

# Pop-Outs

8th Grade



*This slide deck is intended to help guide you and your students through the sequence of each pop-out lesson, which focus on issues of social justice and the nature of science. Each pop-out may be implemented at any point throughout the corresponding unit as the content is intertwined with, yet independent of, the unit concepts; however we offer a timing recommendation in each teacher guide. While you may choose to use these slides as a helpful tool to prompt and facilitate students, all detailed information for each pop-out is in the student and teacher unit booklets.*

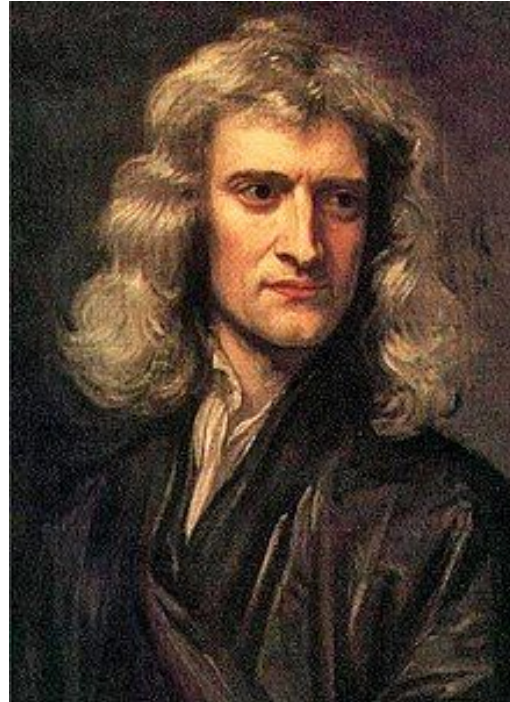
# Pop-Out 1: What is a Scientist?

Unit 1:  
Colossal Collisions

What makes a person a  
scientist or engineer?

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In Unit 1, you learned about Isaac Newton's work to develop concepts of motion and collisions...



Are there other scientists or engineers who have contributed to the science of motion and collisions?



# Engage



# What is a scientist or engineer?



1. Individually, draw a scientist or engineer in their environment:
  - a. What do they look like?
  - b. What do they do?
  - c. What tools do they use?
2. Share and compare your drawing with a partner.
3. Discuss as a class to define *scientist* and *engineer*.

# Explore

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# Is this person a scientist or engineer?



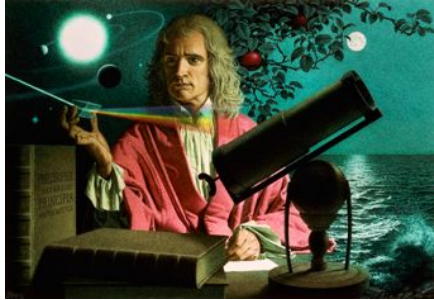
With your group,

1. Read and annotate your assigned case study.
2. Record your analysis in your student guide.

# Explain

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# Share and learn about other case studies

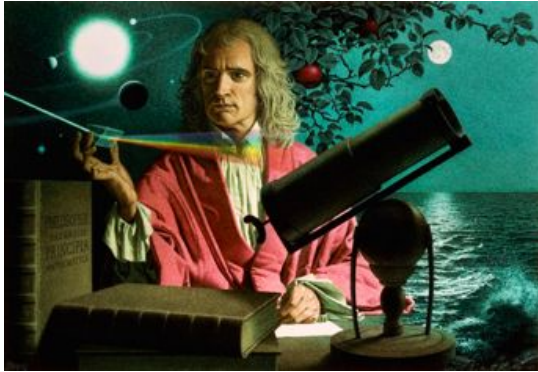


1. Prepare a 1-2 minute presentation about your case study.
2. Present to two other groups.
3. Record notes about the other 2 case studies in your student guide.

# Elaborate

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# Draw conclusions: Is each of these people a scientist or engineer?



# Evaluate and Reflection



# Reflect: What is a scientist and what is an engineer?

Write and then discuss:

1. Look back at your original picture of a scientist or engineer. What would you add, subtract or change?
2. Look back at our definitions of a scientist and an engineer. What would you add, subtract or change?
3. Do you believe you are a scientist or engineer? Do you see yourself becoming a scientist or engineer? Why or why not?
4. What do you envision when you think of a scientist or an engineer? What makes a person a scientist or engineer? How do we know?

