



**Should Scientists Be Allowed to Edit Heritable Genes?  
A Guide to Having Ethical Discussions in a Middle School Classroom**

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This curriculum unit is recommended for:  
8<sup>th</sup> Grade Social Studies, 8<sup>th</sup> Grade Science, or All Levels Debate Course

**Keywords:** Ethics, Bioethics, Biology, Cells, DNA, Genetics, Debate, Science, History

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:** This unit will cover a broad spectrum of content areas. The goal of this unit is to expand students' knowledge and understanding of controversial and sensitive topics, such as bioethics. Students will learn about the development of genetic research overtime. Students will learn about ethics in the medical and scientific fields. Students will explore general historical significance of scientific and medical research as it pertains to the study of genetics and biology. As a result, students will be able to explain and articulate sound arguments around the topics covered in this unit. Through rigorous research practices and thorough investigations, students will develop arguments and use those arguments in a modified Lincoln Douglas style debate. The hope is that their ability to discuss their research will help with their cognitive abilities to retain the information. Through guided discussions, students will gain better understandings of their own beliefs and views as well as those of their peers. This will in turn provide students with a platform to practice empathy as well as reason to explore science and history. Students will also gain deeper connections between a multitude of content areas to help bridge a cross-curricular divide between science and history.

*I plan to teach this unit during the coming year to 60 students in 8<sup>th</sup> Grade Debate Class.*

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# **Should Scientists Be Allowed to Edit Heritable Genes? A Guide to Having Ethical Discussions in a Middle School Classroom**

*by Arianna Bonner*

## **Introduction**

How far, is too far? In the 1990s blockbuster film, Jurassic Park, Jeff Goldblum's character says, "Your scientists were too preoccupied with whether or not they could, and they didn't stop to think if they should." The character, Ian Malcom, says this just before a genetically modified dinosaur eats him. Jurassic Park is an entertaining fictional movie, but poses a good question, "where do we draw the line with science?"

Such fictional scientific endeavors as cloning, designer babies, and genetic modifications are discussed in mass media as attainable scientific feats. Credible news sources, such as NPR, discuss designer babies as if it is on the foreseeable scientific horizon. News outlets bombard students on a daily basis with fictional realities. These outlets of mass information, which influence popular opinion, throw facts and non-facts at young impressionable minds rapidly through social media. In the age of information, it is vital to teach students how to sift through and use information to support arguments. Such a skill is essential to surviving in a world filled with "fake news" and bad sources. These skills are what will best prepare them to live in a 21<sup>st</sup> century global society.

In this Curriculum Unit, students will work collaboratively to compose arguments that either affirm or negate a topic about genetics. As science progresses, the fictional can seem possible. With genetics as a popular topic in mass media and current news, it is important to provide students with the vocabulary and a platform to speak knowledgeably about these topics. Students will digest teacher provided sources to help them develop their own opinions and find evidence to support assigned opinions about a topic of genetics.

This unit hopes to challenge students in their moral and ethical opinions of the direction of science. Science fiction, when presented in a factual way, can deceptively cause students to think of it as a scientific reality. When given sources that support either side of the argument, this challenges students in their own opinions as well as the opinions of those around them.

As science pushes the envelope on discovery, it causes those involved to question ethical standards of such discoveries. It is pertinent to present students with information about recent scientific debate and allow them a safe space to discuss these topics. The hope being that one day students will grow to adults who can discuss and disagree with civil discourse. Thus, creating a generation of civically minded human beings launched into the future with the tools to tackle our world's biggest problems.

## **Rationale**

There are many reasons to have a discussion around the bioethical standards of editing heritable genes in a middle school classroom. In these formative years, students are learning about anatomy, sexual and reproductive education, and they are beginning to develop political opinions outside their peers or familiar influences. As these opinions develop, it is important to guide their development in an informed and educated way. Having academic conversations based on controversial and relevant topics help students not only form their own opinions but to expose them to other and differing opinions.

Providing students with a platform from which they can voice their opinions is empowering to a child's educational experience. The initial implementation of this unit will take place at, Martin Luther King Jr Middle School (MLK), a Title I school. This means that assumedly the majority of the population are predominantly from lower socioeconomic households. According to demographic reports, students from this school are also from predominantly minority backgrounds. After many anecdotal discussions and encounters with the students at MLK, one will find that majority of students have experienced marginalization and adverse childhood experiences (ACES).<sup>i</sup> Providing students with a platform to connect their life with the content learned in their classes helps them not only to recall the information but also to develop their own opinions in response to the information. The hope is to provide students with the tools necessary to advocate for themselves and others.

The 8<sup>th</sup> Grade science curriculum covers biotechnology as a unit of study. Students learn about Genetically Modified Organisms, Genes, Ethics, and the many uses of biotechnology. The following Curriculum Unit will be taught in conjuncture with the 8<sup>th</sup> Grade science curriculum. Students will be learning about biotechnology in their science classes as they formulate arguments for or against the uses of biotechnology in their debate class. The hope is that through debate, discussion, and research students will have their core content learning supported. The idea is that through academic discourse students will better remember and retain this information, thus improving not only their test scores on their 8<sup>th</sup> grade Science EOG, but also better preparing them for their high school courses and eventually beyond.

This is what students will be using in their science classrooms and the content from which they will be learning. The goal and purpose of this curriculum unit is to connect the debate course to the science course in a cross-curricular way that established and supports the connection of science and real life. Students will be learning about science through historical, literary, political, and global perspectives.

## **Demographics**

According to the school report card, 59.4% of students attending Martin Luther King, Jr. Middle School (MLK) are considered economically disadvantaged. This qualifies MLK for Title I funding. This means that MLK receives federal funding to supplement school's existing programs. MLK provides its students with Free and Reduced lunch programs; all students qualify for Free and Reduced Lunch. The school total population is 973 students. Of these 973 students, 20 identify as Asian, 451 Black, 474 Hispanic, 1 Native Hawaiian or Pacific Islander,

20 White, and 7 other. Inquiring minds can find these demographics on the National Center for Education Statistics website.<sup>ii</sup>

The relevance of these demographics and statistics to a curriculum about genetics is justifiable by the need for fair and equitable health programs in lower income communities. Starting this conversation early in a middle school debate class gives students the knowledge and education to advocate for themselves and their communities. Exploration of a topic about bioethical standards involved in genetic studies exposes students to the historical events and political conversations that have influenced the evolution of bioethical standards in the medical field.

### **Unit Goals**

The topic of the seminar “How to Build a Human” dives into the current political, scientific, and academic discussions surrounding the field of developmental biology. The challenge that has evolved from this seminar is the puzzle of fitting a debate course centered on history into a scientific seminar. Fortunately, the topic of developmental biology is a controversial and relevant topic that would be beneficial to introduce into a middle school debate curriculum. The hope of this unit is to guide students to develop educated opinions on the social justice and ethical conversations surrounding the sciences of human development.

The North Carolina 8<sup>th</sup> Grade Science standards state that students will learn about genetics by the end of the course. This unit provides a bridge between the Science standards and Language Arts standards. It will do this by asking students to produce written arguments in response to a relevant debate about genetics. Students will also learn the historical significance of genetic biology and its impact on humanity. Research in this field has also raised political controversy. Students will bring their knowledge and skills from a multitude of cross-curricular standards to help them master the content taught in this unit.

The conversations happening in our government are often uninformed and lack the scientific support that is necessary to make educated decisions about policy and law. Students will be doing research to guide the development of their arguments. Students in a debate course are required to argue either the affirmative or the negative side of an argument. They receive their position assignment in the beginning stages of the research process. Regardless of student opinion, they will have to write an argument using evidence to support their assigned claims. Through the analysis of potentially opposing opinions to their own, they develop a greater understanding and empathy for opposing views and values.

