable names labeled on x and y axes with UNITS (in parentheses)
* Graph title specific to your topic

# Conclusion (20 pts)

* Restate the hypothesis (directly, inversely or no connection) and whether or not it was correct. If not, give the true conclusion.
* Cite at least 2 specific examples from the data to show the relationship, using numbers
* Point out specific data points that do not seem to fit with the others
* Discuss significant sources of error (how the data could be off due to the way the experiment was performed and quantities measured)

# Sources (15 pts) You *must* have sources

* List of sources used.
* Must be cited in MLA format.

Due: 5/12/17 by 11:59pm.

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_

Experimental Design Project Requirements (50pts)

\_\_/5 Formatting/Layout

\_Title with Group member names, teacher, and period

\_Neat and organized

\_No Grammar or Spelling Mistakes

\_Organized

\_Visually appealing with appropriate graphics, pictures and colors.

**The following sections must have titles and must be in numbered or bulleted lists, with NO COMPLETE SENTENCES ANYWHERE, MAX 20 words per slide, NO PERSONAL PRONOUNS**

\_\_/5 Introduction – Describe the experiment. Give the independent variable, dependent variable. State the hypothesis (complete sentence okay)

\_\_/5 Materials – bulleted list of what was used to collect data

\_\_/5 Procedure – Numbered list of steps taken to collect data (with indep/dep/controls)

\_\_/5 Photo of experimental setup with dependent variable labeled

\_\_/5 Data – a table of values with column labels (with units)

\_\_/5 Graph – with title and axis labels (with units) Darken points to be visible

\_\_/5 Conclusion –the relationship between the variables and conclusion statement

\_\_/5 Sources of Error – 3 possible weaknesses in the data collection and results

\_\_/5 Sources—Must be in MLA format

**Due: 5/22/17 by 11:59pm**