# Pop-Out 2: How Power Influences Science

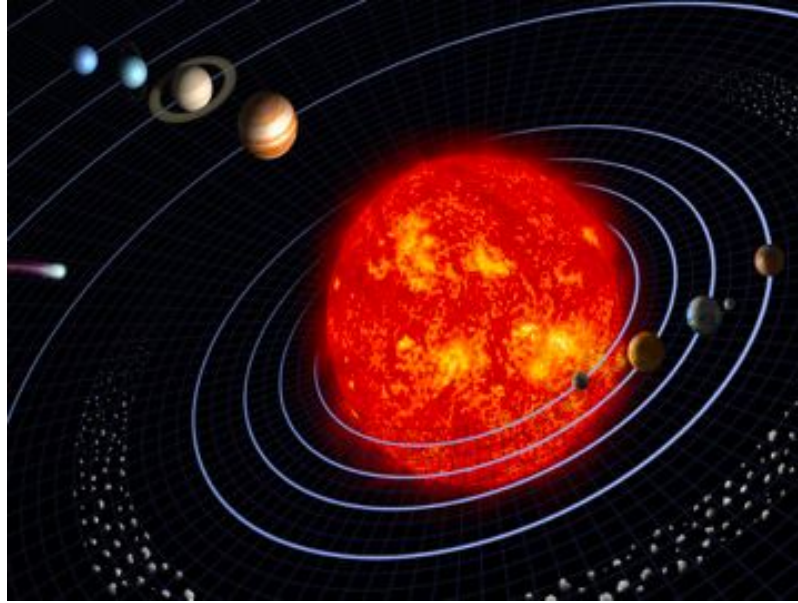
Unit 2:  
Travelling Through Space

How do scientific ideas change  
and who has the power to  
change them?

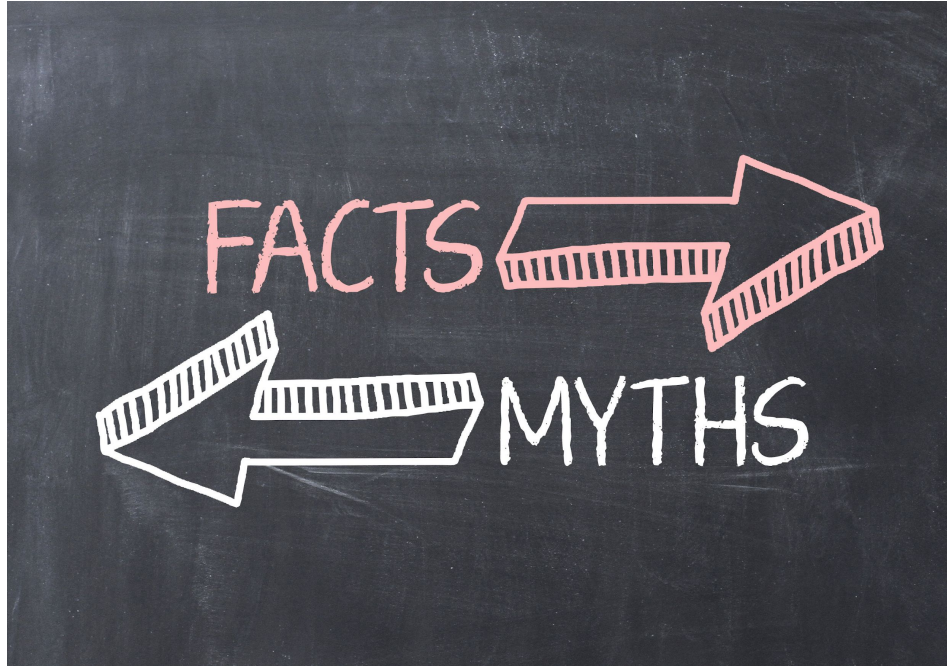
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In Unit 2, you learned about scientific ideas related to our solar system...



But how did we come to know these scientific ideas?



# Engage



# Make a Guess



1. True or False? It is possible to sail off the edge of the Earth.
2. True or False? Over the course of history, people have believed that the Earth is different shapes.
3. True or False? There has been a lot of debate over the shape of the Earth.
4. What shape is the Earth? How do we know?

