**Performance Tasks:**

**Option 1:** 4a

*4a: I can develop a claim with supporting evidence to predict different environmental factors which influence variation within populations.*

Choose one of the genetic mutations on this website <https://learn.genetics.utah.edu/content/basics/outcomes/>. Research and answer the statements below.

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| **Task** | **Met** | **Not Met** | **Scoring Criteria** |
| Write a claim and defend with evidence that describes types of genetic variations and how they occur.   * What type of mutation and how does it occur? |  |  | EMERGING |
| Inheritable genetic variations may result from new genetic combinations through meiosis, DNA replication, and/or mutations caused by environmental factors.   * Defend your claim by including the type of protein and cells affected. |  |  | DEVELOPING |
| Use evidence to defend your claim that inheritable genetic variations may result from new genetic combinations through meiosis, DNA replication, and/or mutations caused by environmental factors.   * How does a difference in the DNA sequence (genotype) lead to a difference in an observable trait (phenotype)? * Is this mutation helpful, harmful, or neutral for the organism? |  |  | PROFICIENT |
| Predict a plausible environmental factor which would lead to this mutation being beneficial.   * How would this mutation influence variation within the population? * Would the mutation be an advantageous trait? |  |  | EXEMPLARY |
| **TEACHER FEEDBACK** | STUDENT FEEDBACK | | |

**Option 2:** 4a

*4a: I can develop a claim with supporting evidence to predict different environmental factors which influence variation within populations.*

Create a card game (matching, spoons, go fish…) that has 4 cards for 5 of the mutations (20 cards total will be the “deck of cards” for your game). Follow this format for the cards to match:

Each card: picture of the organism with the trait (printed or drawn) in the upper left hand corner

1st card: name of organism and trait affected

2nd card: affected protein with type of mutation

3rd card: physical (phenotypical) effects of mutation

4th card: predict an environmental factor that would make this trait beneficial.

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| **Task** | **Met** | **Not Met** | **Scoring Criteria** |
| Write a claim and defend with evidence that describes types of genetic variations and how they occur.   * What type of mutation and how does it occur? |  |  | EMERGING |
| Inheritable genetic variations may result from new genetic combinations through meiosis, DNA replication, and/or mutations caused by environmental factors.   * Defend your claim by including the type of protein and cells affected. |  |  | DEVELOPING |
| Use evidence to defend your claim that inheritable genetic variations may result from new genetic combinations through meiosis, DNA replication, and/or mutations caused by environmental factors.   * How does a difference in the DNA sequence (genotype) lead to a difference in an observable trait (phenotype)? * Is this mutation helpful, harmful, or neutral for the organism? |  |  | PROFICIENT |
| Predict a plausible environmental factor which would lead to this mutation being beneficial.   * How would this mutation influence variation within the population? * Would the mutation be an advantageous trait? |  |  | EXEMPLARY |
| **TEACHER FEEDBACK** | STUDENT FEEDBACK | | |

**Option 3:** 4b

*4b: I can model and predict changes in the frequency of traits in a population based on environmental or genetic pressures.*

Create a dihybrid cross (big Punnett square) and a pedigree for a trait that exists in your family. Predict which genotype/phenotype would be more beneficial based on an environmental or genetic pressure.

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| **Task** | **Met** | **Not Met** | **Scoring Criteria** |
| Dihybrid cross and pedigree drawn correctly.   * Dihybrid cross requires two traits * Pedigree can be one trait (Grandparents, Parents, kids) * Must have a KEY |  |  | EMERGING |
| Use probability and statistics to find the variation and distribution of expressed traits in a population.   * What kind of inheritance pattern does the trait follow. * Genotype frequencies * Phenotype frequencies |  |  | DEVELOPING |
| Apply the probability and statistics to EXPLAIN the variation and distribution of expressed traits in a population.   * Write a paragraph that explains your genotype and phenotype frequencies and how they will affect the population in the future. |  |  | PROFICIENT |
| Make a prediction regarding the changes in the frequency of the traits in a population based on an environmental or genetic pressure.   * What is the environmental or genetic pressure? * How will the frequency of the trait change? |  |  | EXEMPLARY |
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