BIOTECHNOLOGY

Genetic improvement method: genetic engineering

Focus questions	How are breeding techniques being used in agriculture to solve problems? How might we model genetic engineering through paragraph construction?
Vocabulary	GMO, traits, genes

What does **GMO** (genetically modified organism) really mean? There are many different interpretations of this label and not all are accurate. In this activity, you will model a genetic engineer by choosing which sentence or phrase (trait) applies to the genetically modified item you are describing. This exercise is a language model of the process scientists use as they choose which genes to move from one organism to another.

Materials

- Assigned paragraphs
- Computer or paper and pencil for composing paragraphs

Procedure

1. Write out your definition of a GMO (How would you describe a GMO to someone?).
2. Keep your definition to compare to your answer at the end of the lesson.
3. Complete the practice paragraph with your instructor.

Practice: Roundup Ready soybeans

Paragraph A

Herbicide-tolerant crops, known as Roundup Ready varieties, contain a gene that allows them to survive exposure to glyphosate, a broad-spectrum herbicide. This genetic modification enables farmers to spray their entire field with a single herbicide that kills all plants except the modified crops. The simplified weed control reduces the number of herbicide applications needed, lowers overall chemical use, and decreases fuel consumption from fewer tractor passes across fields. Farmers appreciate the flexibility to control weeds throughout the growing season without worrying about damaging their crop, though some scientists caution about potential development of herbicide-resistant weeds.

Paragraph B

Weed control represents one of the biggest challenges in farming. Weeds compete with plants for nutrients, water, and sunlight, significantly reducing crop yields if left unchecked. Traditional farming methods require labor-intensive mechanical cultivation and the careful application of multiple herbicides. Farmers use selective herbicides that kill weeds without harming soybeans. The timing and complexity of weed management made farming particularly demanding.

4. Using the practice paragraph, write your new paragraph below.
   (Use paragraph B as a starting point.)

5. Read your assigned paragraphs.
   a. Analyze your source paragraph: organism with desirable trait (5 min).
      - Highlight the strongest, most interesting "traits" (facts or sentences) in each paragraph.
      - Identify what makes each paragraph unique.
      - Compare the two paragraphs, looking for similarities and differences.
   b. Plan your "modified" paragraph: Organism that would benefit from a desirable trait (5 min) by creating a brief outline.
      - Which trait (sentences/ideas) will you keep from Paragraph A?
      - Which traits will add value or benefit to Paragraph B?
      - How will you combine them to show an "improved" paragraph with new function (more convincing argument)
      - What transitions might you need?
   c. Write your synthesis paragraph (10 min) by combining the sentence from one paragraph to make an improved cohesive paragraph that:
      - Flows naturally (proper transitions)
      - Includes the strongest information from both sources
      - Eliminates repetitive information
      - Creates something better than either original

Reflection

1. Define a GMO based on the information you learned about in your paragraphs.

2. How is this process of combining paragraphs similar to creating a GMO?

3. What are the benefits of combining traits?

4. What challenges did you face?

5. What types of misinformation are most common when people talk about GMOs?

6. Why is verifying sources important before sharing science claims?

7. How does accurate communication about GMOs affect public perception of biotechnology?

8. What is your definition of a GMO now? How does it compare to your definition at the beginning of the activity?

Rubric for self-assessment

Skill	Yes	No	Unsure
I can identify at least 4 strong facts or sentences from each paragraph.			
I can choose one sentence from the “donor” paragraph that will make the “recipient” paragraph stronger.			
I can give specific examples of similarities and differences between the sources.			
I can create a detailed outline showing which traits I'll use from each paragraph.			
I can identify the specific transitions needed to make my paragraph flow smoothly.			
I can explain how combining paragraphs compares to making a GMO.			