

Vocabulary Focus: Technical Terms Related To Biotechnology

Writing Focus: Correcting Run-On Sentences

Cloning and Genetic Engineering

Gene cloning is the process of isolating and making copies of a gene. This is useful for many purposes. For example, gene cloning might be used to isolate and make copies of a normal gene for gene therapy. Gene cloning involves four steps: isolation, ligation, transformation, and selection.

1. In isolation, an enzyme is used to break DNA at a specific base sequence. This is done to isolate a gene.
2. During ligation, the enzyme DNA Ligase combines the isolated gene with plasmid DNA from bacteria. (Plasmid DNA is circular DNA that is not part of a chromosome and can replicate independently.) The DNA that results is called recombinant DNA.
3. In transformation, the recombinant DNA is inserted into a living cell, usually a bacterial cell. Changing an organism in this way is also called genetic engineering.
4. Selection involves growing transformed bacteria to make sure they have the recombinant DNA. This is a necessary step because transformation is not always successful. Only bacteria that contain the recombinant DNA are selected for further use.

Polymerase Chain Reaction

The polymerase chain reaction (PCR) makes many copies of a gene or other DNA segment. This might be done in order to make large quantities of a gene for genetic testing. PCR involves three steps: denaturing, annealing, and extension. They are repeated many times in a cycle to make large quantities of the gene.

1. Denaturing involves heating DNA to break the bonds holding together the two DNA strands. This yields two single strands of DNA.
2. Annealing involves cooling the single strands of DNA and mixing them with short DNA segments called primers. Primers have base sequences that are complementary to segments of the single DNA strands. As a result, bonds form between the DNA strands and primers.
3. Extension occurs when an enzyme (Taq polymerase or Taq DNA polymerase) adds nucleotides to the primers. This produces new DNA molecules, each incorporating one of the original DNA strands.

Quiz

Circle the letter of the correct choice.

1. *Recombinant DNA*

- (a) Results from the ligation of an isolated gene and plasmid DNA.
(b) Is inserted into a living cell in the transformation process.

- (c) Is screened for in the selection process.
(d) all of the above

2. *The steps of gene cloning are, in order,*

- (a) isolation, transformation, ligation, and selection.
(b) isolation, ligation, transformation, and selection.

- (c) ligation, transformation, isolation, and selection.
(d) selection, transformation, ligation, and isolation.

3. *The steps of PCR are, in order,*

- (a) denaturing, annealing, and extension.
(b) denaturing, extension, and annealing.

- (c) annealing, extension, and denaturation.
(d) extension, annealing, and denaturation.

4. Transgenic crops have been created that

- (a) yield more food.
- (b) resist insect pests.
- (c) survive drought.
- (d) all of the above

5. Ethical, legal, and social issues associated with biotechnology would include questions about

- (a) the safety of genetically modified crops.
- (b) the use of biotechnology in modifying a baby's genotype.
- (c) the ownership of genetically modified organisms.
- (d) all of the above

6. PCR allows scientists to

- (a) rapidly make many copies of a gene or other DNA segment.
- (b) clone a recombinant DNA in bacteria.
- (c) ligate together two pieces of DNA from different sources.
- (d) all of the above.

7. The first human protein produced using biotechnology was

- (a) cytokine.
- (b) insulin.
- (c) DNA Ligase.
- (d) Taq polymerase.

8. Biotechnology methods are used in which of the following? (1) medicine, (2) agriculture, (3) law enforcement.

- (a) 1 only
- (b) 2 only
- (c) 1 and 2
- (d) 1, 2, and 3

Match the vocabulary word with the proper definition.

Terms

Definitions

- | | |
|------------------------------|---|
| a. biotechnology | ___ 1. Enzyme that joins two pieces of DNA |
| b. DNA Ligase | ___ 2. First human protein to be produced by genetic engineering |
| c. gene cloning | ___ 3. Process that makes many copies of a gene or other DNA segment |
| d. genetic engineering | ___ 4. The process of isolating and making copies of a gene |
| e. insulin | ___ 5. The process of placing recombinant DNA into a living cell |
| f. plasmid | ___ 6. Circular DNA that is not part of a chromosome |
| g. polymerase chain reaction | ___ 7. Genetically modified plants |
| h. recombinant DNA | ___ 8. Changing an organism by transforming with recombinant DNA |
| i. transformation | ___ 9. The use of technology to change the genetic makeup of living things for human purposes |
| j. transgenic crop | ___ 10. Made by joining DNA from two different sources |

Fill in the blank with the appropriate term.

1. Transgenic crops are genetically modified with new _____ that code for traits useful to humans.
2. The _____ makes many copies of a gene or other DNA segment.
3. DNA _____ can join together an isolated gene and plasmid DNA.
4. Gene _____ is the process of isolating and making copies of a gene.
5. Gene cloning involves four steps: isolation, ligation, _____, and selection.
6. Plasmid DNA is circular DNA that is not part of a _____.
7. Changing an organism by transforming with recombinant DNA is known as genetic _____.

8. The use of biotechnology has raised a number of _____, legal, and social issues.
9. The first step of the PCR process is _____.
10. _____ DNA is made by combining DNA from two different sources.
11. Biotechnology can be used to transform bacteria so they are able to make human _____.
12. Biotechnology is the use of _____ to change the genetic makeup of living things for human purposes.

Writing

Run-On Sentences

Definition: A run-on sentence either has too many independent clauses or two independent clauses that are not linked correctly.

