

Freshman Summer Assignments for Medical Biology and Scientific Research

Bring all the below to the first day of school for a grade. Punctuality and timeliness are factored into the grade.

Medical Biology

Read the indicated pages/passages from A Short History of Nearly Everything by Bill Bryson.

Part IV Dangerous Planet

Chapter 13	Bang!
Chapter 14	The Fire Below
Chapter 15	Dangerous Beauty

Part V Life Itself

Chapter 16	Lonely Planet
Chapter 17	Into the Troposphere
Chapter 18	The Bounding Main
Chapter 19	The Rise of Life
Chapter 20	Small World
Chapter 21	Life Goes On
Chapter 22	Good-bye to All That
Chapter 23	The Richness of Being
Chapter 24	Cells
Chapter 25	Darwin's Singular Notion
Chapter 26	The Stuff of Life

1. As you read, you will be taking notes in a composition notebook. Before you begin, create a table of contents that includes: notes, extra chapter, vocabulary. Write on one side of the paper only and place the page numbers/date on each page as you add to the notebook.
2. **In the composition notebook, take legible notes** on examples of the following topics in the book: how earth science and biology are interconnected, how life has changed on this planet and what has allowed life to thrive and change on Earth, variations in approaches to doing research, how an individual's personal life affected their scientific contributions and how an individual's discovery changed the scope of man's knowledge in science. Clearly **label** the sections and chapters so the teacher knows which notes they are looking at. Each chapter should address at least one or more of the indicated topics. **Notes must be in a composition notebook. Only use one side of the paper, and number /date all pages. If digital, PRINT them out and glue them into the composition notebook before school starts. If you do not have access to a printer before school, you will have to handwrite your notes.**
3. In the back of the composition notebook, generate a list of terms used in the book (A Short History of Nearly Everything) which are new to you (not just scientific words). **Define** the terms. **Vocab must be in the back section of the composition notebook. If digital, PRINT them out before school starts. If you do not have access to a printer before school, you will have to handwrite your vocab.**
4. In the composition notebook, after the notes, choose **one** of the other chapters (1-12 or 27-30) and read it in addition to the chapters listed above. Write a summary about the chapter. Include the name of the chapter you chose, a summary of the information in the chapter and why you chose that chapter to read versus the other chapters. The summary should be an appropriate length for the chapter you choose. **Summary must be in a composition notebook. If digital, PRINT them out before school starts. If you do not have access to a printer before school, you will have to handwrite your summaries.**

Scientific Research

Since this is your freshman year and you are taking biology as your science class, you will be doing a project based in the biological sciences. Although not considered one of the main branches of biology, research topics in the social sciences and psychology may be considered for areas of research.

1. Choose a topic in the **biological** sciences that you would like to perform an actual experiment on- this is NOT just a research paper. It includes background research in addition to performing an experiment. Since your first-year science class is based in biology, your research topic for your freshmen project should be based in biology. To help you get started and give you an idea of what topics are in the biological sciences, read the "Choosing a Biological Project" sheet. If you have performed research projects in the past and have an interest in a topic other than biological science, you may be able to pursue this topic with approval from your freshmen teacher.

2. Digitally, fill out the “Freshmen Summer Research Ideas” form. E-mail the completed form to Mrs. Ostrom (kaostrom@henrico.k12.va.us). **You MUST e-mail the completed research idea form to Mrs. Ostrom by the assigned due date, or you will not receive full credit for this part of the assignment.** This is JUST to generate ideas and start the planning process- final approval will come from the medical biology teacher in the first month of school. You will NOT receive feedback on the proposal until the first month of school. (To obtain a digital copy of the “Freshmen Summer Research Ideas” form, go to the center schoology page. The form should be at the top of the page along with digital copies of other summer work.) No google docs accepted.

Areas of study that are acceptable for a freshmen year research project (but are not limited to):

- Human Biology (study of human body systems)
Note: Projects that have human test subjects will require supervision by a medical professional, ie. nurse
- Medicine and Health (study of medicine and drugs and factors that affect the health of an individual)
- Zoology (study of animals and their behavior & growth)
- Botany (study of plants and their behavior & growth)
- Environmental Science (water studies and factors that affect the environment and the organisms that live there)
- Psychology (the study of human behavior and factors that affect human behavior)
- Sports Science (the study of how different aspects affect one’s performance in a game)

Below are ways to measure different biological processes that deal with the topics listed above. Read over them and they may help you generate an idea.

Plants

Plant growth (measured by height or mass of plant)

Photosynthetic Rate (measure the amount of CO₂ used or amount of O₂ produced- need a way to measure gas)

Germination (the seed did or did not start to grow)

Animals

Growth of an organism (measure the length or mass of an organism)

Respiration Rate of mammals (measure the amount of CO₂ produced or amount of O₂ used- need a way to measure gas)

Respiration Rate of fish (Number of gill flaps/minute)

Regeneration (the worm planaria has the ability to regenerate if cut- full, partial, none or dead)

Daphnia (small see-through crustacean with a visible heart)

Number of animals* attracted/ repelled by a substance (* insects, dogs, cats, fish, etc.)

Excitability (# of times a dog barks in a minute, etc.)

Human Biology and Psychology

Reflexes (ruler test)

Vertical and Horizontal Leap

Amount of weights bench pressed

Basketball: # of baskets made/ missed and speed at which a ball is dribbled

Baseball: How far a ball is hit or thrown, speed at which the bases are run and speed a ball is thrown or hit (need a radar gun)

Track: Speed of a given distance

Tennis: Speed of the ball (need a radar gun)

Survey with Yes/No, Multiple Choice or Ranking questions (**NO** open-ended questions)

Person’s IQ (download a reputable one off the internet)

Person’s Performance on an assessment (use math questions with definite right/wrong answers)

Person’s Learning Style (download a reputable survey off the internet)

Environmental Science

Water pH (need a way to measure pH)

Dissolved O₂ (need a way to measure dissolved gas)

Dissolved CO₂ in water (need a way to measure dissolved gas)

Turbidity of water (secchi disc)

Internet Resource for Research Ideas

To begin formulating ideas log on to: <http://www.sciencebuddies.org>. Click on “Project Ideas” and look under “Life Science”, “Behavioral & Social Science” and “Environmental Science”. This can help you generate ideas about a biological research topic that may interest you. You can also click on “Project Guide” on the home page and look under “Tools, Techniques and Reference Information”. This has some useful resources for ways of collecting data during a research experiment.