

**Upper Miami Valley Science Days
Research Plan**

Name(s):

Grade:

School:

County:

Working Title: This doesn't have to be your final title-- just something to use while you're working.

Statement of Problem or Question: It may require up to one paragraph.

Hypothesis:

- Your testable idea. A good hypothesis includes a general prediction of results and reason(s) why the result is expected. This is required for non-engineering design projects.

Relevant Background Research:

- Write 3-5 pages, double-spaced.
- MUST use references! Use APA style for in-text citations and references. Must also credit sources of any photos, diagrams, tables or graphs used.
- Think of the background research section as if you were writing a report on your subject. Give enough relevant information and organize it logically so that when the audience reads your hypothesis at the end of the section, they'll think, "Oh, that makes sense".
- See the suggestions below to help organize. (This is only one of the many ways to write a background research section.) Pay attention to the scientific journal articles in your topic area to see how they're written

1st paragraph suggestions/ options/ examples:

1. Give context of why your research question or problem is important. Using statistics or describing the problem is often one way to do this.

e.g. "Approximately 50-60% of all cases of dementia are associated with the neuropathological changes of Alzheimer's disease (Hulme et al., 1993). More than 5 million Americans are living with the Alzheimer's disease and around 200,000 are younger than sixty-five years old with early-onset Alzheimer's. Also, in 2014, around \$214 billion was put towards Alzheimer. There is no way to cure this horrible, complex disease, yet, and approximately 500,000 people die each year because they have Alzheimer's. Women, though, are the focal point of the Alzheimer disease considering almost two-thirds of Americans with Alzheimer's are women. Women have a higher chance of developing Alzheimer's with ratios around every one out of six, rather than breast cancer which is close to about one out of eleven women. On the same hand, though, most caregivers for these patients are women: more than sixty percent (Alzheimer's Association, 2014)."

Fair, G. (2015). Alzheimer's Memory & Motion. *Bradford Journal of Science & STEM*, 1(1), 5-8.

2. Describing the primary thing you are investigating is another way to start the background information.

e.g. “Glycerol-3-phosphate acyltransferase (GPAT3; EC 2.3.1.15) initiates the pathway of TAG synthesis by esterifying a long-chain fatty acyl-CoA to a glycerol-3-phosphate backbone at the sn-1 position to form sn-1-acylglycerol-3-phosphate (lysophosphatidic acid). A second esterification at the sn-2 position is catalyzed by acylglycerol-3-phosphate acyltransferase. The phosphate is then hydrolyzed by phosphatidic acid phosphohydrolase (lipin), and then a final acylation is catalyzed by diacylglycerol acyltransferase to form TAG. In addition to their roles in TAG synthesis, the phosphatidic acid and diacylglycerol intermediates in this pathway are precursors for all the glycerophospholipids, and they initiate signaling pathways.”

Wendel, A., Cooper, D., Ilkayeva, O., Muoio, D., and Coleman, R. (2103). Glycerol-3-phosphate Acyltransferase (GPAT)-1, but Not GPAT4, Incorporates Newly Synthesized Fatty Acids into Triacylglycerol and Diminishes Fatty Acid Oxidation. *The Journal of Biological Chemistry*, 288(38), 27299–27306.

Middle paragraphs: This is bulk of your background research. Try to set it up logically to lead your reader to the hypothesis while giving them enough information to understand your study.

Last paragraph: Write at least one transition sentence that connects your background information to your hypothesis. State your hypothesis. Optional last sentence: end with how your research will address your “problem” or question—connect it to the first paragraph

e.g. “Because the amount of force can be varied depending on the body weight of the athlete, I hypothesize that there is a mathematical relationship between them. Knowing and applying the mathematical relationship will help reduce the amount of injuries to the wrist because the force will be distributed more equally.”

Moore, K. (2015). The Mathematical Relationship Between Body Weight and Take-Off Force During a Back-Handspring in Adolescents. *Bradford Journal of Science & STEM*, 1(1), 22-28.

Procedure / Experimental Design:

How do you plan to test your hypothesis? Procedure should be written step-by-step and also include a list of all of the materials and/or equipment you will use so that you could give someone else the steps and he/she could conduct your experiment. (Engineering design projects do not require a hypothesis)

Think about what you will measure and what data you will get. From your results you will be able to determine whether your hypothesis was supported or not. *Stop and think: What results would I need to get to support my hypothesis→ could I get those results from the experiment as I have designed it?

References

Use APA-style formatting for your reference list and in-text citations.

<https://owl.english.purdue.edu/owl/resource/560/01/>