

*Overview*

Overview | Genetic Engineering



## *Genetic Engineering*

*by Holly Wood, Monica Osborne, and Monica Osborne*

*Should advances in genetic technology be used to alter human embryos?*

**Grades:** 10 11 12

**Discipline:** Science

**Teaching Task:** Task Template 2 (Argumentation and Analysis)

**Course:** Biology

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## Section 1: What Task?

### TEACHING TASK

#### *Task Template 2 [3 Levels]*

#### *Argumentation & Analysis*

**L1:** Should advances in genetic technology be used to alter human embryos? After reading "Racing for Sam-Progeria", "Stem Cell Research", and "Genomes for All" write a feature article or blog entry that addresses the question and support your position with evidence from the text(s).

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**L2:** Be sure to acknowledge competing views.

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**L3:** Give examples from past or current events or issues to illustrate and clarify your position.

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### STUDENT BACKGROUND

Students will not have extenuating knowledge regarding engineering and technology because this is an introduction to genetic engineering and application of genetic technology. Prior knowledge will come from what students have been exposed to in the news, internet, personal experience and research. Opinions may have already been formed based on familial discussions or experiences with various media. However, it is imperative that students have an understanding of human genetics, heredity, inheritance patterns, the difference between autosomal inheritance versus sex-linked inheritance. Students will have an even better understanding if they know the central dogma and have an idea of how proteins are produced, edited, and passed on from parent to offspring. Reproduction is a concept that will tie into this content and add richness to the instruction.

### EXTENSION

Rubric

| Scoring Elements        | Not Yet   |     | Approaches Expectations   |     | Meets Expectations   |     | Advanced   |
|-------------------------|---|-----|---|-----|--|-----|--|
|                         | 1   | 1.5 | 2   | 2.5 | 3  | 3.5 | 4  |
| <b>Focus</b>            | Attempts to address prompt, but lacks focus or is off-task.   |     | Addresses prompt appropriately and establishes a position, but focus is uneven.   |     | Addresses prompt appropriately and maintains a clear, steady focus. Provides a generally convincing position.  |     | Addresses all aspects of prompt appropriately with a consistently strong focus and convincing position.  |
| <b>Controlling Idea</b> | Attempts to establish a claim, but lacks a clear purpose. (L2) Makes no mention of counter claims.  |     | Establishes a claim. (L2) Makes note of counter claims.   |     | Establishes a credible claim. (L2) Develops claim and counter claims fairly.   |     | Establishes and maintains a substantive and credible claim or proposal. (L2) Develops claims and counter claims fairly and thoroughly.   |
| <b>Reading/Research</b> | Attempts to reference reading materials to develop response, but lacks connections or relevance to the purpose of the prompt.   |     | Presents information from reading materials relevant to the purpose of the prompt with minor lapses in accuracy or completeness.  |     | Accurately presents details from reading materials relevant to the purpose of the prompt to develop argument or claim.   |     | Accurately and effectively presents important details from reading materials to develop argument or claim.   |
| <b>Development</b>      | Attempts to provide details in response to the prompt, but lacks sufficient development or relevance to the purpose of the prompt. (L3) Makes no connections or a connection that is irrelevant to argument or claim. |     | Presents appropriate details to support and develop the focus, controlling idea, or claim, with minor lapses in the reasoning, examples, or explanations. (L3) Makes a connection with a weak or unclear relationship to argument or claim. |     | Presents appropriate and sufficient details to support and develop the focus, controlling idea, or claim. (L3) Makes a relevant connection to clarify argument or claim. |     | Presents thorough and detailed information to effectively support and develop the focus, controlling idea, or claim. (L3) Makes a clarifying connection(s) that illuminates argument and adds depth to reasoning.                |
| <b>Organization</b>     | Attempts to organize ideas, but lacks control of structure.   |     | Uses an appropriate organizational structure for development of reasoning and logic, with minor lapses in structure and/or coherence.   |     | Maintains an appropriate organizational structure to address specific requirements of the prompt. Structure reveals the reasoning and logic of the argument.             |     | Maintains an organizational structure that intentionally and effectively enhances the presentation of information as required by the specific prompt. Structure enhances development of the reasoning and logic of the argument. |
|                         | Attempts to   |     | Demonstrates an uneven command of   |     | Demonstrates a command of standard English conventions and   |     | Demonstrates and maintains a well-developed command of standard English conventions and  |

|                              |  |  |  |   |
|------------------------------|--|--|--|---|
| <b>Conventions</b>           | demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics. Sources are used without citation.    | standard English conventions and cohesion. Uses language and tone with some inaccurate, inappropriate, or uneven features. Inconsistently cites sources. | cohesion, with few errors. Response includes language and tone appropriate to the audience, purpose, and specific requirements of the prompt. Cites sources using appropriate format with only minor errors. | cohesion, with few errors. Response includes language and tone consistently appropriate to the audience, purpose, and specific requirements of the prompt. Consistently cites sources using appropriate format. |
| <b>Content Understanding</b> | Attempts to include disciplinary content in argument, but understanding of content is weak; content is irrelevant, inappropriate, or inaccurate. | Briefly notes disciplinary content relevant to the prompt; shows basic or uneven understanding of content; minor errors in explanation.                  | Accurately presents disciplinary content relevant to the prompt with sufficient explanations that demonstrate understanding.   | Integrates relevant and accurate disciplinary content with thorough explanations that demonstrate in-depth understanding.   |