### **Content Research**

Imagine a world eradicated of all disease. What if there was one cure-all solution for all human ailments. In theory this sounds great; a futuristic utopia where doctors are able to edit human DNA as a means of preventative medicinal science. How could there be anything wrong with this? To be able to prevent disease, pain, or harm to the ones that we love and provide the human race with a cure all formula sounds ideal, in theory. It is, however, akin to when Miss America inevitably answers the question about her thoughts on solving the world problems and she lets

out a resounding, “World Peace!” There is nothing wrong with world peace, but how do we achieve such a lofty goal? What are the ethical concerns accompanying such a lofty goal?

We currently live in a world where we have improved our knowledge of DNA from the early discoveries found through James Watson and Francis Crick’s metal three-dimensional models of DNA to imagining a world where we can manipulate the DNA of embryos to prevent disease.<sup>iii</sup> A world without disease and mutation sounds ideal; however, there are ethical considerations to take into account. When considering the ethics of editing the germline, it is pertinent to recognize a slew of controversial consequences that can occur.

This begs the question of idealization versus reality. Like the age-old colloquialism: If it sounds too good to be true, then it probably is. There are a multitude of concerns that invested parties need to weigh when they make decisions of this kind. For example, take into consideration that the embryo did not consent to the procedure, and the impact will influence generations. Descendants will be the ones dealing with the ramifications of our scientific experiments. Editing DNA to eliminate illness could also allow people to edit DNA for alternative or superficial reasons. What we consider desirable genetic or physical traits could be duplicated in future generations. This could cause bias and increase prejudice. If you can edit DNA to prevent sickle cell anemia, then why not go one-step further and choose your child’s eye color or skin color.

Also, consider the ramifications of an advanced procedure on a free market health care system. Clients with better health benefits could opt into procedures that allow for future generations of their families to receive superior genetic coding. This could increase the ever-increasing societal privilege gap. People, when provided the opportunity, could begin to “other” certain genetic traits.

The practice of eugenics as commonplace could create a dystopia as severe as the unachieved goals of the Nazi regime or Margret Atwood’s *Handmaids Tale*<sup>iv</sup>. When in the hands of corrupt leaders, like those in Nazi Germany, the ability to edit human DNA to achieve the ideal human could turn volatile and perpetuate the idea of a superior race or class. In Atwood’s, dystopian novel adding the ability to edit heritable genes would increase the incentive to place certain people in classifications or labeling them as “other.”

No other time in our lives are labels and imperfections more noticeable than that of adolescence. At the youthful ages of 11-18, the cognitive abilities of the brain hyper focus on and rationalize material as well as physical measures of success. In middle school, it makes sense to talk about the potentials of editing heritable genes, especially the physical ones. If you ask a middle school student what they would edit about themselves, I guarantee the list would be a mile long. Instead, this unit provides these same students with a platform of empowerment from which they can speak about the traits that make them special or unique. This platform causes students to question what society deems normal, and to question what society will tolerate in general. The ethics of scientific research is so controversial and relevant that it is important to begin discussing with students early. The hope is to guide them down a path where their decisions and thoughts as adults will be more ethically sound and based in scientific rational rather than prejudice or farce.

In the North Carolina 8<sup>th</sup> Grade Science Curriculum, students learn about biotechnology and its impacts on society. Prior to beginning a seminar about biology and genetics, I knew next

to nothing about the subject my students would be studying. My only experience with this subject being my own 8<sup>th</sup> grade science experience, which was arguably eons ago. This seminar has opened my eyes to the impact science is having on everything that we put into and do to our bodies as well as the functions of our bodies. The seminar discussions have even caused me to reevaluate my own perceptions of what constitutes a normal body or human.

In a matter of months, my students will travel to their science classes to learn all about how biology plays a role in our daily lives. The biological factors that dictate our genetic makeup are also topics of controversy. How we use biology and science in the future brings about ethical questions. Because these controversial questions are on the forefront of scientific discovery, it is important to expose students to the implications and possibilities science could bring at an early age. If you get them thinking about it early enough, then the hope is that their future adult decision-making is through a more educated lens.

The resolution argued by students in this curriculum unit, “Scientists should be allowed to edit heritable human genes,” evolved from a discussion that stemmed from browsing an article, which discusses the “Dual-use dilemma” in the scientific world. In Michael J. Selgelid’s “Governance of dual-use research: an ethical dilemma,” the dilemma in question is that scientific methods can be used for both good and harmful purposes.<sup>v</sup> This brings us back to the quote in the introduction from Jurassic Park, “Your scientists were too preoccupied with whether or not they could, they didn’t stop to think if they should.”

This all to say, where do we draw the line? Selgelid argues and questions the regulation of scientific theory and the ethical dilemmas that consequently occur. Government regulation of science could be an answer, but this could also be a source of corruption and bureaucratic demolition of the autonomy many scientific researchers often enjoy. It is arguably necessary to have regulations, guidelines, and laws that prevent science from “going too far.” However, the questions becomes, How far is too far and by what means are we willing to stifle scientific discovery for the sake of safety?

There are scientific endeavors that once seemed only possible in the imaginations of those invested in science fiction. We are now able to use viruses as weapons of mass destruction and popular news outlets discuss designer babies as a fathomable future. If we can have cellphones inspired by Captain Kirk’s portable phone on Star Trek in the palm of our hands, then what is our limit? Some would argue that human potential is limitless. Nevertheless, this still begs the question: if our science has the potential to do harm, is it worth pursuing?

When science can cause damage, then the ethical nature of the experiment becomes questionable. According to the definition of ethics as found in the Miriam-Webster dictionary ethics has three potential definitive uses:

First, “Ethics: the discipline dealing with what is good and bad and with moral duty and obligations.”<sup>vi</sup> This first definition framing similarly to Selgelid’s “Dual-use Dilemma.” If we know it can be used for good but has the potential to cause harm, then it is a matter of ethics. The society’s ethical decision-making is blurred when the nature of the science in question falls within the boundaries of the dual-use dilemma. Second definition, “as a set of moral principles: a theory of system of moral values.” This second definition tends to fall in line with materialistic principles, work ethic, and religious ethics. “2b. The principles of conduct governing an individual or a group. 2c. a guiding philosophy. 2d. a consciousness of moral importance. Third

definition, A set of moral issues or aspects (such as rightness) examples found and debated in the ethics of human cloning.”<sup>vii</sup>

All of these definitions of ethics are applicable to a discussion about the bioethical standards accompanying editing heritable genes. Even when just simply discussing whether to publish scientific articles, one must consider the ripple effect that will ensue. The scientific community has accepted a general understanding that certain things just should not be published for general public consumption. The “Statement on Scientific Publication and Security” in *Science*, *Nature*, *The Proceedings of the National Academy of Sciences*, and the *American Society for Microbiology* journals indicated that, “these Journals would Screen submissions for ‘safety and security issues’ and that when harm of publication outweighs the potential societal benefits...the paper should be modified or not published.”<sup>viii</sup> If we feel this strongly about the publication of theory and experimentation, then maybe there is cause to refrain from editing heritable genes.

Bioethics of gene therapy or the ethics of medical and biological research is breaching the surface of mainstream scientific discovery. Biochemist Lenny Moss claimed, “The idea of ‘the gene’ has been the central organizing theme of the 20<sup>th</sup> century biology.”<sup>ix</sup> If this is such a prevalent theme in modern science, then it is pertinent to discuss in a unit on the ethics of science. The gene dominates the mainstream discussion of modern medicine and science journals. Therefore, its ethical periphery must as well.

