

Name: _____

WebQuest: Genetically Modified Organisms

Introduction: This webquest will explore two of the main uses for genetic modification of organisms:

- 1) Increasing our food supply and enhancing the nutritional value to ensure that the basic requirements of all individuals worldwide can be sustained.
- 2) Improving the health and quality of life, as well as decreasing the incidence of disease, with the development of pharmaceutical medicines, vaccines, and a healthier diet.

Even though there are obvious benefits for humans from these scientific developments, many people will still argue that the long-term effects outweigh any benefits. By the time you have completed this webquest, you will be able to make a more informed decision and form your own opinion based on the information provided from several different sources.

Part 1—What are Genetically Modified Organisms?

Copy and paste the following website into your browser. Read the article and answer the questions below.

http://web.ornl.gov/sci/techresources/Human_Genome/publicat/hgn/v12n1/07gmorgs.shtml

- 1) How is biotechnology different from genetic modification?
- 2) What is the purpose of recombinant DNA technology?

Use the following link (<http://www.isaaa.org/resources/publications/briefs/44/executivesummary/>) to answer the following:

- 3) Which countries were responsible for growing the most biotech crops in 2012? How many hectares were devoted to these crops?

Country	Percentage

- 4) What types of crops made up the majority of these GM crops?

- 5) What are the 5 ways biotech crops have contributed to sustainability?
- a)
 - b)
 - c)
 - d)
 - e)

Use the following link to answer the next set of questions:

<http://www.ecologyandsociety.org/vol4/iss1/art13/>

- 6) Name 8 benefits of GM organisms.

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)

- 7) Name 5 controversial issues associated with GM organisms.

- a)
- b)
- c)
- d)
- e)

- 8) Does the law in our country require genetically modified foods to be identified on the label?

Part 2 – Exploring A Few Genetically Modified Organisms

A) GoldenRice

Copy and paste the following website into your browser. Read the article and answer the questions below. <http://www.goldenrice.org/>

- 1) Name 4 nutrient deficiencies that are common in children around the world.
 - a)
 - b)
 - c)
 - d)
- 2) What health problems can result from these deficiencies?
- 3) Describe what types of foods people should eat regularly to prevent nutrient deficiencies.
- 4) Rice plants naturally produce Vitamin-A, however, regions of the world where rice is a staple food often have high numbers of people suffering from Vitamin-A deficiency. Why?
- 5) What three health risks have been associated with small children that are Vitamin-A deficient ?
 - a)
 - b)
 - c)
- 6) How many genes did scientists have to insert into rice to make “Golden Rice”?
- 7) What do these two genes do?

B) **Dolly**

Copy and paste the following website into your browser. Read the article and answer the questions below. <http://www.understandinganimalresearch.org.uk/how/areas-of-research/animal-cloning/>

- 1) Cloning creates a _____.
- 2) What kind of animal is Dolly?
- 3) Are there any natural clones? If so, what are they?
- 4) How many attempts did it take to create Dolly?

- 5) Scientists created Dolly using the following procedure:
- The _____, which contains almost all of the genes, from an adult udder cell was injected in to an unfertilized _____ that had previously had its removed.
 - The newly created cell was then shocked with an _____ to cause the nucleus to fuse to the cell.
 - The nucleus, containing the DNA, came from a _____ sheep.
 - The newly created embryo was implanted into a _____ sheep after it was cultured for _____ days to ensure it divided and developed normally.
- 6) Why do scientists want to be able to clone?
- 7) How has cloning been used in medical treatments?
- 8) How can cloning be used to treat infectious disease or cancer?
- 9) What are the other uses for cloning?
- 10) What are the possibilities of cloning humans? Why?
- 11) What type of cloning did President Clinton endorse? Describe the program.

C) Pesticide Resistant Crops

Copy and paste the following website into your browser. Read the article and answer the questions below. http://www.gmo-compass.org/eng/agri_biotechnology/breeding_aims/146.herbicide_resistant_crops.html

- How can too many weeds affect crop yield?
- Selective herbicides are only able to kill specific types of plants and often leave some weeds in the field to continue to grow. Why would a farmer choose to use a selective herbicide?
- Non-selective or broad-spectrum herbicides will kill all types of weeds. Why can't farmers use this type of herbicide without using GM crops?

- 4) Explain how GM crops allow for better weed control with less work for the farmer.

- 5) What are two other advantages of using herbicide-resistant GM crops?
 - a)
 - b)
- 6) What are three potential problems some people foresee happening if GM crops continue to be grown?
 - a)
 - b)
 - c)

D) **Vaccines and Medicine**

Copy and paste the following website into your browser. Read the article and answer the questions below.

