

Topic 1.4: How and why are the genes of organisms manipulated?

- DNA of a living cell can be _____, modified, and _____ into another organism.
- _____ technology has many uses.
- The use of _____ has some risks and raises some _____ issues.

Concept 1: DNA of a living cell can be _____, modified, and _____ into another organism.

- _____: the use of technology and organisms to produce useful products
- _____: a process that produces identical copies of genes, cells, or organisms
- **Gene cloning:** manipulating DNA to produce _____ of a gene or another segment of DNA in _____
- Gene cloning is used to mass produce _____ (i.e., i_____).

Steps in cloning a _____:

- 1) Choose a _____ to be used as a carrier of the DNA to be cloned (i.e., _____).
 - 2) A _____ is a small, circular piece of DNA in a _____ cell.
 - 3) Insert a segment of DNA to clone into the _____.
 - 4) This DNA molecule that has genetic material from a different source is called _____ **DNA**.
 - 5) Introduce the _____ DNA into foreign cells through _____.
 - 6) Once inside the foreign cells, _____ of the cloned gene will be made.
- **Transgenic organisms:** organisms that have foreign DNA from a _____ inserted into them
 - These are types of _____ (GMOs).

- Transgenic crops have been genetically modified to be _____ to herbicides, pests, fungus, and viruses.
- _____ has been genetically modified with genes from _____ different plants.
- It has increased iron and vitamin A content to help reduce_____.
- _____ goats are used to produce _____ , human growth hormones, and
- _____ factors in their milk.
- What is the function of a vector in gene cloning?
- Make a T-chart to list the different uses of transgenic plants and transgenic animals.

Concept 2: _____ technology has many uses.

Two biotechnology advancements that help people conceive children:

- _____: a process that involves collecting and concentrating sperm, and then placing it in the female's uterus
 - _____: a process that results in a female's eggs being fertilized by sperm outside of the body
 - **Gene therapy:** an experimental treatment to cure _____ that involves
 - inserting a healthy, normal form of a gene into the cells of _____ that are affected by a disorder
 - Biotechnology can be used to reduce testing time for the presence of _____ in crops for export.
 - **Invasive species:** a species that is not _____ to an ecosystem and can cause harm to it
 - e.g., Asian _____ , Asian gypsy moth
 - Detection of invasive species can be done by extracting _____ from insect eggs from exported lumber.
1. Compare and contrast artificial insemination and in vitro fertilization.
 2. Choose one of the uses of biotechnology discussed in the text and describe the benefits of its use. Do you think there are any disadvantages to its use? Explain.

Concept 3: The use of _____ has some risks and raises some _____ issues.

- Although _____ have helped health care, they pose some concerns as well.
- _____ threats include:
 - Use of herbicide-resistant plants can lead to the use of _____ that will leak into the soil and water systems.
 - _____ can cross to other species.
 - GMO may _____ species in the wild.
- _____ effects include:
 - _____ effects of GMOs are not known.
 - GMOs may produce _____
 - GMO products do not have _____ on them.
- Social and _____ issues include:
 - A lot of money is spent on _____.
 - _____ have too much say over global food market.
 - _____ behind humans using other species for their own benefit.
- Some people have experienced _____ effects with gene therapy. Safer procedures need to be developed.
- Why should social, and economic issues be considered when deciding how to use biotechnology?
- Discuss one thing that concerns you about the use of biotechnology. Justify your concern with evidence collected from this concept.

Topic 1.4 Summary: How and why are the genes of organisms _____?

DNA of a living cell can be _____, modified, and _____ into another organism.

DNA _____ has many uses.

The use of _____ has some risks and raises some _____ issues.