Ancestry & Allele Frequencies – choose 2

**European – lactase persistence**

**Nigerian – sickle cell anemia**

**Ashkenazi Jew – Tay-Sachs disease**

**Han Chinese – Genghis Khan’s Y-chromosome**

Heredity – Single-gene traits – choose 2

**Almond eyes Dimples Widow’s peak Round face**

**Wide-set eyes Freckles Straight hairline Square face**

**Long eyelashes Red hair Cleft chin Attached earlobe**

**Short eyelashes PTC taster Smooth chin Detached earlobe**

Heredity – Polygenic/multifactorial traits – choose 1

**Black hair Tall height Blue eyes Fair skin**

**Brown hair Medium height Brown eyes Tan skin**

**Blonde hair Short height Green eyes Dark skin**

Heredity – sex-linked traits – choose 1

**Male-pattern baldness Color blindness Hemophilia**

DNA Mutations – choose 1

**Point mutation Expanding repeat Aneuploidy Translocation**

**Chr. Deletion Chr. Duplication Inversion**

Genetics & Behavior – choose 1

**Anorexia Insomnia Addiction Depression Schizophrenia**

**Bulemia Bipolar disorder Autism**

Genetics of Immunity – choose 1 (coin toss for Rh+/-)

**Type A Type B Type AB Type O**

Genetics of Cancer – choose 1

**TP53 PTEN BRAF NRAS**

Honors Genetics: Final Project

Your final for this class will be to demonstrate your comprehensive knowledge of the principles of human genetics in the context of an individual’s life. You will tell the story of your hypothetical person in any form you choose – movie, story book, novel/essay, PowerPoint lecture, puppet show, etc. Some aspects of your person’s life will be decided at random, and others will be chosen by you. While there is room for you to take liberties with the events in your person’s story, be sure to note the required elements for your project.

**DUE DATE: MAY 30th**

The following details about your person will be chosen at random. Please record the results for each characteristic drawn.

* Ancestry and Allele \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Single-gene Traits \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Polygenic/Multifactorial Trait \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Sex-linked Trait \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* DNA Mutation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Behavior \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Blood Type \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Cancer Allele \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The following questions must be addressed thoroughly and completely in your project. Remember, you are demonstrating all the knowledge you have gained from this course!

1. Your person has two unique ancestries, one from each parent. Choose an allele associated with one of your ethnic populations. How did this allele/chromosome become more common in this population than in others? Please use the principles of microevolution in your answer.
2. Before your person was born, the parents had to participate in sexual reproduction. What is the role of meiosis in sexual reproduction? Be sure to include its influence on genetic variation.
3. A developing embryo is made up of many stem cells. How do stem cells work?
4. **Choose either a reproductive technology (such as *in vitro* fertilization) or a fetal genetic test (such as amniocentesis) to include as part of your person’s life story.** How does your chosen procedure work? What are the pros and cons?
5. For each of the types of traits (single-gene, polygenic/multifactorial, sex-linked), explain the mechanics of inheritance and what environmental factors, if any, are involved. **Include at least ONE Punnett square.**
6. In the context of one of your single-gene traits, describe the process of gene expression from transcription to translation. Also, what is the role of epigenetics in gene expression? How can this gene’s expression be modified/regulated post-translation?
7. What is the effect of your DNA mutation on your individual?
8. What is the role of genetics in behavior? Be sure to tailor your answer to the context of the behavior randomly selected for your person.
9. What is the role of genetics in your person’s immune system? Be sure to include some discussion about how your person’s blood type.
10. At some point in your story, your person will need to either develop cancer or be tested for cancer alleles. How is cancer genetic, but not an inherited disease?
11. In the context of testing for cancer alleles (either by your person or their offspring), explain how one conducts such a test.
12. Choose one of the biotechnologies we have discussed this year (such as RFLP analysis, PCR, BLAST, etc.) and apply it to an event of your choice in your person’s life. Get creative! Here are some ideas to get you thinking…
    1. Your person commits a crime or is a suspect in a case.
    2. Your person takes a DTC test for either alleles or ancestry.
    3. Your person participates in a research study involving their genetic information.
13. **Include a reference page with your project. You may use the textbook (which does not need to be cited) but you must also conduct your own research using at least THREE other credible sources. Use APA format for your citations.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Score** | | | | |
| **Criteria** | **5** | **4** | **3** | **2** | **1-0** |
| **Content (x2)** | **All 12 required content items are addressed.** | **10-11 required items are addressed.** | **8-9 required items are addressed.** | **About half of the required items addressed.** | **Less than half of the required items addressed.** |
| **Accuracy (x2)** | **All components (required or added) are thorough and scientifically sound.** | **Most components are thorough and scientifically sound.** | **Some required components lack detail and/or are inaccurate.** | **Many required components lack detail and/or are inaccurate.** | **Most required components lack detail and/or are inaccurate.** |
| **Effort** | **Project clearly demonstrates thoughtful effort.** |  | **Project demonstrates satisfactory effort.** |  | **Project demonstrates a lack of effort.** |
| **Creativity** | **Required content presented in an inventive, exciting manner.** | **Required content presented in an interesting manner.** | **Project contains a few interesting elements.** | **Project contains one or two interesting elements.** | **Project lacks interesting elements.** |
| **TOTAL** | **\_\_\_\_\_\_\_\_\_/30 x 2 = \_\_\_\_\_\_\_\_\_/60** | | | | |