

Science (Ms. Cange and Ms. Polson):

RECOMMENDED SUMMER ACTIVITY FOR STUDENTS WHO WILL TAKE ADVANCED SCIENCE RESEARCH 10

During Research 1, students learn basic research techniques and conduct a literature search on a topic of choice. However, in Advanced Research 10 students are expected to devise and conduct a hands-on experiment, employing the scientific method. The first several weeks of the school year are spent choosing an acceptable, long-term research project that has a degree of originality. The sooner an idea is approved, the sooner the student can begin conducting a search of the literature to gather necessary background information. Therefore, it is recommended that students record ideas and interests during the summer that may potentially evolve into a research project.

When considering project ideas, keep the following restrictions in mind:

- 1) Students may **not** use vertebrates, including humans.
- 2) Students may **not** use pathogens which could cause illness.
- 3) Students may only use Biosafety Level 1 bacteria. Examples include, but are not limited to, the following bacteria: *Agrobacterium radiobacter*, *Aspergillus niger*, *Bacillus thuringiensis*, *Escherichia coli* strain K12, *Lactobacillus acidophilus*, *Micrococcus leuteus*, *Neorospira crassa*, *Pseudomonas fluorescens*, and *Serratia marcescens*.
- 4) A project **cannot** be entirely comprised of a short-term study which could be completed as a one or two day classroom laboratory activity.
- 5) Students may **not** conduct psychological, behavioral, or sociological studies.
- 6) Students may **not** conduct a purely comparative study. For example, water absorption may not be compared between several brands of paper towel to determine which is “best.” However, a student would be allowed to develop an original paper towel and assess its effectiveness.

Recommended activity

1. Obtain a new marble covered log book. Use all guidelines previous taught in Research 1 for your notebook, including but not limited to:
 - a. Before making your first entry, skip the first 8 pages of the marble logbook. This will be used later for a Table of Contents and Vocabulary List.
 - b. After the table of contents/vocabulary list, each page must be numbered in the outside margin at the top. Number the pages before you write your first entry.
 - c. Be sure all entries are made in blue or black ink. Do NOT use a pencil. Do NOT white out. Use a simple cross out if a mistake is made.
 - d. Date all entries you make in the log book. The date should be in the MARGIN of the page.
2. Record a list of at least **two project ideas**. Keep in mind that your project may involve any branch of science including earth science, biology, chemistry, physics, engineering, inventing, and electronics.

3. Examine various sources for project ideas. For example:
 - Make a list of your own personal interests.
 - Watch science related shows such as *Nova* and *National Geographic*.
 - Talk to friends, family and professionals about topics that might warrant examination.
 - Read articles in science-related magazines such as *Scientific American*, *Discover*, *Popular Science*, *Popular Mechanics*, etc.
4. Read at least ONE Primary Journal Article for each topic idea you potentially want to pursue. Primary articles can be found a number of ways including the use of the *Syosset High School Library Online Databases*.
<https://www.syossetschools.org/domain/249>
Click on “Databases” on the left hand side, log in with your school Google account.
5. Create two project proposals. One project proposal must be a project that could be completed at home. The second proposal could be one that can be completed at home *OR* using laboratory facilities at Syosset High School. Each proposal must fit the below criteria.
 - a. Each proposal needs to have at least one journal article as a reference.
 - b. Email BOTH project proposals in one email to Ms. Cange, Ms. Polson and Ms. Ade by **August 1**
ccange@syossetschools.org
gpolson@syossetschools.org
vade@syossetschools.org

Project Proposal Format

Each proposal should include (use these headings in the text):

- A. Question being addressed
- B. Hypothesis / Engineering Goals
- C. Description of methods or procedures and experimental design including required equipment to be used for data collection
- D. Bibliographic References: APA formatting for three primary or secondary scientific journals.

The most important element in selecting a research topic is to **read, read, read!** As you begin to read scientific articles of interest to you pay close attention to who the researchers are and where they work. You should ultimately be able to trace the information back to the primary scientific source (research journal article). Once you have been able to obtain the primary literature, read the materials and methods section to learn about how these experiments were conducted and to obtain useful information about experimental technique. This is where you will get ideas to incorporate into your own procedure. Although it is not appropriate to simply copy another researcher's experiment, it is acceptable to use other researchers' methods to ask your specific research question.