

ILA BIOLOGY READING PROCESS SCORING GUIDE

PREPARATION TO SCORE

1. Carefully read the 6 document sections written about genetic engineering. As you read, consider the five sections individually, but also think about how they relate to one another.
2. Show your thinking about the reading by taking notes in the margins or on the texts.
3. This preparation will enable you to interpret the annotations students make with greater insight.

SCORING PROCESS

What are we looking for?

Level of student engagement and problem solving with the text. Specifically, the use of reading strategies that can build understanding of the document content.

You will be reviewing student text annotations (document sections 1-5) carefully in order to score students' use of Reading Strategies.

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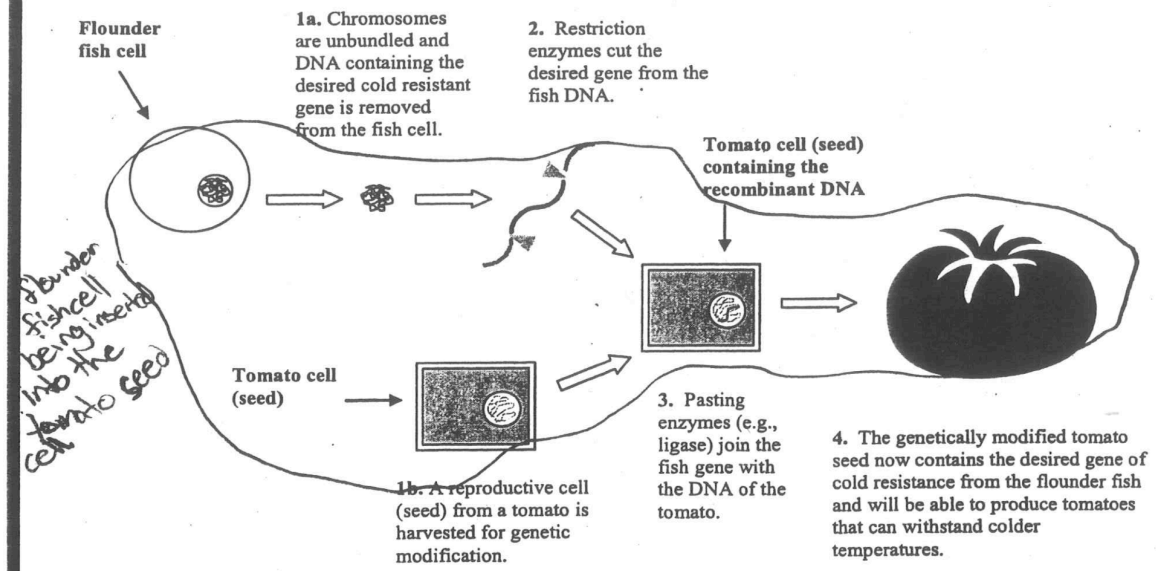
Annotations include:

- **marks** (e.g., underlining, highlighting, circling, connecting lines, brackets, symbols, etc.)
- **comments** (e.g., single words, statements, questions)

Student sample #1: student annotations include underlines and statements

Genetic engineering has been used in many areas related to food and nutrition. In fact, the first commercially produced genetically engineered product was human insulin. In 1982, genetic engineered human insulin became widely used for diabetes treatment. A more recent focus of genetic engineering has been to enhance the nutrient content of food. This area includes the development of oils with reduced saturated fat content and rice that has been modified to have high carotene levels (a vitamin A precursor). Tomatoes have also been altered for the purpose of increasing their cold resistance, thus allowing a longer growing season. This genetic engineering process was accomplished by inserting a specific flounder fish gene (that enables the fish to survive in very cold ocean waters) into the DNA of a tomato seed. Today, scientists continue to investigate how genetic engineering can be used to improve quality of life.

Gene Splicing and Recombinant DNA Used to Improve the Cold Resistance of Tomatoes (Illustration not to scale)



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Student sample #2: student annotations include circles, connecting lines, statements, and underlines

Using Biotechnology to Improve Food Production

Jennifer Flak and Julie Albrecht
Department of Agronomy and Horticulture at University of Nebraska-Lincoln, USA

Method used to study living cells

The Scoop on Biotechnology *? - answer*

What is "biotechnology"? Biotechnology can be defined in a number of ways. It can be defined as "the use of biotechnical methods to modify the genetic material of living cells so they will produce new substances or perform new functions." *also the process of living cells* It also refers to genetic engineering, or more generally, to moving or transferring genetic material between sources. The broadest definition of biotechnology is the use of living organisms to make a product or conduct a process. This includes using bacteria to make yogurt, cheese, and vinegar as well as the use of plant or animal cross-breeding techniques or genetic engineering to produce food with enhanced qualities. Methods of biotechnology include cross-breeding, selective breeding, recombinant DNA, and genetic engineering.

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Types of reading strategies

The purpose of reading strategies is to build understanding of the text. Students may use a range of reading strategies, including:

General reading strategies

- Identifying key vocabulary
- Identifying unknown vocabulary
- Attempting to define unknown vocabulary (e.g., through identifying root words, looking ahead in the text for a definition)
- Identifying the main ideas of the text
- Paraphrasing
- Summarizing
- Predicting the content of text sections
- Identifying confusions
- Using context clues to build understanding

Student sample #3: identifying unknown vocabulary

Genetic Engineering

What is genetic engineering?

