Elaborate: The Art of Gene Expression

INSTRUCTOR:
no_reply@example.com

Objective:

Create artwork showing RNA structure and DNA mutations. Explain their functions and effects on protein synthesis.

Background Information:

RNA is a molecule that helps cells by making proteins. RNA is shown as a single strand because it is made of a single strand of nucleotides. The parts of RNA include messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA).

Messenger RNA (mRNA) is important because it carries the code from DNA to the ribosome. Transfer RNA (tRNA) works by bringing the correct amino acids to the ribosome to build proteins. Ribosomal RNA (rRNA) is a part of the cell that makes up the ribosome.

Mutations are changes in the DNA sequence. A substitution mutation happens when one base is replaced by another. The substitution mutation is shown by changing one letter in the DNA sequence. A deletion mutation occurs when a base is removed. The deletion mutation affects the DNA by missing a letter in the sequence. An insertion mutation happens when an extra base is added. The insertion mutation shows how an extra letter is added to the DNA sequence.

Mutations can change proteins by altering the DNA code. When a substitution mutation occurs, the protein might have a different amino acid. A deletion mutation can cause the protein to be shorter or completely different. An insertion mutation can affect the protein because it changes the reading frame of the DNA sequence. Proteins are important for cells because they do many jobs, like building cell structures and helping with chemical reactions.

Assignment:

1. **Create Artwork:**
    - **RNA Structure:** Draw or create a model of RNA. Show its single strand and label the parts (like nucleotides, mRNA, tRNA, and rRNA).
    - **DNA Mutations:** Create a visual representation of the three types of mutations: substitution, deletion, and insertion. Show how each mutation affects the DNA sequence and protein synthesis.
2. **Explanation:**

- Write a short paragraph explaining each part of your artwork. Describe the function of RNA and the impact of the mutations on protein synthesis.

3. **Presentation: Gallery Walk**

   - Present your artwork to the class. Explain what you have created and its biological significance.

Sentence Starters: Remember, you don't have to use them all.

- ***RNA Structure Artwork*:**

  1. *"RNA is a molecule that helps cells by..."*
  2. *"In my drawing/model, RNA is shown as a single strand because..."*
  3. *"The parts of RNA I have labeled include..."*
  4. *"Messenger RNA (mRNA) is important because it..."*
  5. *"Transfer RNA (tRNA) works by..."*
  6. *"Ribosomal RNA (rRNA) is a part of the cell that..."*

- ***Mutation Artwork*:**
  1. *"A substitution mutation happens when..."*
  2. *"In my artwork, the substitution mutation is shown by..."*
  3. *"A deletion mutation occurs when..."*
  4. *"The deletion mutation in my artwork affects the DNA by..."*
  5. *"An insertion mutation happens when..."*
  6. *"My representation of an insertion mutation shows how..."*

- ***Explanation of Effects on Protein Synthesis*:**
  1. *"Mutations can change proteins by..."*
  2. *"When a substitution mutation occurs, the protein might..."*
  3. *"A deletion mutation can cause the protein to..."*
  4. *"An insertion mutation can affect the protein because..."*
  5. *"Proteins are important for cells because they..."*

- ***Presentation*:**
  1. *"Today, I will explain my artwork that shows..."*
  2. *"This part of my artwork represents RNA and its role in..."*
  3. *"Here, you can see how mutations like substitution affect..."*
  4. *"The reason why I chose these colors/shapes is because..."*

  5. *"I learned that mutations are important to understand because..."*

Name: _____ Date: _____

Drawing

Name: _____ Date: _____

Reflection

Name: _____ Date: _____

Rubric for RNA and Mutation Art Project

Category	Excellent (5 points)	Above Expectations (4 points)	At Expectations (3 points)	Below Expectations (2 points or less)	Points Earned
RNA Structure Artwork	Highly accurate, detailed, and labeled; shows clear understanding of RNA structure.	Mostly accurate and detailed; most parts labeled correctly.	Adequate representation of RNA structure with some labels.	Inaccurate or incomplete representation; few or no labels.	
Mutation Artwork	Highly accurate representations of all three types of mutations; clearly shows effects on DNA and proteins.	Mostly accurate representations; effects on DNA and proteins are mostly clear.	Adequate representation of mutations; some effects on DNA and proteins shown.	Inaccurate or incomplete representations; effects on DNA and proteins are unclear.	
Explanations	Clear, detailed, and accurate explanations for all parts of the artwork; demonstrates strong understanding.	Mostly clear and accurate explanations; demonstrates good understanding.	Adequate explanations with some accuracy; demonstrates basic understanding.	Unclear or inaccurate explanations; demonstrates limited understanding.	
Presentation	Confident, clear, and engaging presentation; effectively communicates understanding and importance of RNA and mutations.	Mostly clear and engaging presentation; effectively communicates most points.	Adequate presentation; communicates basic understanding.	Unclear or unengaging presentation; fails to effectively communicate understanding.	
Feedback and Critique	Provides insightful and constructive feedback to peers; effectively uses peer feedback to improve own work.	Provides useful feedback to peers; uses peer feedback to improve own work.	Provides basic feedback to peers; makes some effort to use peer feedback.	Provides little or no feedback to peers; does not use peer feedback.	
Connections and Application	Demonstrates strong ability to make connections between new and previous knowledge; effectively applies concepts to the art project.	Demonstrates good ability to make connections; applies most concepts effectively.	Demonstrates basic ability to make connections; applies some concepts.	Demonstrates limited ability to make connections; struggles to apply concepts.	
Total Points					