For example: *She writes the music he plays the guitar.*

'*She writes the music*' and '*he plays the guitar*' are each independent clauses containing a subject and a verb and expressing complete thoughts. '*He plays the guitar*' is an independent clause that can stand alone because it expresses a complete thought and is grammatically correct.

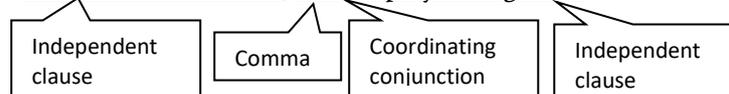
However, in the above example, the independent clause, '*She writes the music,*' incorrectly runs into a second independent clause, '*he plays the guitar.*'

Strategies for Correcting Run-On Sentences:

1. Create a compound sentence.

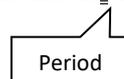
Inserting a coordinating conjunction FANBOYS (for, and, nor, but, or, yet, so) plus a comma correctly links these independent clauses. This sentence structure is called *a compound sentence*.

Correct compound sentence: She writes the music, and he plays the guitar.



2. Separate independent clauses with periods and capitalization, creating simple sentences.

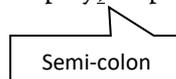
Correct sentences: She writes the music. He plays the guitar.



3. Insert a semi-colon. (;)

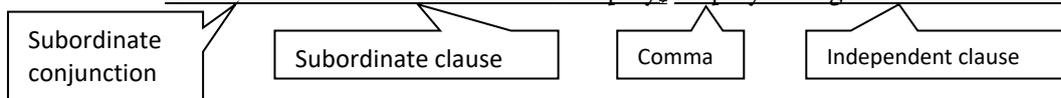
Semi-colons are used to connect independent clauses whose meanings are closely related.

Correct sentence: She writes the music for Coldplay; he plays the guitar for that band.



4. Link ideas using a subordinate clause (dependent clause).

Correct Sentence: While she writes the music for Coldplay, he plays the guitar for that band.



'*While*' is a subordinating conjunction, which makes '*while she writes music for Coldplay,*' a dependent clause. That is, the clause depends on the rest of the sentence for the overall meaning to be

clear. A dependent clause cannot stand alone. Use a comma to separate a dependent clause that appears before an independent clause.

**Note: A sentence constructed of one independent clause and one or more dependent (or subordinate) clauses is called a complex sentence.*

Let's practice

Tick the run-on sentences.

- a. Greece is a fantastic country it has lovely people and great food.
 - b. Despite a long flight, arriving in Athens is always a good feeling.
 - c. She gave me a withering stare I was really scared.
 - d. There is nothing better for a cold than a hot whisky and a big box of chocolates.
-
- a. The chest contained large amounts of gold, rubies, sapphires and other precious stones.
 - b. She ran out of the room the shadows in the corner had scared her.
 - c. I will never fly again it is far too polluting.
 - d. She always recycles her bottles they are collected twice a month.
-
- a. I hate kippers the smell puts me off.
 - b. Bill rushed to his mate's house there was cold beer in the fridge.
 - c. She never walks anywhere she is really lazy.
 - d. Tim loves jelly strawberry is his favorite flavor.
-
- a. The meal was a huge success despite his lack of skill in the kitchen.
 - b. The meal was a disaster he is useless in the kitchen.
 - c. Given his ineptitude with a food mixer, the meal was a surprising success.
 - d. I really enjoyed the smoked kippers that he had prepared the night before.
-
- a. 'Give me that pencil it's mine.'
 - b. She found the wallet he found the money.
 - c. Pirates sailed the seas during the warmer months.
 - d. Leaving the house early, Bill found the roads empty.
-
- a. Tim left his job because he could not stand his boss.
 - b. Tim left his job he could not stand his boss.
 - c. Tim left his job; he could not stand his boss.
 - d. Tim left his job, as he could not stand his boss.
-
- a. She threw down the bottle she hates wine anyway.
 - b. I love wine the French reds are definitely the best.
 - c. Tim prefers a nice pint of bitter, but sometimes likes a lager on warm days.
 - d. She uncorked the new bottle that she had bought in France the previous summer.
-
- a. Tim rushed out of the house; he desperately needed another pint of milk.
 - b. Tim rushed out of the house he desperately needed another pint of milk.
 - c. Tim rushed out of the house because he desperately needed another pint of milk.
 - d. Tim rushed out of the house, as he desperately needed another pint of milk.

Fifteen of the following sentences are run-on sentences. Please correct each one of them on the lines below. Use all the ways to correct run-on sentences at least three times each (period, semicolon, comma plus coordinating conjunction). Five of them are correct. Write a C under each correct sentence.

1. My father retired from the Air Force last year he is writing a book about his experiences.

2. Jeff mowed the grass this morning tonight he will water the flowers and bushes.

3. The small girl seemed to be lost, she was crying and looking for her mother.

4. Mrs. Dawson inherited a large sum of money from her brother she can buy a new car now.

5. Kathy and Jerry worked very hard on their project therefore they felt they deserved a high grade.

6. I can never beat my little brother at video games, he has them all mastered.

7. Dave is flying to Orlando for spring break, he will be gone a week.

8. We are moving to Cincinnati in July I'll go to school there.

9. The storm passed quickly through the area last night, and it caused a lot of damage.

10. We will be on vacation next week we will be unable to attend your party.

11. We bought shoes, luggage, hats, and swimsuits at the mall fortunately, we have a large trunk in our car.

12. I didn't think it would be necessary to take my umbrella; after all, the sun was shining when I left home.

13. Most of my study time is spent on biology it's my toughest class.

14. My car ran out of gas therefore I was late for my appointment.