## STANDARDS

### *Common Core Anchor Standards Reading*

**R.CCR.1:** Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

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**R.CCR.2:** Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

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**R.CCR.4:** Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

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**R.CCR.10:** Read and comprehend complex literary and informational texts independently and proficiently.

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### *Common Core Anchor Standards Writing*

**W.CCR.1:** Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

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**W.CCR.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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**W.CCR.5:** Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

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**W.CCR.9:** Draw evidence from literary or informational texts to support analysis, reflection, and research.

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**W.CCR.10:** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

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### *Custom Standards*

**SCIENCE CONTENT STANDARDS-BIOLOGY (9-12) :** Kentucky Core Academic Standards (NGSS) HS-LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. HS-LS2-2: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through

meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.\*HS-LS2-8: Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

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## Section 2: What Skills?

### Selected Skills

#### *Preparing for the Task*

**TASK ENGAGEMENT:** Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns

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**TASK ANALYSIS:** Ability to understand and explain the task's prompt and rubric.

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#### *Reading Process*

**TEXT SELECTION:** Ability to identify appropriate texts

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**ACTIVE READING:** Ability to identify the central point and main supporting elements of a text.

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**ESSENTIAL VOCABULARY:** Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts, or information.

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**ACADEMIC INTEGRITY:** Ability to use and credit sources appropriately.

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**NOTE-TAKING:** Ability to read purposefully and select relevant information; to summarize and/or paraphrase.

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#### *Transition to Writing*

**BRIDGING:** Ability to begin linking reading results to writing task.

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#### *Writing Process*

**CONTROLLING IDEA:** Ability to establish a controlling idea and consolidate information relevant to task.

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**PLANNING:** Ability to develop a line of thought and text structure appropriate to an information/explanation task.

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**DEVELOPMENT:** Ability to construct an initial draft with an emerging line of thought and structure.

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**REVISION:** Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose.

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**EDITING:** Ability to proofread and format a piece to make it more effective.

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**COMPLETION:** Ability to submit final piece that meets expectations.

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## Section 3: What Instruction?

### MiniTasks

#### *Preparing for the Task*

**TASK ENGAGEMENT:** Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns

#### **SHORT CONSTRUCTED RESPONSE**

**10 minutes**

You just found out your unborn child has a genetic disorder. In light of what you know about genetic engineering, to what extent would you allow a geneticist to manipulate your child's genes? Explain your thoughts. In a quick write, write your first reaction to the question. Add some notes of things you know about this issue.

#### **Scoring Guide (Work Meets Expectations If):**

Student conveys any prior knowledge they have regarding genetic engineering or genetic technology. Student answers the questions.

#### **Instructional Strategies:**

Think-Pair-Share

Discuss student responses.

Inject controversial topics and have students to re-evaluate their thinking.

#### **Notes:**

This can be done in a Writer's Notebook on a QECC form or a Science Notebook, if already implementing in instruction and students are comfortable with those requirements.

#### **Accommodations and Interventions:**

For those students who need more scaffolding, implement a writing frame where students can give their thoughts through filling in blanks and have a segue into independent writing.

**TASK ANALYSIS:** Ability to understand and explain the task's prompt and rubric.

#### **LIST**

**15 minutes**

After reading the task prompt, what is your first reaction to the prompt? What are you expected to do? In your own words, what are the important features of a good response to this prompt?

#### **Scoring Guide (Work Meets Expectations If):**

Student must adequately evaluate the prompt, create a task list, and list features of each task that would be included in a good response.

**Instructional Strategies:**

Share examples of type of text students will produce (either from past students or from professional writers).

Identify or invite students to identify key features of examples.

Pair students to share and improve their individual bullets.

Create a classroom list: Choose one student to share a few ideas on the board, and ask other to add to it.

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*Reading Process***TEXT SELECTION:** Ability to identify appropriate texts**NOTES****Homework**

Research and find a text of your own. For each text, list the needed bibliographic information. Add bullets on why you think the work is credible and/or worthy of study.

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**Scoring Guide (Work Meets Expectations If):**

Identifies author, title, publisher, date, and any other needed information (for example, the volume for a periodical or the editor for an anthology).