Ethics is an interlacing seam that finds itself woven into the framework of our most modern scientific publications. This leads us back to the ethical question, if we have the potential to wipe clean the human genome of harmful genetic mutations and eradicate all potential diseases, then should we? Currently there are studies and experiments being conducted that have proven potential to do just that. However, “Ethical concerns arise when genome editing, using technologies such as CRISPR-Cas 9, is used to alter human genomes.”<sup>x</sup>

In the United States, it could be argued that the roadblocks of government would stagnate the potential of scientific research and studies. On the flip-side, with less regulation we can end up in situations where our science causes more harm than it does good. For example, in China a scientist took it upon himself to conduct an experiment on two young girls. His aim is to take preventative measures toward eliminating HIV/AIDS from humanity. He Jiankui used CRISPR Case 9 to create genetically modified embryos for twins to modify their immune systems to prevent the contraction of HIV/AIDS. This controversial study has caused waves of ethical discussions around the world. The scientist conducted the experiment without much regulation. It is now being questioned whether these twins will actually be immune to the disease or not. <sup>xi</sup>

Even in the US, the CRISPR tool is being looked at as a preventative tool to eradicate genetic disease. Scientists can use Clustered regularly interspaced short palindromic repeats (CRISPR) to alter the DNA of a patient. “In a first, Doctors in U.S. use CRISPR tool to treat patient with genetic disorder.” Sickle cell anemia is a horrific genetic disease, which causes a significant amount of pain to people who suffer from the genetic mutation. Scientists see the potential to alleviate much of the pain as well as the potential to eradicate the disease with the use of CRISPR. Scientist should be able to correct disease-causing mutations in the germline with the use of this tool. In theory, the ability to edit the germline should lead to positive outcomes such as the elimination of many genetic diseases. <sup>xiii</sup>

The unique Henrietta Lacks case highlights a key moral dilemma in scientific research. Henrietta Lacks cells (HeLa) are responsible for a lot of cell research; however, the discovery and use of her cells are controversial. Students in 8<sup>th</sup> grade science classes often learn about her case to help them understand bioethics and its role in genetic research. The controversy being that she was not informed of how her cells would be used. In the same strain that future generations will not be informed of how their genetic makeup was altered to prevent or cure disease. The rights to her biologically unique DNA became an ethical concern. Medical professionals are now required to ask permission of all people regardless of their background before using their biomedical technology for experimental use.<sup>xiii</sup> Therefore, due to our concern about the legal ramifications following the Henrietta Lacks case, should we too be concerned about future generations' willingness to participate in such scientific experimentations?

Is it ethical to permanently change or alter someone's DNA before they are born if we do not have their consent or permission? In Vitro Fertilization (IVF) is becoming a more commonplace practice in modern family making. As we have children later and fertilization difficulties become more prevalent, IVF is a medical solution to many families who are seeking to build families. IVF also opens doors to many farfetched possibilities that once seemed only possible in science fiction. The ability to create your family in a petri dish could also lead to choosing certain characteristics that your families may have or pass on the future generations.

The myth of the normal body plastered across the cover of many magazines, advertisements, television series, and Hollywood. The normalcy of human physical features dangerously align with eugenics movements that inspired some of the most notorious genocides. Changing heritable genes could encourage the elimination of people deemed "other." Defining a normal human is difficult when so many people have such varying physical features. However, when we define normal and then replicate our definition normal by design, then we have entered dangerous territories conducive to bias, prejudice, and tribalism.

When discussing genetic modifications of any kind it is relevant to explore the extremes. "Eugenics' is a term loaded with historical significance and a strong negative valence. Its literal meaning—good birth—suggests a suitable goal for all prospective parents, yet its historical connotations tie it to the selective breeding programs, horrifying concentration camps, medical experiments, and mass exterminations promoted by Germany's Nazi regime in World War II."<sup>xiv</sup> Stanford's encyclopedia poses a good point. It is important to promote a healthy future for humankind but also significant to remember the horrifying dangers that come from misidentifying "good" human traits and eliminating what certain cultures and societies deem as "bad" traits. The Nazis idea of one pure race was obscure and misguided. However, it is important to assess genetic traits to see which will be evolutionarily beneficial. Natural selection does much of this for us, but skipping a step through editing DNA could alleviate generations of epidemics and plagues.

Ensuring the future generations success could be considered a moral obligation of all parents. Parents decide where their children go to school, what food they eat, the environments they are exposed to; why not add what genetic traits are passed down. This is not too far off from Plato's state run program of mating to achieve the best genetic qualities.<sup>xv</sup> As well as Francis Galton's belief that the human race could be improved through selective breeding.<sup>xvi</sup> Both the philosopher and eugenicist posed questions that are being revisited today through modern scientific discoveries. Being able to edit heritable DNA gives humans an advantage over other



species because we skip over natural selection all together. Being able to select traits to ensure the successes of future generations eliminates certain steps in the evolutionary process.

Gregor Mendel discovered the pattern for genetic traits while observing beans in his garden. Observation of hereditary traits lead to Reginald Punnett's squares for predicting what offspring will look like when mating plants or animals. Knowing the traits and the potential to pass down the dominant or recessive genes is important when thinking about the long-term success of a species. No species breeds for extinction. Modifying genetic traits to give humans a leg up in the natural selection process seems like basic survival strategies when looked at from a biological standpoint. Punnett Squares predicting what offspring will look like evolved our general understanding of how certain physical traits are passed down. Mendelian Genetics give us a greater understanding of the human genome in general.<sup>xvii</sup>

In the 8<sup>th</sup> Grade science textbook biotechnology is defined as "the use of living organisms in production and manufacturing processes."<sup>xviii</sup> Modification of our food, modification of our medicine, modification of a general organism could be considered biotechnology. This is a yet another way that the human species has worked to genetically advantage themselves against possible extinction. To study these processes gives scientists, philosophers, historians, and anyone seeking to understand the human evolutionary process and better grasp on basic genetic traits passed down through generations.

The humble beginnings of genetic research has led to novel innovations and a potential to alleviate pain and eradicate many diseases from much of the world. Epidemiology as a branch of medicine that deals with the incidence, distribution, and possible control of diseases and other factors relating to health works to vaccinate and eradicate disease. The potential to prevent disease prior to the need for vaccination, as in the beginning of life and alteration of human DNA, could prove revolutionary.

People living in harsher environments have stresses on their bodies that can cause heritable genetic traits that could be detrimental to future generations. Biology dictates the success of certain genetic traits determined by environmental successes. This is true for most species. They will pass down the traits that will help future generations survive. Therefore, it must be considered for adapting even further to genetically advance human generations to survive long into the future.

So, just what are the bioethical ramifications of editing heritable human genes? Making modifications to heritable human genes could have irreversible impacts on future generations. There could be unknown consequences that will only show up as humanity evolves. There is potential to create mutations that could far surpass the worst modern diseases. The potential for risk is great. However, the debate remains inconclusive as scientific communities still work to seek the most advance treatments for biological disease.

## **Instructional Implementation**

*Collaboration with 8<sup>th</sup> Grade Science- taught in alignment with 8<sup>th</sup> grade curriculum at MLK Middle School.*

Teaching Strategies

*Cornell Notes*

Students will take Cornell Notes to help guide their learning process. This style of notes helps students to organize the information provided. It helps guide them through the information in a way that is accessible. Students are better able to sift through their notes when they are organized and structures. Students will receive handouts that will guide them through the notetaking process.

### *Turn-and-talk*

This strategy is exactly as it sounds. Students will to turn to their neighbor and discuss different topics. When structured correctly this can act as a great check-for-understanding. Students use teacher-provided sentence stems and questions to guide their conversation. Then students share out what they learned from their partner.

### *Exit Ticket*

Students will be asked to answer an essential question at the end of every lesson. This question should encompass what was learned during that class period. Students show mastery of content through their ability to correctly respond to the review question. If students do not show mastery, then this is a great opportunity for the teacher to re-explain the content the next class.

### *Carousel Debate*

Students will have to opportunity to look at examples of biotechnology in small groups. Once students have had a written discussion at their tables about the picture in front of them, then students will walk around the classroom leaving comments on the papers around the room.

