Advanced Science Research

***Summer Assignment***

Assignments are due the second research class of school, September 2015

**Advanced Science Research – Grade 10**

**Class of 2018**

1. Essay Questions 1-5
2. Advanced Science Research Mathematics
3. Advanced Science Research Science
4. Advanced Science Research Social Science

**Materials needed:**

1 black 4 inch binder

8 dividers

1 laboratory notebook (with carbon paper, not spiral. Check neebu.com)

1 Folder

Welcome to the Calhoun High School Advanced Science Research (ASR) course. Research can be an exciting and rewarding experience for students. You will have an opportunity to explore topics in mathematics, science and social science and determine a topic that you are passionate about in which you will study in great depth. Many students will experience the thrill of making discoveries and analyzing problems that may never have been examined before.

Research implies a commitment to an area of study beyond the standard classroom obligations. The rewards received by students who perform in depth research projects are far greater than the grades, medals and plaques awarded. To become an expert in one small area of knowledge requires devotion as well as time. You must want to learn everything there is to know about your topic in order to do a genuinely fine job. The skills that are developed in the process of doing research will be with you for the rest of your life.

Selecting a topic is not only the first step in doing research but it is also the most critical step. Your topic should allow you to examine material that interests you. This summer you will be reading articles in mathematics, science and social science. You may have your heart set on biological research only to find out that you are really interested in mathematics.

Any student involved in research should realize that the role of the teacher is very different than in the traditional classroom. Your ASR teacher’s role is that of a facilitator.

Welcome to ASR!

Mrs. C. Boyce Mr. M. Hughes

Cboyce@bellmore-merrick.k12.ny.us Mhughes@bellmore-merrick.k12.ny.us

Ms. D. Nigro Ms. J. Pefanis

Dnigro@bellmore-merrick.k12.ny.us Jpefanis@bmchsd.org

**Assignment #1:**

*Essay Questions*

*All essays should be type and double spaced.*

*Please have your name, ASR period and teacher on each essay.*

Please log all time spent working on your essays in your lab notebook.

Completed essays will go in your binder under Divider #2 - Essays

1. What inspired you to join ASR in hopes of conducting a research project?

*1000 characters*

1. How do you think doing a research project of this capacity will help you clarify your interest in science?

*1000 characters*

1. Think about one of the articles that you are studying this summer. What benefits do you think this research will bring to the world? What additional steps, and by whom, might be needed for this benefit to be realized?

*1000 characters*

1. Your promise as a Scientist, Mathematician or Engineer:

Address through specific and concrete examples what characteristics you have that best demonstrate your affinity and aptitude for being a good scientist. What have you done that illustrates scientific attitude, curiosity, inventiveness, initiative? What qualities do you possess that suggest future success as a researcher?

*3000 characters*

1. Major Scientific Question of the Future:

What is a major scientific question whose answer you believe will have a significant impact on the world in the next 20 years, and why? Using examples from your own experience of current research that you have studied, explain how you might envision addressing the question over the next 20 years.

*3000 characters*

**Advanced Science Research**

***Mathematics***

***“Mathematics possesses not only truth, but also supreme beauty”***

Bertrand Russell

Problem solving skills and mathematics are closely related. It is not possible to do mathematical research without spending time doing mathematics. You do not have to be a powerful mathematical to make great observations in mathematics. Once you make the observation, you begin your research to see if anyone else ever noticed that same thing you just noted. You will be surprised at how many ideas you have that went unnoticed for centuries. All of the fundamentals have not been discovered yet. Putting two preexisting ideas together in a new way is the foundation for a thesis. Proving an existing theorem using a different approach from the previous method can also be the basis for a paper. Listen carefully in your math class and I guarantee that every day you will walk away with an unanswered question or thought that begins with, **“I wonder what would happen if…”**. This is where your study begins.

Please do not dismiss mathematics as an excellent field for research.