Includes reasonable evidence that work is credible and/or worthy of study.

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**Instructional Strategies:**

Provide citation guide and discuss why each element of citation is needed.

Ask students to brainstorm what makes an author credible and/or worthy of study.

Provide access to research sources for students to assess the texts.

Note: for an after researching task, add teaching and time for students to select the texts they will use.

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**Accommodations and Interventions:**

For those students with IEP's, they will select a previously approved article and complete the activity as instructed with scaffolding.

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**ACTIVE READING:** Ability to identify the central point and main supporting elements of a text.**SHORT CONSTRUCTED RESPONSE****Homework**

What is the author trying to accomplish? Which parts of the text show you that?

L2 What competing arguments have you encountered or can you think of?

L3 What historical or current examples can you note that relate to the task prompt?

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**Scoring Guide (Work Meets Expectations If):**

Answers questions with credible response.

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**Instructional Strategies:**

Invite students to brainstorm ways to figure out any authors intent.

Invite students to share and discuss their answers for each text.

After the discussion, allow them to add to their entries.

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**Accommodations and Interventions:**

For those students who have an IEP with a reading goal, you could have a form ready to help them demystify the learning tasks. You may also want to eliminate the L3 task.

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**ESSENTIAL VOCABULARY:** Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts, or information.

**LIST**

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In your notebook, list words and phrases essential to the texts. Add definitions, and (if appropriate) notes on connotation in this context.

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**Scoring Guide (Work Meets Expectations If):**

Lists appropriate phrases.

Provides accurate definitions.

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**Instructional Strategies:**

After scoring, ask some students to share definitions of terms that others overlooked or misunderstood.

After scoring, be willing to provide direct instruction or guide a close reading if needed to work through a key phrase most students missed.

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**ACADEMIC INTEGRITY:** Ability to use and credit sources appropriately.

**SHORT CONSTRUCTED RESPONSE**

**15 minutes**

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Define "plagiarism" and list ways to avoid it.

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**Scoring Guide (Work Meets Expectations If):**

Provides accurate definition

Lists several appropriate strategies

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**Instructional Strategies:**

Think-Pair-Share

Discuss respect for others work to assemble evidence and create texts.

Discuss academic penalties for stealing others thoughts and words.

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**NOTE-TAKING:** Ability to read purposefully and select relevant information; to summarize and/or paraphrase.

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**NOTES**

**30 minutes**

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Using the QECC form, write evidence from the article you read to support your claim. You may also want to note any counterclaim arguments you can write about as well.

Do what you need to do to avoid plagiarism.

L2(a) What strategies will you use to discern credible sources?

L2(b): What implications can you draw? (Tasks 11,12 )

L3 Why is it important in the process of inquiry to identify gaps or unanswered questions about the topic?

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**Scoring Guide (Work Meets Expectations If):**

Identifies relevant evidences that support claim or refute counterclaim.

Includes information to support accurate citation (for example, page numbers for a long text, clear indication when quoting directly).

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**Instructional Strategies:**

Teach how to implement the QECC form for note taking.

Check that early student work is in the assigned format (or in another format that gathers the needed information effectively).

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*Transition to Writing*

**BRIDGING:** Ability to begin linking reading results to writing task.

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**LIST**

**5 minutes**

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In a quick write, write about what you know now that youve read about (content).

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**Scoring Guide (Work Meets Expectations If):**

Student is able to contribute what he/she wrote in group discussion.

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**Instructional Strategies:**

Discussion-based strategies, such as seminar.

Small group discussion using question.

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## *Writing Process*

**CONTROLLING IDEA:** Ability to establish a controlling idea and consolidate information relevant to task.

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### **SHORT CONSTRUCTED RESPONSE**

**20 minutes**

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Write an opening paragraph that includes a controlling idea and sequences the key points you plan to make in your composition

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#### **Scoring Guide (Work Meets Expectations If):**

Writes a concise summary statement or draft opening.

Provides direct answer to main prompt requirements.

Establishes a controlling idea.

Identifies key points that support development of argument.

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#### **Instructional Strategies:**

Offer several examples of opening paragraphs.

Ask class to discuss what makes them strong or weak.

Review the list that students created earlier to identify needed elements (from Cluster 1, skill 2).

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#### **Notes:**

Teacher may need to write samples if this is the first time teaching the task.

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#### **Accommodations and Interventions:**

Writing frames can be implemented for those who are struggling writers.

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**PLANNING:** Ability to develop a line of thought and text structure appropriate to an information/explanation task.

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### **OUTLINE**

**10 minutes**

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Using the QECC form, create an outline based on your notes and reading in which you state your claim, sequence your points, and note your supporting evidence. Also address the counterclaims and evidence to refute these ideas.

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#### **Scoring Guide (Work Meets Expectations If):**

Creates an outline or organizer.