# Why was there a controversy over whether the Earth was flat or round?

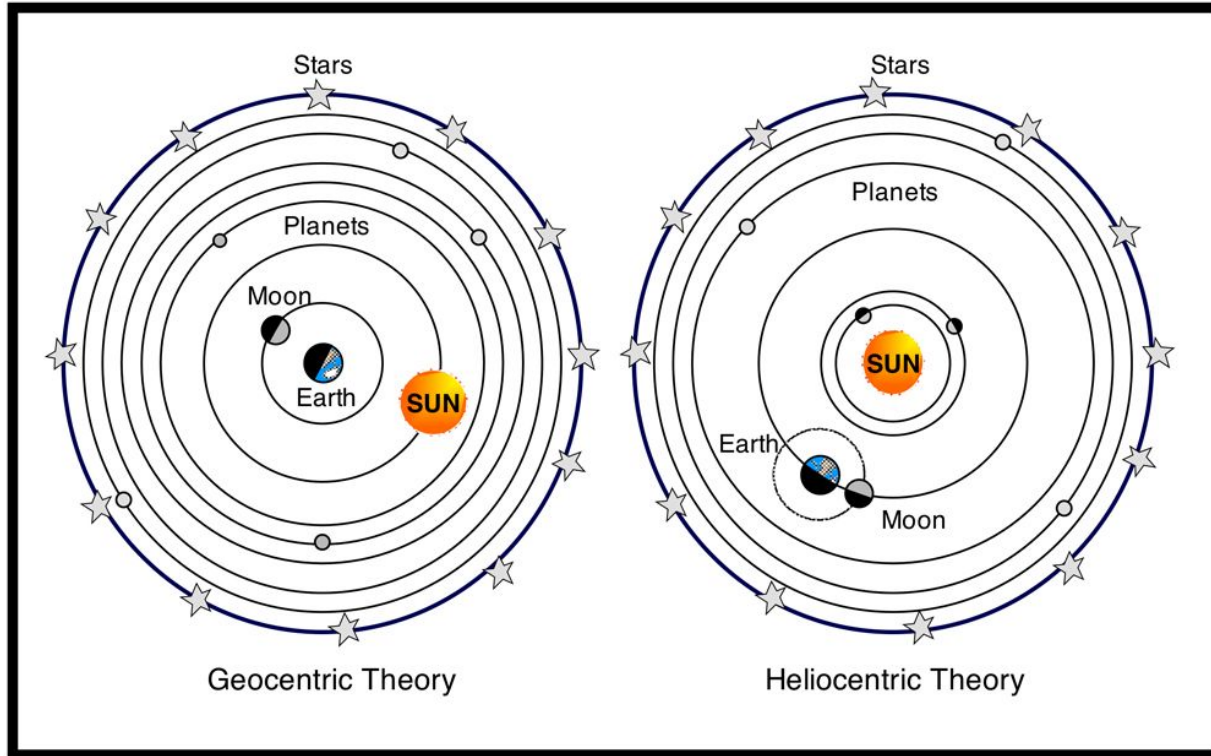


In partners, read about the flat vs. round Earth debate. Discuss and answer the questions in your student guide.

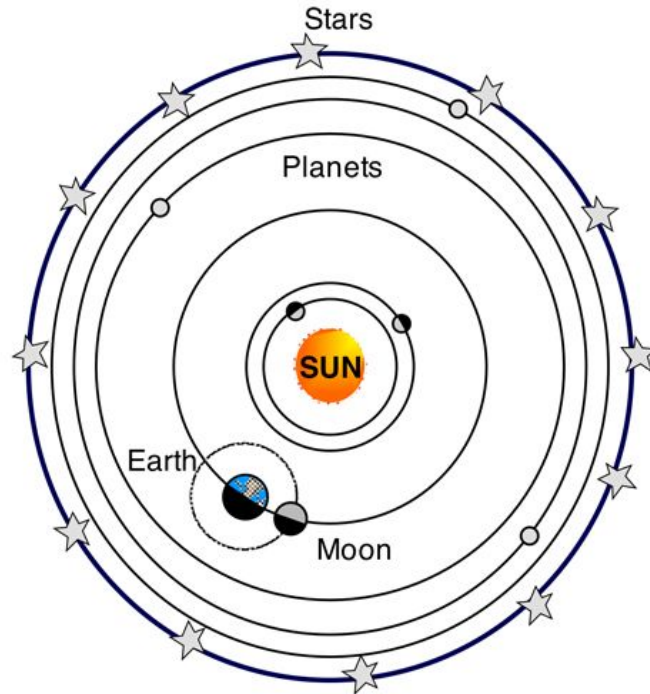
# Explore

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# The Heliocentric vs. Geocentric Controversy