<http://www.mfe.govt.nz/>

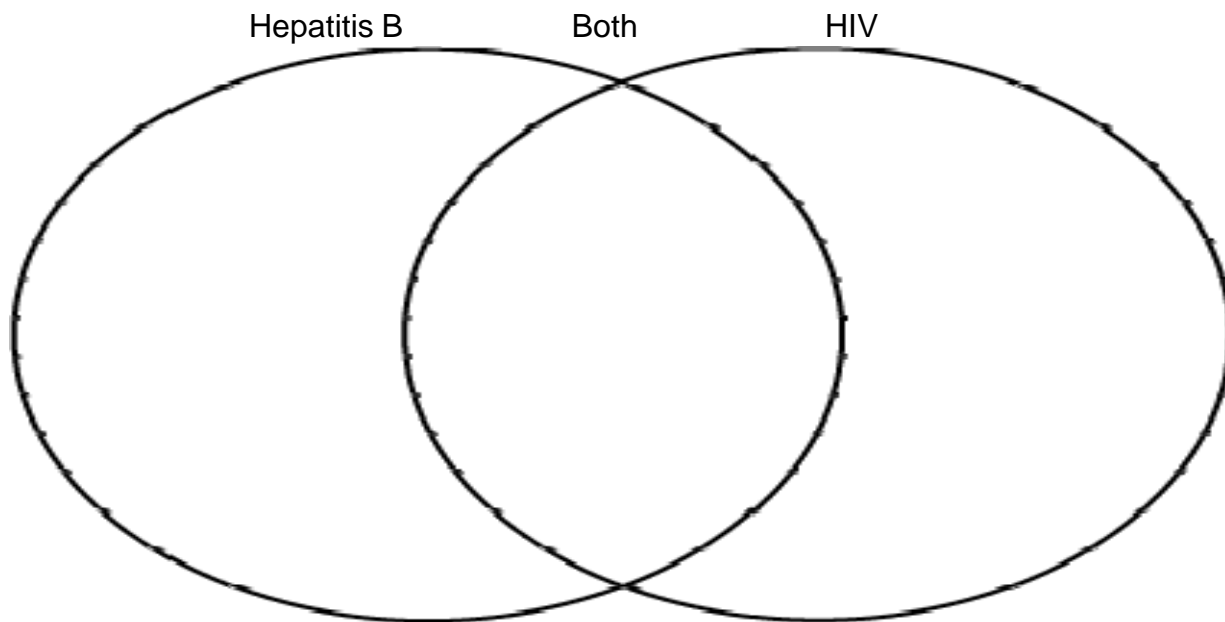
You will have to use the search function to find your topics.

- 1) Name 3 ways that genetic modification is used in medicine.
 - a)
 - b)
 - c)
- 2) What is the Human Genome Project? What is it being used for?
- 3) Name 5 diseases that genetic modification can help to prevent or cure.
 - a)
 - b)
 - c)
 - d)
 - e)
- 4) Explain how vaccines work.

Part3–Creating AGMVaccine

Copy and paste the following website into your browser. http://www.pbs.org/wgbh/nova/bioterror/vacc_flash.html

- 1) Click on the Subunit Vaccine for Hepatitis B (5th box across). Read the description and follow the directions provided in the pop-up box to “create” the vaccine.
- 2) Click on the Naked-DNA Vaccine: HIV (6th Box across). Read the description and follow the directions provided in the pop-up box to “create” the vaccine.
- 3) Compare and contrast the two vaccines in the Venn-Diagram below.



Part 4 – Exploring the Current Status of GM Foods

Copy and paste the following website into your browser. Read the article and answer the questions below.

<http://www.agnet.org/library.php?func=view&id=20110721165744>

- 1) Which 5 companies own the most agro-biotechnology patents? How many patents does each own?
 - a)
 - b)
 - c)
 - d)
 - e)

- 2) Which company produced 90% of all Gm pesticide-resistant seeds planted?

- 3) What major difference will farmers have to face when changing from growing crops using traditional agricultural methods to using GM crops?

- 4) Why are consumers of GM products concerned about what they are eating?

- 5) Create an argument for either the advantages or disadvantages of GM crops (pick only one side to defend).

Part5–NewCreationsBeingDeveloped

Copy and paste the following website into your browser. Read the article and answer the questions below.

<http://news.discovery.com/tech/ten-genetically-modified-crops.html>

Read the article. Click on the individual pictures at the bottom of the article to explore other organisms that are currently being researched.

Pick any of the 5 organisms from the article and complete the table below. Identify the organism and answer the following questions: 1) What modifications are being made? 2) What desired outcomes are researchers attempting to create or improve?

	Organism	Modification	Desired Outcomes
1			
2			
3			
4			
5			