### *Socratic Smack Down*

This activity will act as a precursor to the final debate. Students will be able to use their research and provided texts to help them discuss the final resolution. Students will use this opportunity to test out evidentiary support and arguments. The instructions and materials for this activity are attached in the Appendix.

### *Team Deliberation*

Students will work in teams to deliberate the topic. Students will be researching and practicing each lesson to better support their arguments. Each students has a different role on the team. Ideally, teams are divided into 3-4 students. The speaker will be the student responsible for debating and presenting information; it is important that the speaker is knowledgeable of the material. The researcher will be in charge of the team's resources and will be the point person for looking up new information. The scribe will be the person who takes notes on all material and is responsible to compiling all of the information into an argumentative statement that can be used during the debate by the speaker. The timekeeper is responsible for keeping everybody on task and keeping track of the time.

At the end of the unit, each team will have to grade each individual member. Students who do not pull their weight will receive a lower grade.

### *Debate*

For the purposes of this unit, the debate will run a little differently than a traditional debate. The purpose of the debate is to help students have an academic conversation about a topic. Each team

will be assigned either affirm or negate. Students arguing the affirmative are arguing in support of the resolution. Students arguing negate are in opposition to the resolution. The resolution is the overarching topic for the unit. Students will refer back to the resolution for the entirety of the unit. Each lesson will refer back to the unit as an anchor. All research and information should be in support or opposition of the resolution.

### Lessons/Activities

*All the below lessons are created with the assumption that students have been previously taught basic debate and argument frameworks. If necessary, it is recommended that the instructor add a lesson about “how to debate.”*

### Lesson Plan Day 1-Introduction to ethics and background knowledge

Do Now	<p><i>This part of the lesson will introduce the content and skills covered during the lesson.</i></p> <p>Students will have 5 minutes respond to the following question in 3 or more sentences:</p> <ul style="list-style-type: none"> <li>• If you could have any super power, what would it be and why?</li> </ul> <p>This will lead to a discussion about how we inherit certain genetic traits. If we could inherit superpowers, then would there be consequences?</p>
Activator	<p><i>This part of the lesson will garner student interest in the topic to be covered.</i></p> <ul style="list-style-type: none"> <li>• Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate. Rules for this game can be found in the appendix.</li> </ul>
Direct Instruction	<p><i>Teacher will provide students with directions or information to help them during the lesson.</i></p> <ul style="list-style-type: none"> <li>• Teacher will introduce lesson through a brief lecture introducing key terms and content necessary to debate and research throughout the unit.</li> <li>• Key Term/ Concept: Ethics</li> <li>• Key Term/ Concept: Bioethics</li> <li>• Key Term/ Concept: DNA</li> <li>• Key Term/ Concept: Genes</li> <li>• Key Term/ Concept: Cells</li> <li>• Key Term/ Concept: Biotechnology</li> <li>• Key Term/ Concept: Genetically Modified Organisms</li> <li>• Key Term/ Concept: Punnett Squares</li> <li>• Key Term/ Concept: “Dual-Use Dilemma”</li> <li>• Students will take Cornell notes to introduce the Unit and Key Terms to be covered during Unit. Handouts for Cornell Notes can be found in the appendix.</li> </ul>
Group Work	<p><i>Students will collaborate with peers to apply knowledge gained from direct instruction.</i></p>

	<ul style="list-style-type: none"> <li>Students will work in pairs to complete vocabulary booklets based on Cornell notes. Vocabulary booklet handouts can be found in the appendix.</li> </ul>
Independent Practice	<p><i>Students will show their understanding of content taught in lesson. Teacher will check for understanding of skills and content.</i></p> <ul style="list-style-type: none"> <li>Students will complete concept bundles using key terms from vocabulary booklets and Cornell notes. Concept Bundle handouts can be found in appendix.</li> </ul>
Exit Ticket	<p><i>Informal assessment that will summarize the lesson and show student understanding.</i></p> <ul style="list-style-type: none"> <li>What are some ethical concerns if scientists edited human genes to pass down super hero traits?</li> </ul>

### Lesson Plan Day 2-Application and discussion

Do Now	<p>Students will enter and be asked to read and annotate the following statement. Then students will re-write the statement in their own words:</p> <p>“Some human medical disorders are caused by damaged or missing genes. In the future, it may be possible for scientists to treat such disorders by inserting properly functioning genes into the cells of their patients. Medical researchers can also use biotechnology to produce medicines and vaccines. By genetically altering and then culturing bacteria researchers can get bacteria to produce insulin needed by diabetics. Bacteria can be genetically manipulated to produce new forms of antibiotics that will work against organisms that have become resistant to current antibiotics Medicines could be tailored to specific diseases, reducing the risk of unwanted side effects.”<sup>xix</sup></p>
Activator	<p>Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.</p>
Direct Instruction	<p>Teacher will introduce lesson through a brief lecture introducing key terms and content necessary to debate and research throughout the unit.</p> <ul style="list-style-type: none"> <li>Key Term/ Concept: Heritable Genetic Traits</li> <li>Key Term/ Concept: Sickle Cell Anemia Case in Nashville</li> <li>Key Term/ Concept: Henrietta Lacks Case</li> <li>Key Term/ Concept: Chinese Doctor HIV/ Aids</li> </ul> <p>Students will take Cornell notes to introduce general application of material learned in previous lesson. Handouts for Cornell Notes found in the appendix.</p>
Group Work	<p><i>Carousel Debate</i><sup>xx</sup></p> <p>Instructions modified from Academic Conversations Book:</p> <p>Materials Needed: Poster paper, markers, post-it notes, clip-boards, graphic organizers, images and quotes to place in the middle of each poster.</p>

	<p>Instructions:</p> <p>Step 1: Students will begin in groups of 3-4</p> <p>Step 2: Once students are in groups, teacher will explain that this is a silent activity and the only way students can communicate is through writing on the posters.</p> <p>Step 3: Each group is given markers of the same color (i.e. group 1=blue, group 2=green, etc.)</p> <p>Step 4: At each groups table the teacher will place a poster with a quote or image. Groups will have 5 minutes to silently reflect on the document in front of them by writing on the poster. Students should be encouraged to write responses to their peers observations.</p> <p>Step 5: Once 5 minutes are up groups will move to the next table and complete the same task until they have responded to every document.</p> <p>Step 6: Once students are back at their original tables students will be given 3 post it notes each. Posters will be hung around the room. Students will have 7 minutes to silently walk around the room and read the conversations on the posters. Students should analyze the conversations and then write their thoughts about the conversations on the post-it and place it on the poster.</p> <p>Step 7: The teacher will walk around the room and read out loud some of the students reflections and general thoughts.</p> <p>Teacher will ask students to turn-and-talk to their groups for 2 minutes about how a written debate is different from an oral debate.</p> <p>Student groups will share out what they discussed.</p> <p>Teacher is looking for observations about using the documents as evidence to support their thoughts and ideas.</p>
Independent Practice	Students will complete the Carousel Debate Reflection Sheet found in the appendix.
Exit Ticket	What steps can scientists take to potentially treat medical disorders like the ones discussed in class today?

### Lesson Plan Day 3- Team deliberation and research

Do Now	<p>Students will be asked to respond to the following question in complete sentences. Students will have 5 minutes to answer the question:</p> <ul style="list-style-type: none"> <li>• Is it ok for scientists to change people’s genes if it prevents genetic disease? Explain.</li> </ul>
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	<p>Teacher will introduce the debate resolution. Teacher will explain the rules of class debates. Teacher will review fundamentals of creating an argument.</p> <ul style="list-style-type: none"> <li>• Key Term/ Concept: Resolution</li> <li>• Key Term/ Concept: Claim</li> <li>• Key Term/ Concept: Warrant</li> </ul>

	<ul style="list-style-type: none"> <li>• Key Term/ Concept: Impact</li> <li>• Key Term/ Concept: Argument</li> <li>• Key Term/ Concept: Affirm/ Negate</li> <li>• Key Term/ Concept: Debate Rules</li> <li>• Key Term/ Concept: Research expectations</li> <li>• Key Term/ Concept: Group Work and group assignments</li> <li>• Key Term/ Concept: Resolution for debate: “Scientists should be allowed to edit heritable genes.”</li> </ul>
Group Work	Teacher will provide students with general research materials and facilitation. Students will spend the remainder of class beginning their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate).
Independent Practice	Students will spend the remainder of class beginning their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate). Each individual students will be responsible for filling out the claim/warrant/impact hand out found in rubric. Due on the last day of debate preparation.
Exit Ticket	What is one piece of evidence you found to support your teams side?