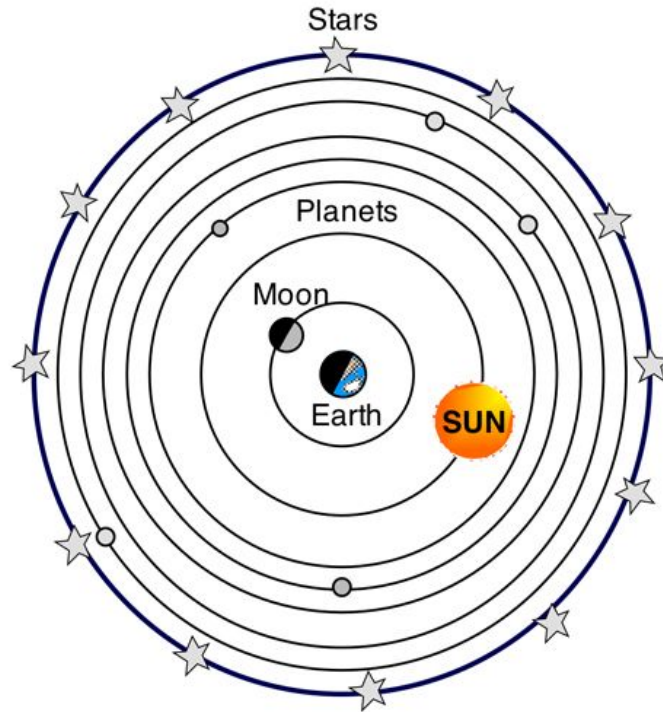
# The Heliocentric Model



The sun sits in the center of the solar system, with planets orbiting around it

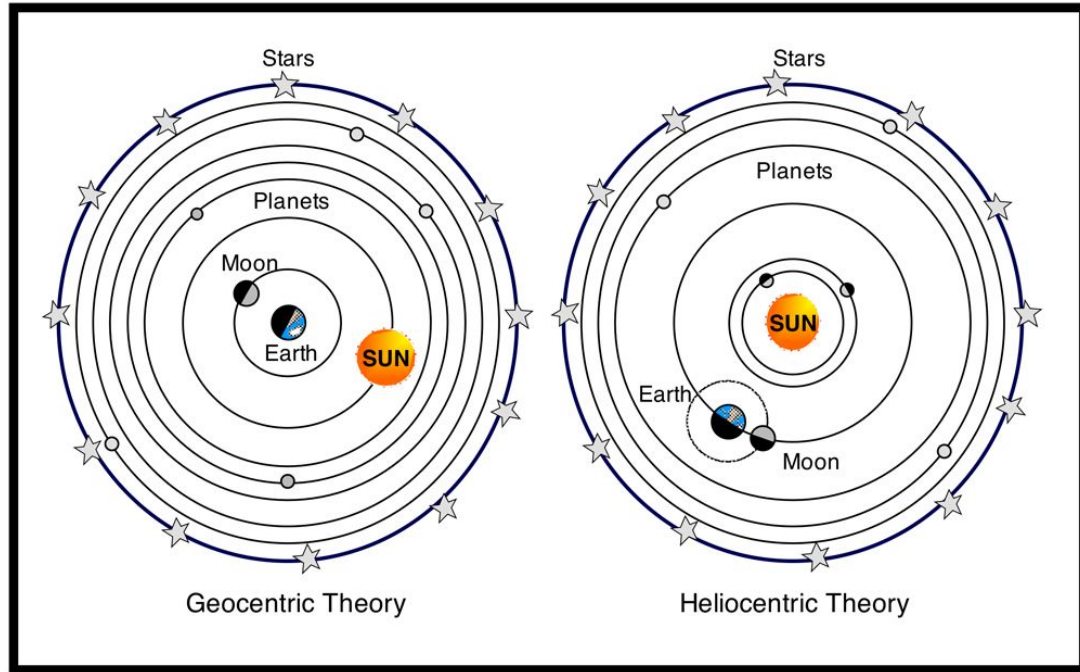


# The Geocentric Model



The Earth sits in the center of the solar system, with the sun and planets orbiting around it

# The Heliocentric vs. Geocentric Controversy

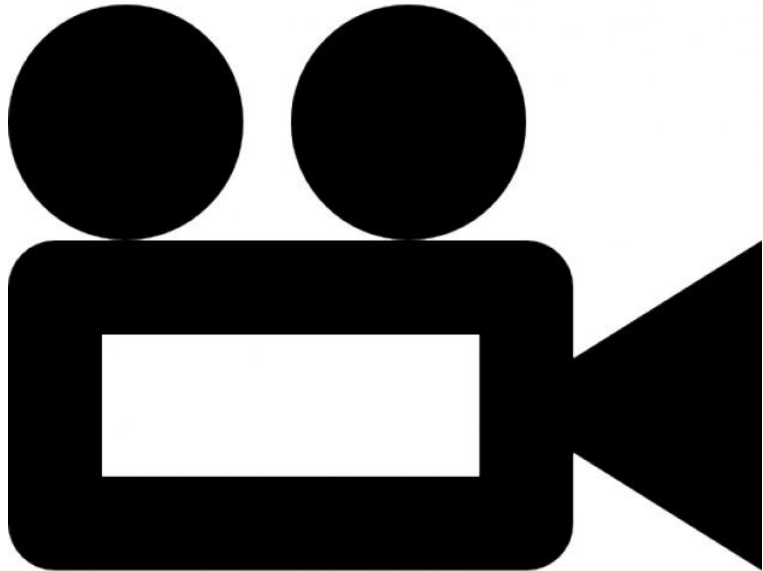


With your group, research the controversy using the resources and instructions provided in your student guide.

