Summer Assignment
SJBMS 8th Grade Accelerated Physics
2017-2018 School Year

All students entering 8th grade accelerated Physics are required to complete this assignment over the summer. The assignment will prepare you for this year's science fair. Please read through this packet and complete the Project Proposal form and the Background Research Bibliography form (attached). These, along with the rubric, are due on the first day of class.

SCIENCE FAIR

All 7th and 8th grade students taking accelerated science are required to present a project at both of these events:

- **The SJBMS Science Fair (on a Wednesday in late January, date to be determined)**
- **The Salt Lake City Diocesan Science fair on Saturday February 10, 2018 (location TBD)**

The purpose of the science fair is to give each student the opportunity to do real science. This means designing, executing, and interpreting your own, original experiment and being able to independently and confidently explain what the results mean in the context of broader scientific principles. Students in *accelerated* science should be committed to participating in the scientific process at an *advanced* level. This means that your project should be original, experimental, interesting, and challenging.

THIS SUMMER'S TASKS

First, you will come up with an idea for your project. This includes coming up with a good scientific question and a plan for the experiment you will use to address that question. Use the guide to choosing a testable question and avoid the bad ideas in the "Topics to Avoid" table (both attached). Fill out the Project Proposal sheet attached and have a parent or guardian approve it.

Second, you will identify and obtain sources of background information. When you return to school, you will begin researching the established knowledge relevant to your project and designing an experiment to test your question. You must use at least two print sources (books, periodicals). Note that some periodicals also publish an identical electronic version (this is acceptable as a print source). Fill out the Background Research Bibliography sheet attached.

IDENTIFYING A TESTABLE QUESTION
by Nikki Wyman

The first and most difficult step in the scientific process is to choose a question and **choose it wisely**!

1. The project **must be original**. You may not choose a project from sciencebuddies.org or other similar websites. Ask yourself, "Has this project been done before?" If the answer is yes, stop here and go back to the drawing board.

2. The project must be interesting enough to you that you want to work on it for several months, and interesting enough to others that they will want to learn about what you discover.

3. The difficulty of the project must be appropriate for *accelerated* science. That means that the project should be more challenging than one done by a typical 8th grade student in academic science, and should be *significantly* more challenging and complex than projects done by typical 7th grade students. Ask yourself, "Could I have done this project last year?" If the answer is yes, stop here and go back to the drawing board.

4. The project must be designed to answer a testable question. Testable questions are not yes/no questions.

5. The testable question/project must have one *independent* variable. The variable should be something that is measurable—something that represents a quantity such as a length, width, height, weight, voltage, time, concentration, angle, temperature, *etc*.

6. The experiment should include a single *dependent* variable that is measurable-- something that represents a quantity such as a length, width, height, weight, voltage, time, speed, *etc.*

7. The experiment should be one in which all other variables (factors that can influence the data or outcome) can be controlled.

8. The experiment should explore an area of science that the student will be able to **research** and **explain**. So, an experiment that compares brands or consumer products will not be allowed because there is no way to isolate a single independent variable and/or the students cannot explain the results obtained in terms of science (the chemistry of many modern products is at the graduate school level or beyond).

9. You must be able to answer “yes” to every question on the checklist below.

- ❑ Do you find the project interesting enough that you want to work on it for six months?
- ❑ Will the project’s results seem relevant and interesting to you, and to judges and spectators?
- ❑ Is the question specific enough to suggest a particular experiment (or set of experiments)?
- ❑ Does the experiment have a single independent variable and a single dependent variable?
- ❑ Can you measure changes in your variables using numbers that represent quantities, such as length, width, height, weight, voltage, time, *etc*.
- ❑ Is it possible to control all other factors that might influence the data that is collected in the experiment, so that they do not interfere with the results?
- ❑ Does the project include a control group (if applicable)?
- ❑ Do you have or can you easily acquire all of the necessary materials and equipment for this experiment?
- ❑ Have you avoided the bad topic areas on the following page?
- ❑ Are there at least two print sources of information on the subject that will allow you to thoroughly research the science going on in your experiment?
- ❑ If your project involves plants, are you willing to have at least ten plants in each category of your experiment to account for the differences in vigor from one plant to the next?