Supports controlling idea. Uses evidence from texts read earlier.

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**Instructional Strategies:**

Provide and teach one or more examples of outlines or organizers.

Invite students to generate questions in pairs about how the format works, and then take and answer questions.

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**DEVELOPMENT:** Ability to construct an initial draft with an emerging line of thought and structure.

**LONG CONSTRUCTED RESPONSE****30 minutes.**

Write an initial draft of a blog complete with opening, development, and closing; insert and cite textual evidence.

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**Scoring Guide (Work Meets Expectations If):**

Provides complete draft with all parts.

Supports the opening in the later sections with evidence and citations.

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**Instructional Strategies:**

Encourage students to re-read prompt partway through writing, to check that they are on track. Group members should peer-edit their tasks with one another, offering constructive feedback.

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**REVISION:** Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose.

**LONG CONSTRUCTED RESPONSE****Homework**

Refine compositions analysis, logic, and organization of ideas/points. Use textual evidence carefully, with accurate citations. Decide what to include and what not to include.

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**Scoring Guide (Work Meets Expectations If):**

Provides complete draft with all parts.

Supports the opening in the later sections with evidence and citations.

Improves earlier edition.

Addresses claim and counterclaims.

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**Instructional Strategies:**

Sample useful feedback that balances support for strengths and clarity about weaknesses.

Assign students to provide each other with feedback on those issues.

Self-Assess using rubric.

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**EDITING:** Ability to proofread and format a piece to make it more effective.

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**LONG CONSTRUCTED RESPONSE**

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Revise draft to have sound spelling, capitalization, punctuation, and grammar. Adjust formatting as needed to provide clear, appealing text.

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**Scoring Guide (Work Meets Expectations If):**

Provides draft free from distracting surface errors.

Uses format that supports purpose.

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**Instructional Strategies:**

Briefly review selected skills that many students need to improve.

Teach a short list of proofreading marks.

Assign students to proofread each others texts a second time.

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**COMPLETION:** Ability to submit final piece that meets expectations.

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**LONG CONSTRUCTED RESPONSE**

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**15 minutes**

Post your blog on the class webpage for others to read and comment on.

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**Scoring Guide (Work Meets Expectations If):**

Fits the Meets Expectations category in the rubric for the teaching task.

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**Instructional Strategies:**

Book computer lab so they can access technology in order to upload content. Have students to read and comment on peer work and evaluate their analysis.

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## Resources

### *Uploaded Files*

### *Keywords*

### *Links\**

\* These Lexile measures were computed automatically and did not undergo human review. They are not certified measures and should not be published or recorded in any way.

### *Other Resources*

#### Racing for Sam-Progeria

A mother fights for her child who suffers from Progeria, trying to extend his life through genetic manipulation.

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#### Stem-Cell Research

An informational text on Stem-Cell Research.

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#### Genome for All

Genome for All addresses designer babies and how genetic technology allows for humans to select traits for their children.

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## Section 4: What Results?

### Classroom Assessment Rubric

| Not Yet                 |  |
|-------------------------|--|
| <b>Focus</b>            | Attempts to address prompt but lacks focus or is off-task.   |
| <b>Reading/Research</b> | Demonstrates weak use of reading material to develop argument.   |
| <b>Controlling Idea</b> | Establishes a claim and attempts to support an argument but is not convincing; (L2) Attempts to acknowledge competing arguments.   |
| <b>Development</b>      | Reasoning is not clear; examples or explanations are weak or irrelevant. (L3) Connection is weak or not relevant.  |
| <b>Organization</b>     | Provides an ineffective structure; composition does not address requirements of the prompt.  |
| <b>Conventions</b>      | Demonstrates a weak command of standard English conventions; lacks cohesion; language and tone are not appropriate to audience and purpose.  |
| Meets Expectations      |  |
| <b>Focus</b>            | Addresses the prompt and stays on task; provides a generally convincing response.  |
| <b>Reading/Research</b> | Demonstrates generally effective use of reading material to develop an argument.   |
| <b>Controlling Idea</b> | Establishes a credible claim and supports an argument that is logical and generally convincing. (L2) Acknowledges competing arguments while defending the claim.                                 |
| <b>Development</b>      | Develops reasoning to support claim; provides evidence from text(s) in the form of examples or explanations relevant to the argument (L3) Makes a relevant connection(s) that supports argument. |
| <b>Organization</b>     | Applies an appropriate text structure to address specific requirements of the prompt.  |
| <b>Conventions</b>      | Demonstrates a command of standard English conventions and cohesion; employs language and tone appropriate to audience and purpose.  |

### Classroom Assessment Task

No Classroom Assessment Task for this module

### Exemplar Work

*Uploaded Files*

*Comments*

Author Notes

Other Comments