# Explain

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# Make a mini-video!



1. As a group, plan a 1-2 minute video explaining the Heliocentric vs. Geocentric controversy.
  - a. Use at least 2 of the sources.
2. Record your video. Your teacher will pick one to share with the class.

# Elaborate

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# Examine a more recent controversy - Is climate change caused by humans?



1. Read and annotate the article about the climate change controversy.
2. Think about the questions in your student guide and record your analysis in the table provided.

# Evaluate and Reflection

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# Reflect: Can scientific ideas change and who has the power to change them?

1. Based on what you've learned about controversies, do specific people or groups have more power to change scientific beliefs? How can self-interests influence science?
2. Do you think that there are scientific beliefs we hold now that could be changed in the future? Does what you've learned in this pop-out affect how you'll consider scientific discoveries or beliefs?



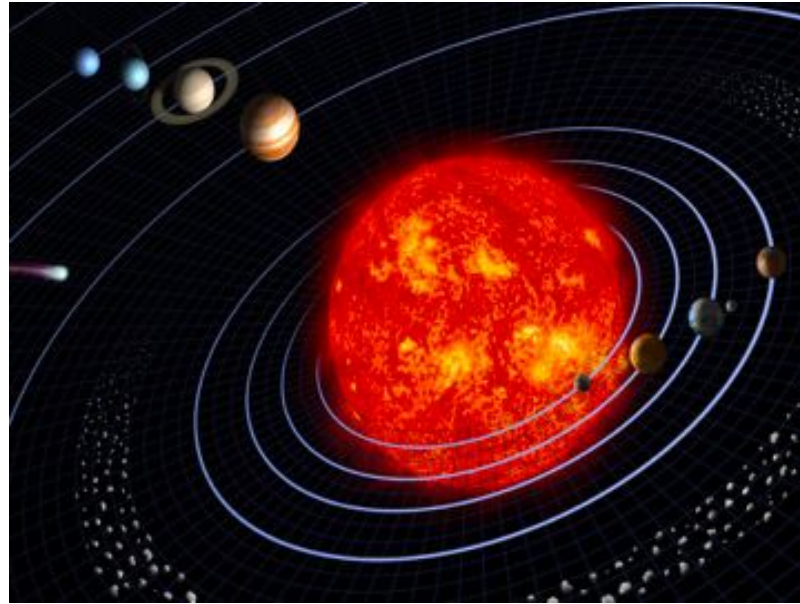
# Pop-Out 3: Right, Wrong, and In-Between

Unit 3:  
Adapt or Die?

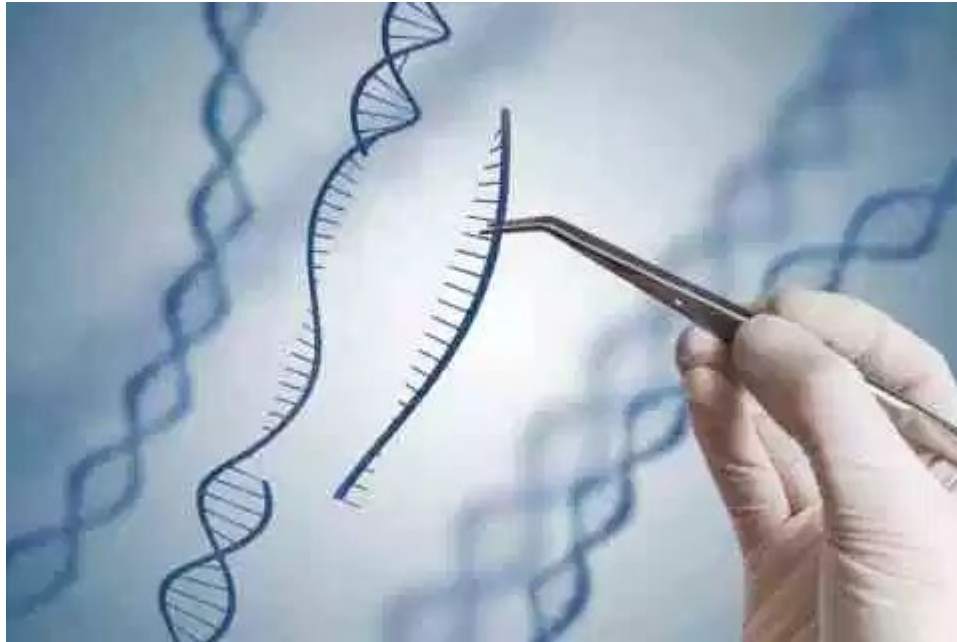
How do we decide what is  
most ethical in science?

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In Unit 3, you learned about how organisms change over time...