Topics to Avoid and Other Project Limitations

Area to Avoid	Reason
Any topics that compare brands, or ask "which _____ works best?"	When going from one brand to a next, there is either more than one manipulated variable, or it is impossible to figure out what the manipulated variable is. Also, the science that underlies why one consumer product works better than another is typically at the college level or beyond.
Any project that asks subjects for personal preferences	Such projects are more like surveys than experiments. They don't involve the kind of numerical measurement we want in a science fair.
Effect of music on plants	Too difficult to measure
Effect of colored light on plants	Too frequently done –be creative!
Effect of anything on taste, emotion, mood, *etc*.	Too subjective and difficult to measure
Any topic that requires measurements that are extremely difficult to make or repeat	Without reliable measurement, you can't do science
Any topic that measures the effect of music, exercise, etc. on blood pressure	Either the result is obvious, or difficult to measure with proper controls
ESP or astrology	No scientific validity
Any project that involves growing microorganisms at home (school lab space is available)	Science fair rules
Any project which could be hazardous to the public is prohibited. This includes projects that use: · Poisons, drugs, controlled substances, hazardous substances or devices (*i.e.* firearms, weapons, ammunition, reloading devices) · Microorganisms which are pathogenic to humans or other live vertebrates · Syringes, needles, any sharp items · Tanks which have contained combustible gases · Highly combustible solids, fluids, or gases	Science fair rules
Any project which uses live animals (other than humans)	Science fair rules

Name _____ **Period**_____ **Date**_____

Rubric:

Project Proposal and Background Research Bibliography

0 = No Evidence 1 = Some Evidence 2 = Clearly Evident	
How original and innovative is the project?	0 1 2
Is there a single independent variable that is measurable using a number t represents a quantity such as a length, weight, voltage, time, temperature	0 1 2
Is there a single dependent variable that is measurable using a number tha represents a quantity such as a length, weight, voltage, time, temperature	0 1 2
Is it possible to control all other factors that might influence the data that collected in the experiment, so that they do not interfere with the results?	0 1 2
Has the student included a control group (if applicable)?	0 1 2
Is the question specific enough to suggest an experiment (or set of experiments)?	0 1 2
Has the student avoided the bad topic areas on the list provided?	0 1 2
If the project uses people as subjects, has the student identified a sufficien large and uniform control group and experimental group?	0 1 2
Does the project meet the requirements listed in "Identifying a Testable Question"?	0 1 2
Is the project of a depth and difficulty expected of an eighth grade honors science student?	0 1 2
Research book/article 1. Is the resource scientifically sound and relevant t your topic?	/5
Research book/article 2. Is the resource scientifically sound and relevant t your topic?	/5
Research book/article 3. Is the resource scientifically sound and relevant t your topic?	/5
Total score:	_____/35
Extra Credit: Is your project in one of the following areas of science: engineering, environmental science, earth science, or astronomy? These areas of science are underrepresented at the science fair. + 5	

Project Proposal

Testable Question:

What is your independent variable?

What is your dependent variable?

What are the variables you will need to control in your experiment?

Is there a control group in your experiment? If so, what is it?

Project Description: What experiment(s) will you do to answer your question?

Student Signature: _____

Parent/Guardian Signature: _____

Background Research Bibliography

Fill out the following with information about your 3 sources (2 of which must be print). To find print sources, visit a library! Some journals and encyclopedias have both a print and electronic version of their publications-- in these cases, an article found online still qualifies as a print source. You may have used more than 3 sources by the time you finish the project: this is just to get you started looking for information.

Source #1

Title_____

Author(s)_____

Type (book, article, *etc.*)_____ **Publisher and date**_____

Brief description of scientific information, how it relates to your project

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Source #2

Title_____

Author(s)_____

Type (book, article, *etc*.)_____ **Publisher and date**_____

Breif description of scientific information, how it relates to your project

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Source #3

Title_____

Author(s)_____

Type (book, article, *etc*.)_____ **Publisher and date**_____

Breif description of scientific information, how it relates to your project

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