# Assignment Summary

For this assignment, you will examine different karyotypes, and research the effects of a genetic disorder. In a written analysis, you will explain how nondisjunction in meiosis can affect a karyotype, and can cause the effects of the genetic disorder.

**Background Information**

A karyotype is the number and appearance of chromosomes in the nucleus of a human cell. A karyotype includes the 22 pairs of autosomes, and the two sex chromosomes or allosomes. These are XX for female and XY for male in humans and many other organisms. Each chromosome contains alleles or forms of genes for many genetic traits. For example, the X chromosome contains over 2000 genes, while the Y chromosome contains about 200 genes. Unfortunately, there are some chromosomal alterations that cause genetic disorders.

Nondisjunction in meiosis can cause an abnormal number of chromosomes in the gametes of an individual. If the error occur in Meiosis I, one or more pairs of homologous chromosomes do not separate. If the error occurs in Meiosis II, sister chromatids do not separate normally. If this gamete with an abnormal number of chromosomes joins with another gamete, an individual with an abnormal number of chromosomes results. This results in a genetic disorder, if the zygote is viable. This abnormal number of chromosomes can be seen in a karyotype of the cell.

In this assignment, you will explore how karyotypes illustrate the chromosomes in normal cells, and the chromosomal abnormalities in some genetic disorders.

**Materials**

* Internet
* Graphic Organizer
* Student Guide

# Assignment Instructions

For this project, you are expected to submit:

1. A graphic organizer that includes the information you researched about a specific genetic disorder.
2. A paragraph that uses a karyotype as evidence to explain the effects of a genetic disorder.

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

1. Read through the guide before you begin so you know the expectations for this project.
2. If there is anything that is not clear to you, be sure to ask your teacher.

**Step 2: Identify a normal karyotype.**

1. Search the internet for a male and female normal karyotype.
2. Copy and paste this image to this word document.
3. Circle the sex chromosome in both karyotypes **(10 points)**
4. Write one similarity that you notice among both karyotypes **(10 points)**

**Step 3: Identify a karyotype caused by nondisjunction.**

1. Search the internet this abnormal karyotype. It can be either male or female. Suggestions include: Down syndrome, Kleinfelder syndrome, Turner syndrome, Trisomy X,and XYY males.
2. Copy and paste this image to this word document.
3. Circle the evidence of nondisjunction in the karyotype **(5 points)**
4. Write the name of the genetic disorder with this abnormal karyotype in the graphic organizer.

**Step 4: Research the effects of the genetic disorder identified in Step 3.**

1. Provide a list of reliable sources in the graphic organizer.
2. Complete the graphic organizer using the information collected on the disorder. Include the following **(50 points):**
   1. Name of the disorder and two reliable sources. Suggestions: National Institutes of Health, Mayo Clinic, National Organization for Rare Disorders.
   2. Description of the disorder.
   3. Causes of the disorder.
   4. Inheritance Pattern of the disorder.
   5. Prognosis of the disorder.

**Step 5: Write a paragraph explaining why nondisjunction in the karyotype may lead to the effects of the genetic disorder**.

1. Identify information from your graphic organizer that explains the connection between the nondisjunction and disorder effects.
2. Think about what happens to chromosomes during meiosis, in the context of nondisjunction.
3. Write a paragraph to explain how this abnormality in the karyotype leads to this disorder **(20 points).** Check your grammar, punctuation and spelling **(5 points).**

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

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

* Did you use reliable sources to find information about the genetic disorder?
* Is your graphic organizer filled out and accurate?
* Does the abnormal karyotype you identified show evidence of nondisjunction?
* Did you carefully think about the process of nondisjunction before writing your paragraph?
* Does your paragraph cite supporting details from your research and karyotype?

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

1. If you were unable to check off all of the requirements in the checklist, go back and make sure that your project is complete. Be sure to save your project before submitting it.
2. Turn in your graphic organizer, abnormal karyotype, and paragraph to your teacher. Make sure that your name is on it.
3. Submit your karyotypes, graphic organizer, and analysis through the virtual classroom.
4. Congratulations! You have completed your project.

**Karyotypes**

**Normal Female Karyotype**

* **Circle the sex chromosomes.**

**Normal Male Karyotype**

* **Circle the sex chromosomes.**

**Compare the normal female and male karyotypes.**

**Abnormal Karyotype Caused by Nondisjunction**

**Name of Genetic Disorder\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* **Circle the abnormal chromosomes.**

**Graphic Organizer: Research on a Genetic Disorder**

|  |  |
| --- | --- |
| **Name of the Disorder** |  |
| **Two Sources** |  |
| **Description of the Karyotype and the Disorder** |  |
| **Frequency of the Disorder** |  |
| **Inheritance Pattern of the Disorder** |  |
| **Effects and Prognosis of the Disorder** |  |

**Written Analysis**

In a well-structured paragraph, explain how nondisjunction has caused the karyotype and the effects of the genetic disorder you researched. Use the karyotype and evidence from your graphic organizer to support your answer.