



University of Washington, Dept of Genome Sciences

Developed by WiGS for Edmonds Expanding Your Horizons (EYH)

Leader Sheet

Grade level: 6-8

Title of Lesson	How to Write the Future with Gene Editing
Topic	Genome editing technology and applications
Description	“Learn how YOU can end world hunger, cure diseases like Zika virus, and save the environment using a technology called gene editing.”
Objectives	<ol style="list-style-type: none">1. Ss will learn key terms and concepts governing gene editing technology and specifically CRISPR.2. Ss will develop scientific process skills through a role-playing activity that requires application of genome editing.3. Ss will apply the genome editing process by crafting an “engineered” animal.
Preparation	<ul style="list-style-type: none"><input type="checkbox"/> Lecture slides<input type="checkbox"/> Cards for GMO problem activity<ul style="list-style-type: none"><input type="checkbox"/> Situation cards<input type="checkbox"/> Solution cards<input type="checkbox"/> Beadie baby craft kits<ul style="list-style-type: none"><input type="checkbox"/> Bird pattern pieces<input type="checkbox"/> Beads<input type="checkbox"/> String<input type="checkbox"/> Keychain hook
Hook	Baking analogy
Vocabulary for Lesson	DNA, heritability, gene, gene editing/engineering
Guided Practice	GMO situation/solution strategy game
Independent Practice	Building adaptive birds craft



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Lesson Plan Outline (35 Minutes)

Set up	<p>Arrange desks/chairs in 4 groups</p> <p>Make sure slides work</p>
Intro/Hook: Baking recipe alteration analogy (5 minutes)	<p>ALL: Welcome, seat Ss in 4 groups</p> <p>LEADER: Introduce idea of editing with recipe-alteration prompts:</p> <ul style="list-style-type: none"> • “What could we do if we wanted extra chocolate chips in our cookies?” • “What could we do if we wanted Reese’s Pieces instead?”
Lecture: Slideshow on gene editing (7 minutes)	<p>LEADER: present major concepts</p> <ul style="list-style-type: none"> • Recipes are <u>hereditary</u>, half from mom and half from dad • Recipes are made up of individual units <u>genes</u> • Instructions for pieces and how they make a whole • Recipes are written in <u>DNA</u> • Check for understanding: multiple choice review • <u>Gene editing</u> is like altering a recipe <p>TOGETHER: Group practice with recipe analogy</p> <ul style="list-style-type: none"> • How many changes can you make before it’s totally different? (cookies → cake) • Specificity of changes (chocolate chips → raisins)
Guided Practice: “Real life” GMO problem (10 minutes)	<p>LEADER: Introduce activity, assign problems 1 per group</p> <ol style="list-style-type: none"> 1. Engineer drought resistant plants for climate change 2. Supplement vitamin A deficiency 3. Remove malaria/Zika from mosquitos 4. Protect reefs from ocean warming <p>MENTORS: use solution hints to focus Ss thoughts</p> <p>TOGETHER: Share solutions</p> <p>LEADER: Wrap up discussion points:</p> <ol style="list-style-type: none"> 1. These “solutions” are GMOs <ol style="list-style-type: none"> a. clarify the general idea b. motivations behind GMOs
Independent Activity: Darwin’s Finches craft (7 minutes)	<p>LEADER: Present scenario of adapting birds to new habitats</p> <p>MENTORS: Assist Ss in choosing a color and body type that will help the bird adapt to her new home</p> <ul style="list-style-type: none"> • Body types: http://evsbeadiecrafter.com/beadies/bbbirds.htm • Feather colors • Beak/feet color (yellow, orange)
Conclusion (5 minutes)	<p>Take home messages:</p> <ol style="list-style-type: none"> 1. Idea of of a genome, and how it can be manipulated 2. Thinking scientifically about a problem <p>About Us</p> <p>Questions (lesson related, or not)</p>



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Student-specific considerations:

(STEM for girls)

Keep in mind:

- How will this rising generation of young adults make sense of this new dimension in bioscience?
- How will they develop into the focused investigators, informed consumers, and thoughtful decision-makers of tomorrow?
- Human health applications (trying to avoid due to controversy)
 - Eliminate a patient's cancer
 - Treat muscular dystrophy
 - Give pig organs to humans
 - Treat HIV
 - Treat blindness
 - Edit humans

Information on Edmonds Expanding Your Horizons:

<http://www.edcc.edu/eyh/default.html>



