# Assignment Summary

In this project, you will analyze claims about the causes of inherited genetic variation. You will then make your own claim based on prior knowledge. Next, you will defend your claim by conducting research to gather information that supports it. Finally, you will present your claim and defense in a typewritten paper.

Background Information

Genetic variation refers to the differences in traits among individuals within a species. Genetic differences help populations change over time as they adapt to changes in their environment. Individuals with traits that allow them to adapt to their environment survive and pass their genetic information to offspring. Individuals with traits that do not allow them to survive in their changing environment eventually die out.

New gene combinations are formed during meiosis. Meiosis is a cell division process involved in the production of egg and sperm cells. In meiosis, two processes contribute to differences in genetic sequence: crossing over and assortment. Crossing over happens when genes are exchanged between chromosomes. In assortment, variation occurs because chromosomes are randomly distributed to the egg and sperm cells. The meeting of the sperm cell and the egg cell in sexual reproduction is also a random process; therefore, it creates differences in traits among offspring.

Mutations are permanent changes in the sequence of DNA. Mutations may affect organisms in three ways. Mutations may be beneficial, harmful, or neutral. Mutations may occur during the DNA replication process or may be caused by environmental factors such as exposure to chemicals and high-energy light such as X-rays. The changes in the sequence of a gene may affect the type of protein produced or the function of a protein.

The expression of traits can be affected by the environment. For example, organisms of a species may have different fur color based on the differences in the temperature of their habitat. Other factors that can affect variation within a species include diet and lifestyle.

Materials

* Computer with Internet access
* Pen or pencil and notebook

# Assignment Instructions

**Step 1: Prepare for the project.**

1. Read the entire Student Guide before you begin this project.
2. If anything is not clear to you, ask your teacher for help before you begin.

**Step 2: Analyze claims.**

1. Consider the following claims.
   1. Inherited genetic variations are caused by genetics only. They are caused by crossing over and assortment in the development of sex cells in meiosis. The random joining of sex cells can also be a source of genetic variation. Mutations also cause variations in genetic sequences. Mutations are always harmful.
   2. Inherited genetic variations are caused and influenced by environmental factors only. Factors like an organism’s habitat conditions and behavior can affect variation within a population.
2. Think about what these claims are saying. Determine if you support these claims. If you support these claims, do you support the totality of the claims or just parts of the claims?

**Step 3: Make a claim.**

1. Recall what you know about crossing over, independent assortment, and random joining of sex cells during sexual reproduction.
2. Now, go back to the claims in Step 2a. Do you support these claims? If so, do you support the totality of the claims or just parts of the claims?
3. Based on your prior knowledge, make a claim about the factors that cause inherited genetic variations within populations. Also make a claim about the effects of mutations. Write your claim in your notebook.

**Step 4: Conduct research to support your claim.**

1. For each part of your claim, conduct research to provide two examples of scientific information that supports it.
   1. Scientific information may be gathered from reputable websites, scientific journals, and video lessons from scientists or educators, information from government agencies, or interactive activities from universities or other educational sites.
2. Be sure to take notes in your notebook.
3. Keep track of the sources you use. You will need to cite them later.

**Step 5: Type your research paper.**

1. Your research paper should start with your claim.
2. In paragraph form, give two examples of scientific information that support each part of your claim.
3. Include a summary paragraph that reiterates your claim and explains how your research defends your claim.
4. Include a list of resources you used in defending your claim.

**Step 6: Evaluate your project using this checklist.**

If you can check each criterion below, you are ready to submit your project.

* Did you analyze the claim regarding the causes of inherited genetic variation?
* Did you make your own claim about the causes of inherited genetic variation?
* Does your research paper start with presenting your claim?
* Does your research paper include paragraphs that give two examples of scientific information to support each statement in your claim?
* Does your research paper include a summary paragraph describing how your paper supports your claim?
* Does your research paper have a list of resources you used to support your claim?
* Did you use proper grammar, spelling, and punctuation in your research paper?
* Does your research paper have your name on it?

**Step 7: Revise and submit your project.**

1. If you were unable to check off all of the requirements on the checklist, go back and make sure that your project is complete.
2. When you have completed your project, submit your typewritten paper to your teacher for grading.
3. Congratulations! You have completed your project.