#### Lesson Plan Day 4- Team deliberation and guided research

Do Now	Students will have 10 minutes to read and annotate the following article: <a href="https://www.npr.org/sections/health-shots/2017/02/14/514580162/scientific-panel-says-editing-heritable-human-genes-could-be-ok-in-the-future">https://www.npr.org/sections/health-shots/2017/02/14/514580162/scientific-panel-says-editing-heritable-human-genes-could-be-ok-in-the-future</a>
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will spend 5-10 minutes reviewing important things to remember when conducting research for a debate. <ul style="list-style-type: none"> <li>• Good sources v. bad sources</li> <li>• Quality and quantity of evidence</li> <li>• Always ask yourself the question, “How does this piece of evidence support my claim?”</li> </ul>
Group Work	Students will spend the remainder of class furthering their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate). Teacher will facilitate group discussion and check for student understanding of concepts and research.
Independent Practice	Students will spend the remainder of class furthering their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate). Teacher will facilitate group discussion and check for student understanding of concepts and research.
Exit Ticket	What is one piece of evidence you found to support your teams side?



### Lesson Plan Day 5- Team deliberation and guided research

Do Now	Students will answer the following question in complete sentences: What is one of the most interesting things that you have come across so far in your research? Explain.
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will spend 5-10 minutes reviewing important things to remember when conducting research for a debate. In addition, it is important to field questions that students may come across as they conduct their research. <ul style="list-style-type: none"> <li>• Good sources v. bad sources</li> <li>• Quality and quantity of evidence</li> <li>• How to give credit to sources through citations and within a discussion or debate.</li> </ul> Always ask yourself the question, “How does this piece of evidence support my claim?”
Group Work	Students will spend the remainder of class modifying their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate).
Independent Practice	Students will spend the remainder of class modifying their research and working in groups to collaborate coming up with a response to the resolution. Groups assigned their sides (Affirm or Negate).
Exit Ticket	Students will answer the following question the last 5 minutes of class: Cite at least two sources that you have used in your research.

### Lesson Plan Day 6- Socratic Smack Down<sup>xxi</sup>

Do Now	How does evidence help make your argument stronger? Explain.
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will review the rules for Socratic smack down and introduce materials used during the activity.
Group Work	Students will participate in Socratic smack down. All rules and handouts found in the appendix.
Independent Practice	Students will participate in Socratic smack down. All rules and handouts found in the appendix.
Exit Ticket	Based on your experience in Socratic Smack Down, how prepared are you and your team for the in class debate?



### Lesson Plan Day 7- Socratic Smack Down Reflection

Do Now	How did you use documents to support your ideas during socratic smack down? Explain.
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will review basic observations from the Socratic smack down. Teacher will advise on next steps for group reflection and debate preparation.
Group Work	Students will discuss in their groups how to use the skills from Socratic smack down in their debates. Groups will create posters or advertisements to supports their arguments. Poster rubrics can be found in the appendix.
Independent Practice	Students will present their posters and each students will be evaluated based on presentations skills that align with debate expectations. Debate rubric found in appendix.
Exit Ticket	What skills can be used in both the Socratic Smack Down as well as the in class debate?

### Lesson Plan Day 8- Final day of preparation (team written arguments are due)

Do Now	Do you feel that your team is prepared for the debate?
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will give general expectations for final day of group work. Final arguments and papers should be turned in at the end of class. Teacher will review arguments and return them to students the next class to be used during the debate.
Group Work	Students will spend the remainder of class working on group arguments and research for debate.
Independent Practice	Students will spend the remainder of class working on group arguments and research for debate.
Exit Ticket	Students will fill out group reflection sheets found in appendix.

## Lesson Plan Day 9- Final Debate

Do Now	Groups will be given back their arguments and students will have 10 minutes to prepare in their groups for the debate.
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will explain rules and expectations for the debate. Rubric for grading the debate found in appendix.
Group Work	Students will spend the remainder of class debating the resolution: Scientists should be allowed to edit heritable genes. Guidelines for debate should follow parliamentary procedures and general Modified Lincoln-Douglas debates. Rules and procedures found in appendix.
Independent Practice	Students will each be expected to debate. Teacher will grade individual student performance based on rubric found in appendix.
Exit Ticket	How do you feel that you performed during the debate? Did you talk a lot? What do you think your grade should be based on the rubric?

## Lesson Plan Day10- Written Argument and Reflection (Students grades and written arguments are due)

Do Now	Students will have 5 minutes to answer the following question:  Even though the teacher assigns sides for the formal debate, what is your actual opinion about the resolution? Do you affirm or negate the resolution? Explain.
Activator	Students will play a game of “I Couldn’t Disagree More” to get them engaged in discussion and practice debate skills. Rules for this game found in the appendix.
Direct Instruction	Teacher will explain the expectations for the written argumentative essay. Rubric and handout for essay found in appendix. Teacher will facilitate a reflective discussion about the unit.
Group Work	Students will turn-and-talk to briefly answer the following questions. Students will decide who is partner 1 and who is partner 2. Partner 1 will have 2 minutes to ask Partner 2 the questions and then they will switch: <ul style="list-style-type: none"> <li>• What did you learn about researching a topic?</li> <li>• What did you learn about genetics?</li> <li>• How did you feel that you and your team did during the debate?</li> </ul> Students will be brought back in to share their partners’ responses to the questions.
Independent Practice	Students will spend the remainder of class writing a reflection essay. Rubric for essay found in appendix.
Exit Ticket	Should scientists be able to edit heritable genes? Explain.

Assessments:

*Written Argument*

Each student will have to write out a claim, warrant, and impact to support the argument. They will then convert their claim, warrant, and impact into a full-length argumentative essay. The rubric is in the Appendix.

*Formal Debate*

Students will be assessed on debate skills using a rubric found in the Appendix.

## Appendix 1: Implementing Teaching Standards

I will be utilizing multiple standards from a variety of courses to develop this Unit. My class is a unique course designed to encourage academic conversations surrounding historical and current events that are relevant to students' lives. Below I will outline not only the Science standards but also the social studies, English language arts, and debate standards incorporated in this unit of study.

### 7th Grade Science Standards<sup>xxii</sup>

*All chosen 7<sup>th</sup> grade standards align with goals and content to be covered in this curriculum unit. Background knowledge is essential to a successful debate. Knowing about genetics and organisms in biology is vital to formulating a cohesive argument.*

7.L.1 Understand the process, structures, and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.

7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis.

7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic disease) and survival.

### 8<sup>th</sup> Grade Science Standards<sup>xxiii</sup>

*All chosen 8<sup>th</sup> grade standards align with goals and content to be covered in this curriculum unit. Background knowledge is essential to a successful debate. Knowing about genetics and biotechnology is vital to formulating a cohesive argument.*

8.L.2 Understand how biotechnology is used to affect living organisms.

8.L.2.1 Summarize aspects of biotechnology including:

- Specific genetic information available
- Careers
- Economic benefits to North Carolina
- Ethical issues
- Implications for agriculture

### English Language Arts Standards<sup>xxiv</sup>

CCR Anchor Standard R.8 – Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

RI.11-12.5 Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging

RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.