The most recent technique in biotechnology is called genetic engineering. It was developed in 1973 and refers to the ability to transfer genetic information between organisms using molecular technology. Genetic engineering physically removes the DNA from one organism and transfers the gene(s) into the genome of another organism. A gene holds information that will give an organism a trait. Using this method a single trait can be added to an organism at a time, making it much more efficient than traditional cross breeding.

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What is insulin?

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Student sample #4: identifying a main idea in the text

The link between biotechnology and food dates back over 3,000 years, yet scientific experiments with biotechnology were not recorded in writing until the 1860's. Gregor Mendel was the first to document the results of his experiments in the carefully planned cross-breeding of garden peas. Mendel used mathematics to conclude that each true-breeding pea plant had two identical copies of an allele for a particular trait. During meiosis, only one copy of each allele went into each pollen or egg cell. He referred to this separation of alleles as the principle of segregation.

Scientific studies did not begin to record until 1860's
Mendel used math/matics to specify true breeding pea plants.

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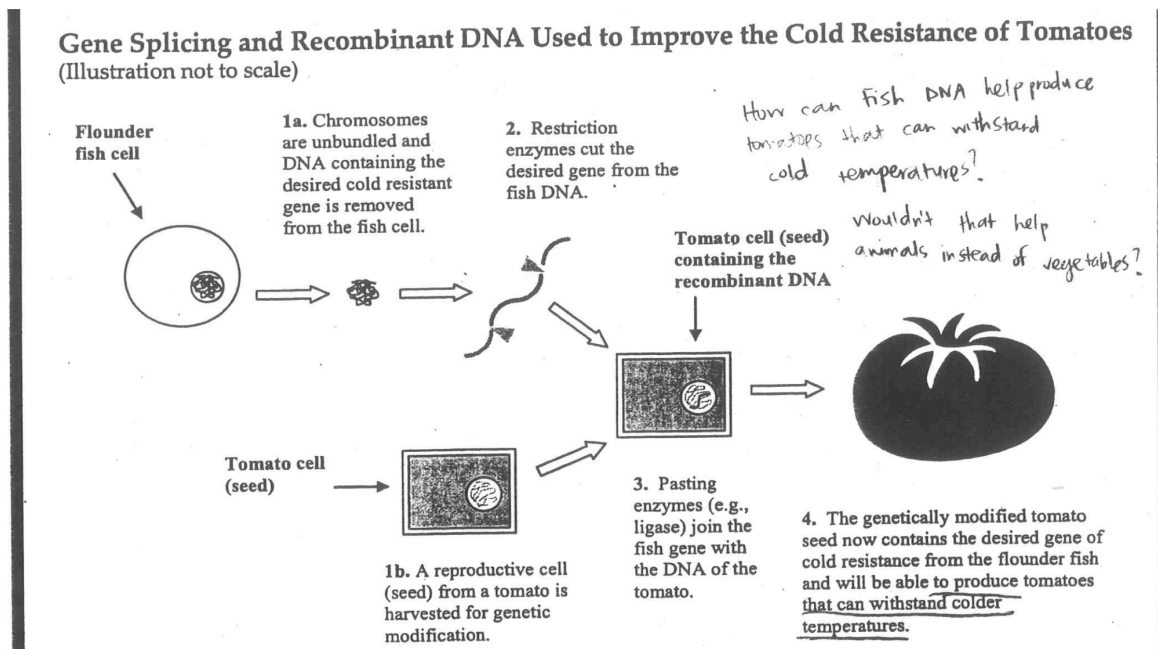
Discipline-specific reading strategies

- Connecting to/applying prior biology knowledge
- Questioning scientific methods
- Attending to and evaluating evidence
- Analyzing graphs, diagrams and other visual aids, including organizing/representing data
- Considering the implications of science beyond the text's scope

A review of reading comprehension carried out by the RAND Reading Study Group cites a tendency of reading growth to slow, and even stagnate, after the elementary grades).¹ The purpose of our work here is to measure the extent to which instructional strategies employed by teachers have advanced the literacy development of adolescents. Empirical evidence indicates that explicit comprehension strategy instruction leads to measurable improvements in students' reading and thinking.

A critical measure of high-level reading skills is the extent to which students use advanced reading strategies. The most skillful readers will emulate scientists, using strategies such as those identified above as "discipline specific reading strategies." Students whose annotations demonstrate use of these strategies should receive the highest scores.

Student sample #5: Questioning scientific method



¹ RAND Reading Study Group (2002). *Reading for understanding: Toward a research and development program in reading comprehension*. Arlington: RAND. <http://www.rand.org/publications/MR/MR1465/>

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Student sample #6: Connecting to/applying prior biology knowledge

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monk who studied/experimented garden peas
- determine traits in certain generation
- heterozygous, homozygous
- phenotype, genotype
- certain allele, trait

Students may write about the reading strategies they used in response to the short answer question on page 15 of Assessment Part 2. These responses will be scored separately. Therefore, responses to this question should not be considered as evidence of reading strategies or influence your Reading Strategies scoring process in any way.

Criteria for rating reading strategies

- **Frequency:** This criterion considers the frequency of annotations across all four documents. Again, students receive credit for both marks and comments.
- **Variety:** This criterion considers the variety of reading strategies evidenced by the annotations. To receive a score of 4, students ought to be demonstrating at least three different strategies (e.g., underlining key ideas, identifying unknown vocabulary, and making connections among the documents).
- **Disciplinary thinking:** This criterion considers whether students utilize reading strategies that are unique to approaching history texts (e.g., identifying bias) or general in that they could be applied to any type of text (e.g., summarizing).