## GMO Decisions

## Target Grade Level: 9-12th Grade

## Full Lesson Plan:

## [https://www.iowaagliteracy.org/Article/GMO-Decisions]( https://www.iowaagliteracy.org/Article/GMO-Decisions)

This document is meant for you, the teacher, to use to convert the lesson plan into a virtual learning module for your students. You can use the steps outlined below to create different elements of a Google Classroom lesson or other online learning module. You can also send the steps directly to your students in a PDF, present them in a virtual meeting, or plug them into any other virtual learning platform you use. Find more virtual lessons here: [Virtual Learning.](https://www.iowaagliteracy.org/Tools-Resources/Other/Virtual-Learning)

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| Engage | In this lesson you will explore how genetic engineering can be used as a tool to solve challenges that farmers face, such as crop damage by insects, diseases, and wind; and larger challenges facing our world including hunger, malnutrition, food waste, and climate change.  Before we dive into genetic engineering, let’s see how much you know about how components of an organism are organized. Sort the levels of organization in an organism from smallest to largest.   * [Levels of Organization Sort](https://docs.google.com/presentation/d/1MirsBp98mslYpT2lBFDcwApna8vPn0un_QYZeOwYgtw/copy#slide=id.gbf0e8c1ccb_0_5) |
| Explore | Now, watch these videos and revise your Levels of Organization Sort based on what you learned.   * [Organization of Life](https://youtu.be/HmMeOrgcuKo) * [What is a Chromosome?](https://youtu.be/IePMXxQ-KWY)   Humans have altered the genetics of organisms for thousands of years through selective breeding or crossbreeding. Read this article to learn more about how genetic engineering is used to create genetically modified organisms (GMOs) and how this differs from traditional breeding techniques.   * [Genetically Modified Organisms](https://www.nationalgeographic.org/encyclopedia/genetically-modified-organisms/)   Think about the levels of organization that we reviewed earlier. Through traditional breeding, genetic engineering, and other science practices, we can make changes at various levels.   * Humans manage organisms (plants and animals) through pesticides and herd management. * Humans manage organs with fertilizer (plants) and antibiotics & vaccines (animals) to keep them healthy * Humans can directly manage cells (example: cancer and chemotherapy) * Humans manage chromosomes (example: selective breeding) * Humans manage DNA (example: genetic engineering) |
| Explain | Let’s look at some of the issues facing farmers and our society. Read the Issues document and think about why each issue is important and who is affected. Answer questions 1-3 for each issue on the GMO Decisions worksheet.   * [Issues](https://drive.google.com/file/d/17Wtfc7iqIGDkbYO6jeXPTWDqsWpUaBj7/view?usp=sharing) * [GMO Decisions Worksheet](https://docs.google.com/document/d/178QYOsU8NNDGEcPhe_lWn-JD2NPMUFbecMi0fEkCKgI/copy?usp=sharing) |
| Elaborate | Now, let’s look at some possible solutions to these issues. Read through the solutions and think about what issue it could solve. Answer questions 4-6 for each issue on your worksheet.   * [Solutions](https://drive.google.com/file/d/1YeuknUKJYJkOb7ya98UicF9dm8HOli11/view?usp=sharing) |
| Evaluate | Next, review the results of each solution and match them up to the issue. Answer questions 7-9 for each issue.   * [Results](https://drive.google.com/file/d/1D-_Ohp4-hhP0zO50u3f_b6dGnvVbF_pU/view?usp=sharing)   Answer the review questions on your worksheet and turn in the completed document to your teacher. |