RI.9-10.8 Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

Writing: To be college and career ready, students should learn how to offer and support opinions/arguments, demonstrate understanding of a topic under study, and convey real and/or imagined experiences. Students learn that a key purpose of writing is to communicate clearly and coherently. The NC ELA Writing Standards emphasize the importance of writing routinely in order to build knowledge and demonstrate understanding. The complete writing process (from prewriting to editing) is clear in the first three writing standards. These standards define what students should understand and be able to do by the end of each grade.

#### Debate Standards<sup>xxv</sup>

Students will use a modified Lincoln-Douglas Debate format. There will be modifications made for the time constraints of the daily schedule and the number of students in the classroom. Students will need to show their ability to form an argument and deliver the argument effectively.

#### Social Studies Standards<sup>xxvi</sup>

The course will use the National Council for Social Studies C3 Framework to guide the lesson planning process. This framework aligns with the state standards as well as the goal to prepare students for careers, college, and civic life. The inquiry arc process will be used to facilitate and guide the students' research process.

## Appendix 2: Lesson 1 Rubric and Handouts

### “I Couldn’t Disagree More” Activity Guide

This simple exercise helps to build the skill of thinking on your feet and quick response.

#### Directions:

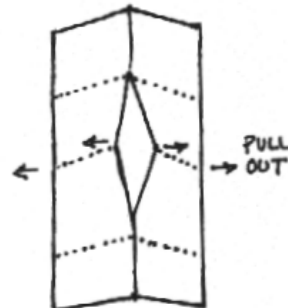
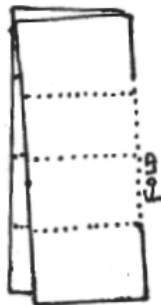
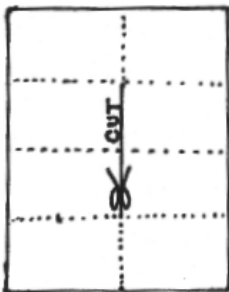
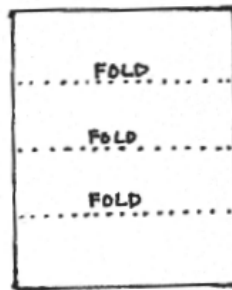
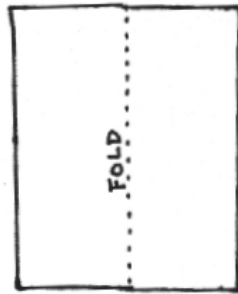
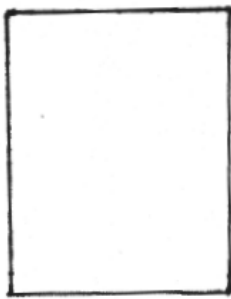
1. Scholars will stand in a circle with their Teacher.
2. Two Scholars will volunteer to step into the center of the circle. These scholars will be the debaters.
3. One scholar will take the side of the affirmative (Agree) the other will take the side of the negative (disagree).
4. The Affirmative debater will make an “I think...” statement to begin the debate.
5. Each scholar will have 5 seconds to respond. This will be monitored by the Teacher.
6. The teacher (or pupil) makes a statement and invites another pupil to respond starting with “I couldn’t disagree more because...” and developing their reason.
7. The teacher will make a statement saying the person's name, that person has to say back, “I couldn’t disagree more...(fill in the rest with their argument).”
8. That student will then pass it on, by picking another statement and saying it to another student.
9. The statements can be light-hearted or serious, linked to the curriculum, current affairs, school issues or totally random e.g “We should brush our teeth every day”, “cats are better than dogs”, “war is always wrong”, “we should get rid of our school uniform”, ”Goldilocks was a very naughty girl” etc.
10. Scholars cannot ask a question, cannot hesitate for more than 5 seconds, and must disagree with their opponent.
11. During the debate, anything that is said will remain true until someone disagrees with the statement.
12. The goal is to stay in the middle of the circle for as long as possible. The scholar who loses the debate will rejoin the circle and another scholar will step up to challenge the winning debater.

# Cornell Notes Handout

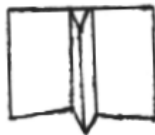
Cornell Notes	
Name	
Date	
Block	
Key Term/Concept	Descriptions/ Definitions
Summary of Notes:	

## Vocabulary Booklet Instructions

1. Start by folding your paper in half hotdog style.
2. Unfold your paper.
3. Fold your paper in half hamburger style.
4. Fold it in half again.
5. Unfold your paper half way.
6. Cut your to the center of the fold.
7. Unfold your paper all the way.
8. Fold your paper in half hotdog style again.
9. Push your paper from the corners so that the folds make a star.
10. The fold the paper into a book.



CREASE



FOLD



FOLD



## Concept Bundle Instructions

### Concept Bundle


#### Directions:

1. Take one minute to think about vocabulary/topics learned in this Unit
2. Right down words/terms, one in each square
3. Pick 1 square to start your activity
4. Write a description of the word/topic in the square
5. Pick a second square that touches the first square, draw an arrow connecting the squares
6. Describe the second word/topic and how the two topics are connected or similar
7. Continue this process until all squares are complete and connections have been made.
8. Remember to include arrows so you can following connections

### Appendix 3: Lesson 2 Rubric and Handouts

#### Carousel Debate Reflection Sheet

Name:	
Date:	
Block:	
Question 1:	Was it frustrating to have to write everything you were saying and not be able to speak?
Question 2:	Did writing out what you were thinking help you with your thinking process?
Question 3:	Which documents did you find most interesting and why?
Question 4:	What did people say in response to your comments?
Question 5:	Does writing down your thoughts help you to remember them?

**Appendix 4: Lessons 3-6 Rubric and Handouts**

Claim/Warrant/Impact Graphic Organizer

Name		
Date		
Block		
Claim		
Warrant (s)		Citations:
Impact		

## **Appendix 5: Lesson 7 Rubric and Handouts**

### Socratic Smack Down Rules and Guidelines<sup>xxvii</sup>

This version of Socratic Smack Down is modified and adapted to fit classroom use\*\*

#### *Game Play/ Setting It Up/ Materials/ Prep*

Copies of text/topic for game  
1 Question set  
Copies of Coach Card  
All-class scoreboard (if needed)

#### *Student Teams*

Divide students into teams of 4 to 6 participants. These teams will participate in the Socratic Smackdown discussion. Decide if you want to put students in homogeneous or heterogeneous groups based on your own criteria.

#### *Text/Topic Choice*

Choose a text or topic for the Socratic Smackdown discussion. We suggest that you choose texts about debatable or controversial topics because then students must use textual evidence to support their ideas and arguments.

#### *Question Sets*

We recommend that the first few times the class plays the game, the teacher provides a well-crafted list of text-dependent questions. It may be helpful to give students the questions in advance to allow them to prepare. Questions may be asked by the teacher, or by students who have been assigned to ask the questions, whenever they feel it is appropriate. A shorter Socratic Smackdown could focus only on one teacher-given question at a time. Ultimately, the teacher's goal may be to teach students to create their own questions for Socratic Smackdown, so that they can teach each other how to effectively discuss text-based questions.

#### *Discussion Strategies for Game*

Choose the discussion strategies for the game and write them on the game board assigning point values to these strategies.

#### *Game Play Rules*

Teams of 4 to 6 students will be given a topic, text, or issue that will be the focus of the Socratic Smackdown, as well as a question set. Students will prepare answers to the questions prior to the Socratic Smackdown. The teacher will reveal which discussion skill strategies will be part of the game. The point value of the different strategies will also be shared. When it is time for the

Smackdown, the class will set up chairs in a fishbowl arrangement. A fishbowl is when there is an inner circle of 4 to 6 chairs—dependent on the size of the student discussion team—within a larger circle of chairs.

One student from each team will be asked to go inside the Socratic Smackdown ring to have a 6-minute discussion (or Smackdown) based on the topic, text, or issue given earlier. During the Smackdown, they will earn points for using discussion skills. They can also lose points if they disrupt the discussion.