**Mathematics Articles:**

1. You must have your binder and laboratory notebook.
2. All time that you spend looking up, annotating and summarizing articles must be entered in to your laboratory notebook. Please include date, time, and brief explanation of what you did.
3. Examine various sources for project ideas including *Scientific American, Discover, Popular Science, Popular Mechanics, American Mathematical Society, The College Mathematics Journal, etc.*
4. Choose 2 articles that you find interesting. Print out a copy and write a 1 page summary (typed, double spaced) about the article*.*
5. Your articles, as well as summaries, will go in your binder under Divider #1 – Articles

**Advanced Science Research**

***Science***

**“If you can’t explain it simply, you don’t understand it well enough”** Albert Einstein

The most important element in selecting a research topic in science is **read, read, read!** In science you start your topic broad and work your way narrow. During your first year in ASR you will learn basic research techniques and conduct a literature search on a topic of choice. The first two months of school are spent choosing an acceptable, long-term research project that has a degree of originality. The sooner an idea is approved, the sooner you can begin conducting a search of the peer reviewed literature to gather necessary background information. Therefore, it is recommended that you record your ideas and interests in your lab notebooks over the summer that may potentially evolve into a research project.

Acceptable Science topics include, but are not limited to:

*Biology*

*Pathology*

*Medicine*

*Chemistry*

*Nutrition*

*Physics*

*Engineering*

*Geology*

*Meteorology*

*Astronomy*

*Forensics*

**Summer Activity:**

1. Make sure to have your binder and laboratory notebook.
2. Make sure that all entries in your notebook are clearly dated and show the amount of time you spent on the particular task. You must also include a sentence or two outlining the task.
3. You must find and summarize 5 articles in science. Please make sure that each article is from a different branch of science (see list above).
4. Sources include, but are not limited to:

*Scientific American, Discover, Popular Science, Popular Mechanics, Nutrition, Engineering, Medical journals, Google Scholar, PubMed, HighWire Stanford, PLoS ONE, or search Google for free online science journals.*

**Do not forget about the Calhoun Library sources!**

**Advanced Science Research**

***Social Science***

**“Science taught ... without a sense of history is robbed of those very qualities that make it worth teaching to the student of the humanities and the social sciences”** – I. Bernard Cohen

Social Science Research can be an exciting and rewarding experience for students. Summer is a great time for reading, observing and thinking of ways to come up with an interesting topic. Putting together two preexisting ideas with a new angle that is of personal interest to you is the foundation for a thesis, and affords the student an opportunity to make discoveries and analyze problems that may affect people from all walks of life.

The Social Science area consists of studies in:

*Psychology Anthropology Finance*

*Language Sociology Geography*

*Literature Women’s Studies Political Science*

*Education History Economics*

The summer activity consists of 3 areas:

1. ***Written Observation*** twice a week of people in social, business, family, etc. settings
2. Popular reading on topics
3. Reading, annotating and summarizing 3 scholarly articles found in on line data bases (can be found through the Calhoun Library Website!)
* Explore the fields above for areas that interest you.
* Make sure to log your work in your laboratory notebook.
* ***Written Observation***: Write in your notebook the following observations at least twice a week:
* How people interact with each other in groups (teams, clubs, camp bunks, etc.)
* How people interact as individuals. Observe others at restaurants, meetings, the family dinner table, and sporting events.
* How people classify themselves
* How people choose surroundings (Activities, jobs, leisure activities)
* Other’s personal choices (clothing style, speech, identification within groups)
* What are some influences under which we operate? Economically? Educationally? Socially?
* Choose 3-5 of the social science areas listed above that interest you. Notice these topics in internet articles and in popular magazines and newspapers for the application of your topic in the larger world. Write about how these articles show this application in your lab notebook.
* Find and read 3 scholarly articles from the Calhoun or local library sources on-line. Annotate the articles, then write a summary for each article (1page, typed, double spaced).

**Communication:**

You **must** email all 4 ASR teachers if you have any questions about your summer assignment.

Please check your school email regularly as we will be sending you individual requests for updates on your work this summer.

**Summer Checklist:**

\_\_\_\_\_ Purchased binder with 8 dividers

\_\_\_\_\_ Purchased laboratory notebook

\_\_\_\_\_ Purchased Folder

\_\_\_\_\_ Essay #1

\_\_\_\_\_ Essay #2

\_\_\_\_\_ Essay #3

\_\_\_\_\_ Essay #4

\_\_\_\_\_ Essay #5

\_\_\_\_\_ 2 Mathematics Articles

\_\_\_\_\_ 5 Science Articles

\_\_\_\_\_ 3 Social Science Articles

\_\_\_\_\_ Social Science written observations

\_\_\_\_\_ Social Science popular reading