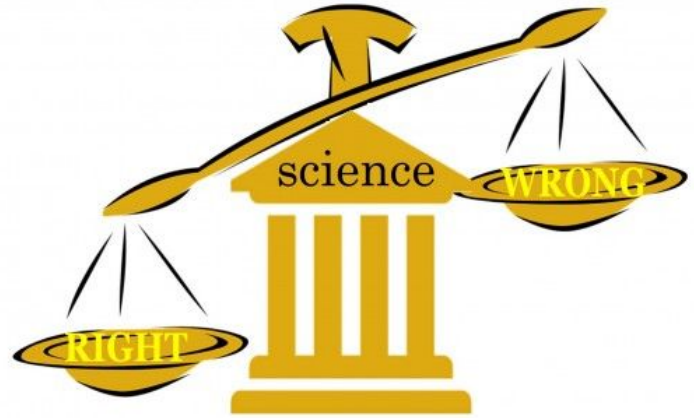


Humans now have the technology to intentionally change organisms!



# How do we decide what is most ethical in science?

When a scientific discovery, like genetic modification, can help some people and hurt others, how do we decide what to do?



# Engage

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# An Imaginary Ethical Dilemma



Pros	Cons

1. Individually, read the imaginary case about the new medicine, *Apoptosis*.
2. In partners, discuss the questions in your student guide and record in the table.

# Explore

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# A Real Ethical Dilemma: The Food Crisis in Zambia



Individually,

1. Read and annotate the article about the real food crisis in Zambia.

In partners,

2. Discuss the questions in your student guide and record in the table.



# Explain

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# If you were the President of Zambia, what would you do?

Discuss the following questions with a partner to help you decide if you would have accepted the genetically modified food or not:

- What is the problem?
- What is the solution?
- Who will be helped and who will be hurt?
- What are the benefits of your chosen solution?
- What is the cost of your chosen solution?
- What are the short and long-term effects of your solution?

Record your decision in your student guide.

# Elaborate

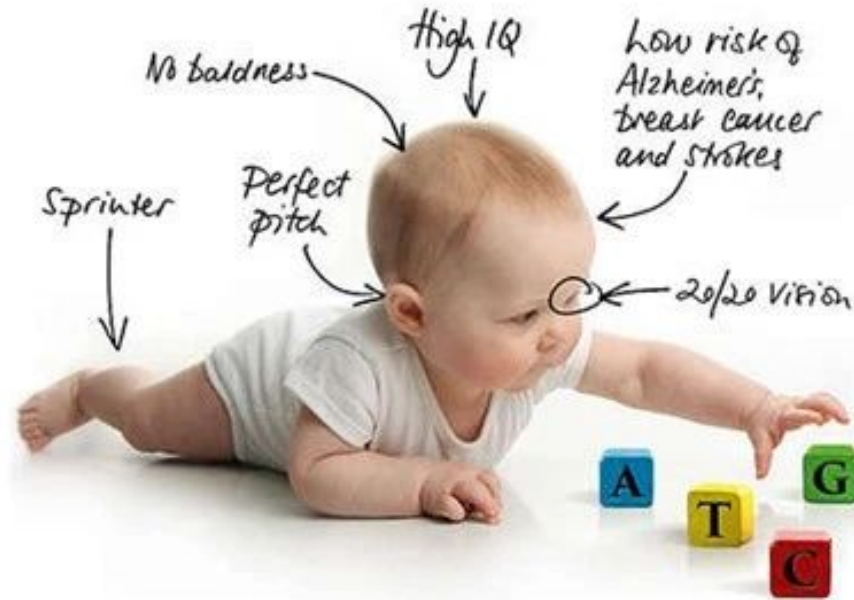
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# Genetically modified organisms are not just plants!



**Designer Babies** - A human embryo that has been genetically modified to produce desirable traits.

# A Current Ethical Dilemma: Designer Babies



Read and annotate the article about Designer Babies.

# Four Corners Activity

Disagree

Agree



Strongly  
Disagree

Strongly  
Agree

I will read a series of statements related to Designer Babies.

- For each statement, move to the corner of the room that best reflects **your** personal opinion (Agree, Strongly Agree, Disagree, or Strongly Disagree)
- Be prepared to share why you chose that corner.

# Do you think Designer Babies should be allowed?



Based on the article and the Four Corners activity, individually record your ideas in your student guide.

# Evaluate and Reflection

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# How do we decide what is most ethical in science?

When a scientific discovery, like the ability to create Genetically Modified Organisms, helps in some ways and hurts in others, how do we decide what to do?

Individually, write a statement in your student guide that includes:

- Both sides of the GMO argument with evidence from the articles
- Your opinion
- A conclusion that explains why it is sometimes challenging to decide what is ethical in science.

