# READY-MADE RESOURCES

# GMOs

name: _____

date: _____

class: _____

Welcome to the GMOs Student-Led  Assignment, a webquest designed to help you become more aware of the science behind GMOs (genetically modified organisms). Save a copy of this assignment to a cloud storage platform, flash drive or computer. Follow your teacher's directions for submission of your assignment.

Before you begin this activity, you will need a computer with internet access, the DNA lab kit from your teacher, and a writing utensil. Complete the assignment by visiting each of the linked items and answering the following questions. Record your answers in an electronic document or on notebook paper. Follow your teacher's directions for assignment completion and submission.

## Activity 1: Understand the science, part 1

This activity will introduce you to DNA Structure/Biotechnology and give you necessary background information about the topic: **Is There DNA in there?** (**grownextgen.org/workspace/uploads/files/dna-extraction.pdf**)

Be certain to respond to all questions in the lab as you complete the activity. Your teacher will give you directions on the space or area to do so.

## Activity 2: Understand the science, part 2

Watch the **Bozeman video explaining restriction enzymes** (**youtube.com/watch?v=yYIZgS-L5Sc**).
As you watch, complete the following questions:

1. What event allowed scientists to manipulate DNA?

2. How does the analogy of a ransom note apply to DNA manipulation?

3. Describe how each of the following apply to DNA manipulation:
   - Scissors
   - Glue
   - Ruler
   - Copier
   - Reader

4. What words did you hear that you need to look up?

Try it out! Use the two DNA sequences found below to complete this activity.
Use the HindIII (A'AGCTT) restriction enzyme to cut both sets of DNA. You need to cut the DNA so the gene to make the soybeans resist the effects of glyphosate can be inserted.

1. Soybean DNA sequence:

A T T C G A T G A A T T C G A T A A G C T T G A A T T C A G A C A G A C A G A G A A T T C T A A

T A A G C T A C T T A A G C T A T T C G A A C T T A A G T C T G T C T G T C T C T T A A G A T T

2. Bacterium DNA sequence containing the gene that provides resistance to glyphosate (Round-Up Ready gene):

A T T C G A T G A A G C T T A T A T G C T T G A A G C T T G A C A G A C A G A G A A T T C G A A

T A A G C T A C T T C G A A T A T A C G A A C T T C G A A C T G T C T G T C T C T T A A G C T T

Paste the Round Up Ready Gene into the DNA of the soybean sequence using the "sticky ends." Ligas is used to permanently seal these fragments together. Congratulations! You have just performed your first experiment in genetic engineering!

## Activity 3: Explore the concept

Complete the **"What Do You Know About GMOs?" e-learning course** (**http://elearning.grownextgen.org/**) to improve your background knowledge about this topic. This course describes the role of genetically modified organisms in modern agriculture and will help you understand some of the ways the agriculture industry is working to meet this growing demand for safe, affordable healthy food.

After completing the e-learning course, answer the following questions:

1. Record five things you learned from the e-learning course:

2. In what ways has agricultural science helped the world to prepare for feeding 9 billion people by 2050? Use specific examples from the e-learning course.

3. What would you tell a consumer about GMOs after completing the e-learning course?

4. Did your opinion change after completing the e-learning course? Why or why not? Be specific.