Using the Socratic Smackdown Scorecard, a number of students (from 2 to the entire class) will track points during the 6-minute Smackdown. The first time the class plays the game the teacher can track points to model scoring. Students who aren't scoring will complete the Coach Card during the Smackdown; if all students are scoring they will then complete the Coach Card after the Smackdown. When 6 minutes is up, the teacher or a student will collect all of the Scorecards, determine the average score for each student in the discussion team, and then sum up the average scores to figure out the team score. After the Smackdown, the students in the ring will complete the Instant Replay Card. After individual and team scores are revealed, the class will have a brief discussion to share thoughts from their Coach Cards.

### *Game Discussion and Play Strategies*

The point value can vary according to the skill that is presently being learned and practiced by students.

Agree

+1

“I agree... and...” to build on an argument.

Disagree

+1

“I disagree because...” to refute an argument.

Question

+1

Ask a probing question to get more details about someone's argument.

Use Evidence

+2

Use a quote from the text to support an argument.

Devil's Advocate

+2

Pose a question or situation that is counter to Advocate a person's argument.

Connect

+2

Link a person's argument with another person's previous statement.

Distract

-1

Distract team or class from discussion.

Insult

-1

Be disrespectful to another person during the discussion.

Interrupt

-1

Speak while another person is speaking.

### *Student Rules*

On the next page is a set of Student Rules that you can print out and give to students to use as a cheat sheet when they are first playing Socratic Smackdown.

### *Cheat Sheet*

Sit with your team of 4 to 6 students. After your team's Smackdown is over, complete the Instant Read an assigned text or Replay Card. research an assigned topic to answer the questions in the question set. If your team is not participating in the Smackdown, you will either Listen to which discussion score the Smackdown or strategies are going to be critique the Smackdown. A part of the day's Socratic Smackdown. After the round of Socratic Smackdown is over and When it is your team's turn, every team has played, the sit in the center of the final scores will be read fishbowl. and individual winners and/or team winners will be announced. When your teacher says "go," begin the Smackdown and try to use as many discussion strategies as you can. Listening is key.

### *Socratic Smackdown Score Card*

<b>Score Card</b>	Player 1	Player 2	Player 3	Player 4
Agree				
Disagree				
Question				
Use Evidence				
Interrupt				
Total Score				

## Appendix 6: Lesson 8 Rubric and Handouts

### Group Work Reflection Sheets

Name:				
Date:				
Block:				
<i>All comments and grades will be considered in group members final grade. Be Honest!</i>				
Group Members Name	On a scale of 0-5 did this group Member Participate?	On a scale of 0-5 Did this group member the complete work?	On a scale of 0-5 do you feel this group member is prepared for the debate?	Total
Name:	Comments:  ---/5	Comments:  ---/5	Comments:  ---/5	Comments:  ---/15
Name:	Comments:  ---/5	Comments:  ---/5	Comments:  ---/5	Comments:  ---/15
Name:	Comments:  ---/5	Comments:  ---/5	Comments:  ---/5	Comments:  ---/15
Name:	Comments:  ---/5	Comments:  ---/5	Comments:  ---/5	Comments:  ---/15

## Appendix 7: Lesson 9 Rubric and Handouts

### Debate Rubric

	5 pts	10 pts	15 pts	20 pts	Total
Speaking	Student did not project their voice. Student made little to no effort to express their opinions.	Student had weak projection of their voice. Student made little effort to express their opinions.	Student projected their voice. Student made some effort to express their opinions.	Student projected their voice. Student made successful effort to express their opinions.	----/20
Posture	Posture was poor. Slouched, shifted from foot to foot, and appeared very uncomfortable. Made almost no eye contact with the audience. Looked down or at notes or visual aids	Sometimes rocked, shifted, or appeared uncomfortable. Made occasional eye contact with one or two audience members. Did not rely too heavily on notes or visual aids	Posture was good for most of the presentation. Made eye contact numerous times during presentation. Did not rely too heavily on notes or visual aids.	Stood upright and appeared confident throughout. Avoided rocking, shifting, and other nervous behavior. Made eye contact throughout the audience.	----/20
Rebuttal	Student did not respond to opponents arguments.	Student attempted to respond to opponents arguments.	Student successfully responded to opponents arguments.	Student successfully responded to opponent's arguments and used evidence to disprove their claim.	----/20
Participation	Student did not participate in debate.	Student spoke up 1-3 times during debate.	Student spoke 3-5 times during debate.	Students spoke 5 or more times during debate.	----/20
Argument	Students produces weak arguments and lacked research support.	Students arguments were effective but lacked evidence.	Student made strong arguments and used evidence correctly.	Student made very strong arguments and disproved appoints with evidence and cited specific texts.	----/20
Total Points					---- /100



## Sentence Stems to Guide Student Responses

<p><b><u>Expressing your opinion:</u></b></p> <ul style="list-style-type: none"> <li>· I believe that _____.</li> <li>· In my opinion _____.</li> <li>· I feel that _____.</li> <li>· I think that _____ because _____.</li> <li>· To me, it seems obvious that _____.</li> </ul>	<p><b><u>Presenting a different angle on a subject:</u></b></p> <ul style="list-style-type: none"> <li>· While I can see why you believe this, I see this differently. In my opinion _____.</li> <li>· I understand where you are coming from, but I see it a bit differently. From my perspective, _____.</li> <li>· That's a valid point, but I feel _____.</li> <li>· On the other hand, _____.</li> <li>· I do agree with the part about _____ but _____.</li> </ul>
<p><b><u>Sentence Frames for agreeing with an idea and adding to it:</u></b></p> <ul style="list-style-type: none"> <li>· My idea is related to _____'s idea _____.</li> <li>· I really liked _____'s idea about _____.</li> <li>· I agree with _____. Also, _____.</li> <li>· My idea builds on _____'s idea. I _____.</li> </ul>	<p><b><u>Sentence Frames for Clarification:</u></b></p> <ul style="list-style-type: none"> <li>· _____, could you please rephrase that?</li> <li>· I did not understand _____, could you repeat that, please?</li> <li>· Can you say more about that?</li> <li>· In other words, are you saying _____?</li> <li>· I have a question about _____. State your question.</li> </ul>

## Guiding Questions for Debate

*Teacher can pose these questions to the group. Students should be encouraged to respond to one another and ask their own questions as well.*

- What are “ethics”? What is “science”?
- Should there be limits to scientific experimentation?
- Who has the right to decide about what these limits should be?
- What are some of the possible benefits of genetically modifying human embryos?
- What are some of the possible consequences of genetically modifying human embryos?
- What makes us as humans continually push forward the boundaries of science and technology?
- Is there a moral or ethical difference between using genetic technologies to prevent disease and to enhance human capacities?
- Do you agree or disagree with the following statement: “Humans should be allowed to select their children’s DNA.”? Explain your response.
- What is meant by the statement just because we can does not mean we should
- Should the government continue to fund biotechnology research and development<sup>xxviii</sup>

## Debate Guidelines

Teacher will open debate with a motion to move into a moderated caucus. Students will then second the motion. Once the motion has been seconded, the students will vote to open the debate. Debate structure will go as followed:

1. Teacher will ask Affirm the first question.
  - a. Affirm will have 1 minute to answer the question.
  - b. Negate will have 1 minute to respond to affirm.
2. Affirm will have the choice to respond to negate or ask for a new question.
  - a. Affirm will have 1 minute to either respond to negate or answer the question.
  - b. Negate responds to affirm in 1 minute.
3. Debate will continue in this manner until the teacher feels that enough questions have been answered.
4. Teacher will tally every time a student speaks and add points whenever they correctly cite and use their research to support their responses.
5. Students will have 2 minutes to give closing arguments.