# Pop-Out 4: Environmental Injustice

Unit 4:  
Using Engineering and  
Technology to Sustain Our World

How do we contribute to environmental problems and how do these problems affect certain populations more than others?

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In Unit 4, you learned how humans are negatively impacting the environment...



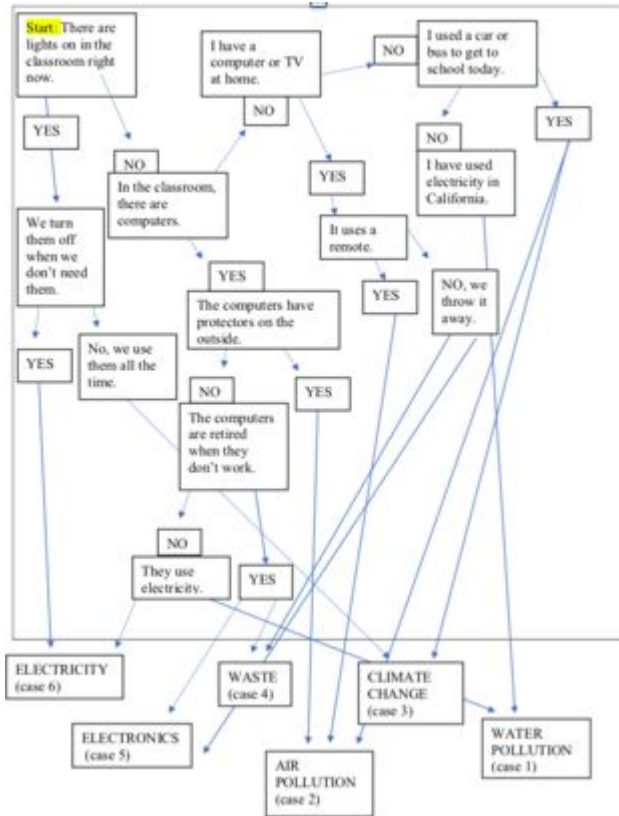
But how are you contributing to these problems and what communities suffer the most as a result?



# Engage

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# How do my actions affect the environment?



Individually,

1. Complete the flowchart in your student guide.
  - a. Answer the questions, circling answers as you go.
  - b. Use a highlighter or colored pencil to trace your path.
2. Go back through the flowchart and think about how you might also contribute to some of the other environmental problems listed.

# Let's discuss our impact

Reflect on the flowchart and discuss as a class:

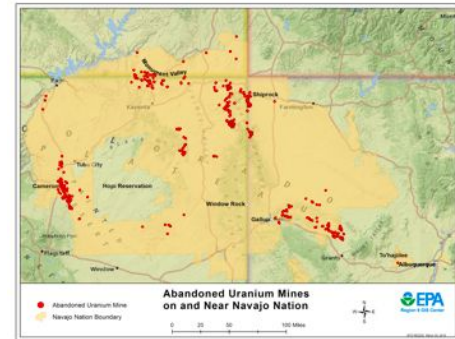
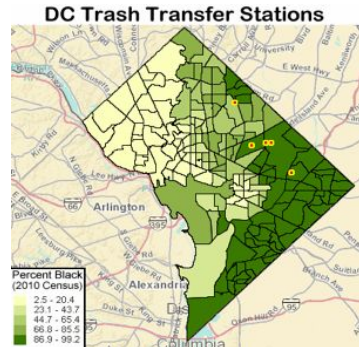
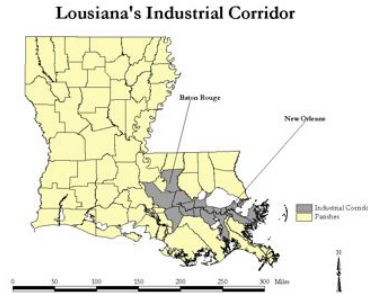
1. What environmental problem did you contribute to?
2. Do you think there are other ways you contribute to this problem?
3. Are there other environmental problems your actions contribute to aside from the one you landed on?

# Explore





# Case Studies of Different Environmental Problems

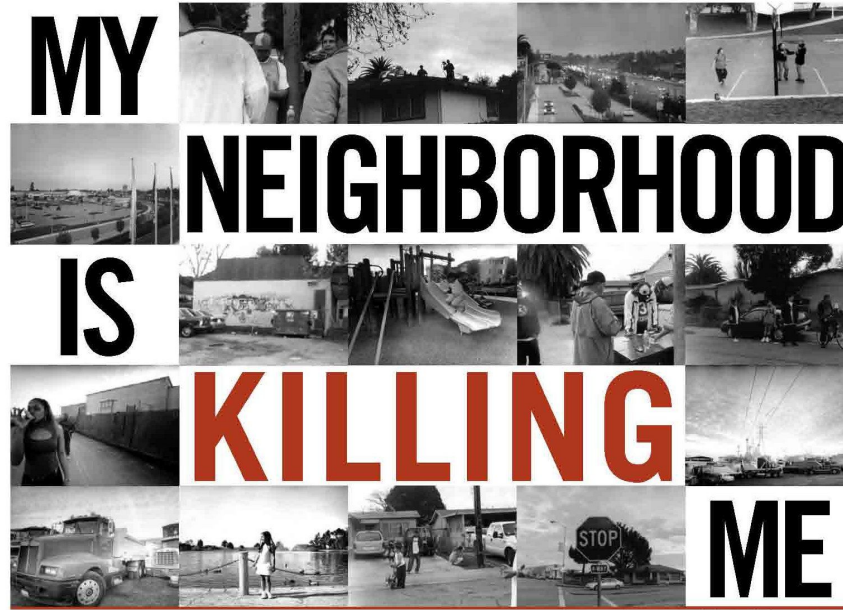


Explore your group's case study and record analysis in the chart in your student guide.

# Explain

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# This trend is known as environmental injustice

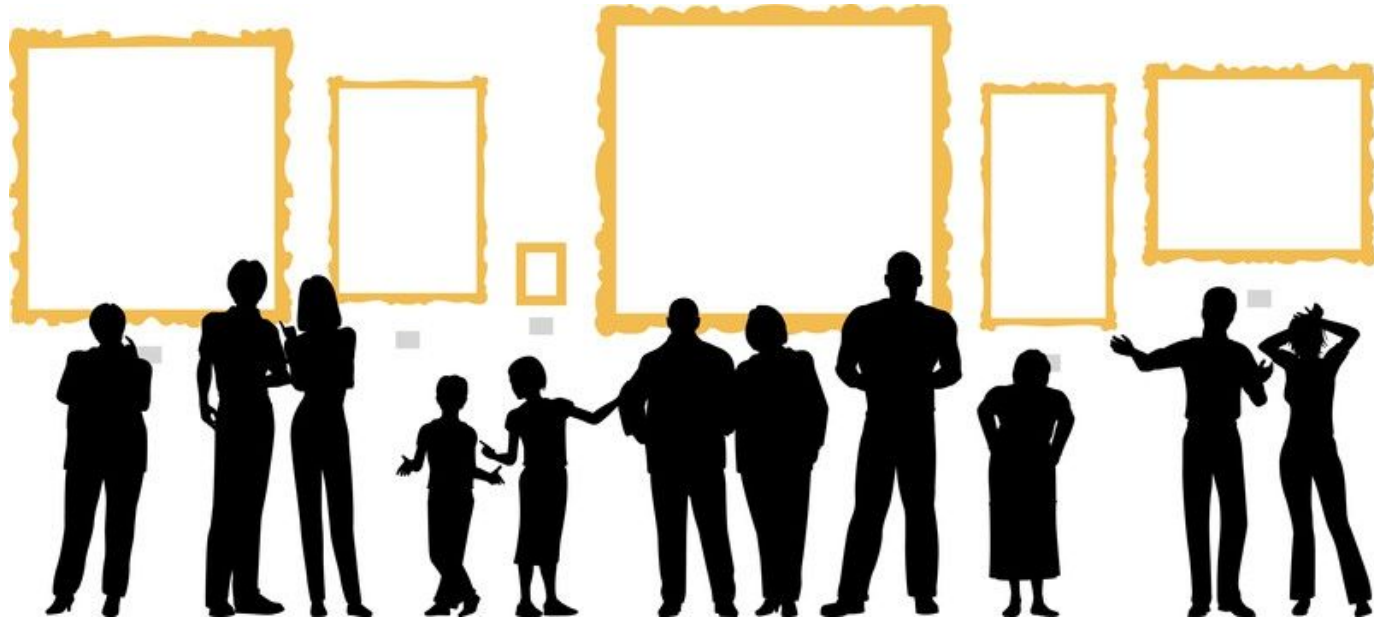


**Environmental Injustice** - when minority communities are unfairly affected by the impacts of environmental problems.

# Make a poster about your environmental problem



# Gallery Walk



Take notes about the other environmental issues in your student guide.

# Elaborate

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# It is not hopeless!



With your group,

1. Read about the soybean pesticides in Argentina to learn about a community attempting to combat an environmental issue.
2. Discuss the questions and take notes in the chart in your student guide.

# Evaluate and Reflection





# Is there environmental injustice? What can we do about it?

Discuss with your group and then as a class,

1. What do the different case studies have in common?
  - a. Why do certain communities seem to be more affected by environmental problems than others?
2. Regardless of whether your community is personally affected, we all are connected to these environmental problems.
  - a. How are you personally contributing to these environmental problems?
  - b. What can you do about it?