## Appendix 8: Lesson 10 Rubric and Handouts

### Rubric for Written Argument

	5 pts	10 pts	15 pts	20 pts	Total
Claim	Student did not clearly express their side (Affirm/Negate)	Student stated their side, but did not elaborate.	Student clearly expressed their side and introduced their argument.	Student clearly expressed their side and supported their introduction with appropriate details.	---- /20
Warrant	Student did not show evidence of research to support their claim.	Student showed evidence of little or weak research with little to no citations.	Student showed evidence of research and successfully cited all sources.	Students successfully used rigorous research strategies to support their claim with multiple pieces of evidence and cited all sources.	---- /20
Impact	Student did not prove why their opponent was wrong and did not provide a strong statement to prove their side.	Student provided a weak statement for why their opponent was wrong and did not provide a strong statement to prove their side.	Student did prove why their opponent was wrong but did not provide a strong statement to prove their side.	Student did prove why their opponent was wrong in addition to a strong statement to prove their own side.	---- /20
Formatting	Writing was fragmented. Ideas were not presented in logical order.	Some ideas were presented in logical order. Introduction,	Ideas were presented in a logical order. Introduction	All ideas were presented in a logical order.	---- /20

	Introduction, body, and conclusion were not clear.	body, and conclusion were included.	was clear, body included many details, and conclusion summarized main idea.	Introduction was clear, body included many details, and conclusion summarized main idea. Writing flowed smoothly throughout.	
Grammar/ Spelling/Punctuation	More than 10 spelling and grammar errors. More than 10 capitalization and punctuation errors. Many sentences show flawed structure.	More than 5 spelling and grammar errors. More than 5 capitalization and punctuation errors. Less than 5 sentences show flawed structure.	Fewer than 5 spelling and grammar errors. Fewer than 5 capitalization and punctuation errors. One or two flawed sentences.	No spelling, grammar, capitalization or punctuation errors. Sentences are all well-formed.	---- /20
Total Points					---- /100

## Notes

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- <sup>i</sup> “Martin Luther King, Jr. Middle School,” accessed November 19, 2018, <http://schools.cms.k12.nc.us/martinlutherkingjrMS/Pages/Default.aspx>.
- <sup>ii</sup> “School Improvement Plan,” accessed November 19, 2018, <http://schools.cms.k12.nc.us/martinlutherkingjrMS/Pages/School-Improvement-Plan.aspx>.
- <sup>iii</sup> “Copy of Socratic Smackdown Packet.Pdf,” Google Docs, accessed November 16, 2019, [https://docs.google.com/document/d/1x8rApOkXRVFd7jU2C7d6JajNMScrX\\_LajUfFn66MqW8/edit?usp=sharing&usp=embed\\_facebook](https://docs.google.com/document/d/1x8rApOkXRVFd7jU2C7d6JajNMScrX_LajUfFn66MqW8/edit?usp=sharing&usp=embed_facebook).
- <sup>iv</sup> Katherine A. Powers, “Ingenious New Audio Version of ‘The Handmaid’s Tale’ Deepens the Original,” *Washington Post*, April 5, 2017, sec. Books, [https://www.washingtonpost.com/entertainment/books/ingenious-new-audio-version-of-the-handmaids-tale-deepens-the-original/2017/04/05/e1df3cf6-1a17-11e7-bcc2-7d1a0973e7b2\\_story.html](https://www.washingtonpost.com/entertainment/books/ingenious-new-audio-version-of-the-handmaids-tale-deepens-the-original/2017/04/05/e1df3cf6-1a17-11e7-bcc2-7d1a0973e7b2_story.html).
- <sup>v</sup> Michael J Selgelid, “Governance of Dual-Use Research: An Ethical Dilemma,” *Bulletin of the World Health Organization* 87, no. 9 (September 2009): 720–23, <https://doi.org/10.2471/BLT.08.051383>.
- <sup>vi</sup> “Definition of ETHIC,” accessed November 16, 2019, <https://www.merriam-webster.com/dictionary/ethic>.
- <sup>vii</sup> “Definition of ETHIC.”
- <sup>viii</sup> Journal Editors and Authors Group, “Statement on Scientific Publication and Security,” *Science* 299, no. 5610 (February 21, 2003): 1149–1149, <https://doi.org/10.1126/science.299.5610.1149>.
- <sup>ix</sup> Staffan Rheinberger Hans-Jörg, Müller-Wille and Robert Meunier, “Gene,” in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, Spring 2015 (Metaphysics Research Lab, Stanford University, 2015), <https://plato.stanford.edu/archives/spr2015/entries/gene/>.
- <sup>x</sup> Genetics Home Reference, “What Are Genome Editing and CRISPR-Cas9?,” Genetics Home Reference, accessed November 16, 2019, <https://ghr.nlm.nih.gov/primer/genomeresearch/genomeediting>.
- <sup>xi</sup> Cohen Nov. 28, 2018, and Pm, “Ethics aside, Does the CRISPR Baby Experiment Make Scientific Sense?”
- <sup>xii</sup> “Sickle Cell,” NPR.org, accessed November 18, 2019, <https://www.npr.org/tags/144698357/sickle-cell>.
- <sup>xiii</sup> Jo Ann Day, “Upholding the Highest Bioethical Standards | Johns Hopkins Medicine,” accessed November 16, 2019, <https://www.hopkinsmedicine.org/henriettalacks/upholding-the-highest-bioethical-standards.html>.
- <sup>xiv</sup> Sara Goering, “Eugenics,” in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, Fall 2014 (Metaphysics Research Lab, Stanford University, 2014), <https://plato.stanford.edu/archives/fall2014/entries/eugenics/>.
- <sup>xv</sup> Goering.
- <sup>xvi</sup> N. W. Gillham, “Sir Francis Galton and the Birth of Eugenics,” *Annual Review of Genetics* 35 (2001): 83–101, <https://doi.org/10.1146/annurev.genet.35.102401.090055>.
- <sup>xvii</sup> Sabine Deviche, “Punnett Squares,” Text, July 20, 2010, <https://askabiologist.asu.edu/punnett-squares>.
- <sup>xviii</sup> Rinehart Holt and Winston, Inc, *Holt Science & Technology. [Gr. 8]. [Gr. 8* (Austin: Holt, Rinehart and Winston, 2005).
- <sup>xix</sup> Holt.
- <sup>xx</sup> Jeff Zwiers and Marie Crawford, *Academic Conversations: Classroom Talk That Fosters Critical Thinking and Content Understandings* (Stenhouse Publishers, 2011).
- <sup>xxi</sup> “Socraticsmackdown\_student\_intro\_docs.Pdf,” accessed November 16, 2019, [http://english3hnsbard.weebly.com/uploads/5/5/8/0/5580519/socraticsmackdown\\_student\\_intro\\_docs.pdf](http://english3hnsbard.weebly.com/uploads/5/5/8/0/5580519/socraticsmackdown_student_intro_docs.pdf).
- <sup>xxii</sup> “Essential Standards: Grade 3 Science. Unpacked Content.”
- <sup>xxiii</sup> “6-8.Pdf,” accessed November 16, 2019, <http://www.dpi.state.nc.us/docs/curriculum/science/scos/support-tools/new-standards/science/6-8.pdf>.
- <sup>xxiv</sup> “Adopted-Ela-Standards.Pdf,” accessed November 16, 2019, <http://www.ncpublicschools.org/docs/curriculum/languagearts/scos/adopted-ela-standards.pdf>.
- <sup>xxv</sup> Dr Seth Halvorson and Cherian Koshy, “LINCOLN-DOUGLAS DEBATE,” n.d., 115.
- <sup>xxvi</sup> “C3 Framework,” National Council for the Social Studies, June 8, 2017, <https://www.socialstudies.org/c3>.
- <sup>xxvii</sup> “Instituteofplay.Org,” accessed November 19, 2019, <http://www.instituteofplay.org/work/projects/print-play-games-2/socratic-smackdown/>.
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