

Pop-Outs

6th Grade

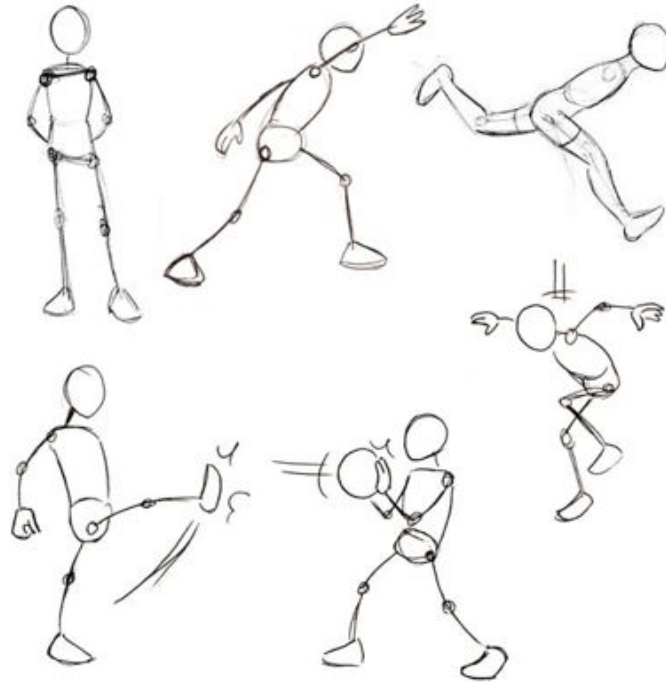
This slide deck is intended to help guide you and your students through the sequence of each Pop-Out lesson, which focus on issues of diversity, equity, and social justice in science. Each Pop-Out may be implemented at any point throughout the corresponding unit as the content is intertwined with, yet 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: Engineering for Equity

Unit 1: Setting Things in Motion

How can we use engineering to provide more access for people with disabilities?

In Unit 1, you have been thinking about an activity that requires your body to make an object move.

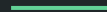


What about people who aren't able to do an activity like yours because of a disability?



How can we make activities like yours more accessible to as many people as possible?

Engage



Students Can Be Engineers Too!



What Solution Did These Students Engineer?



<https://www.youtube.com/watch?v=TwCLOBEUXjs>.

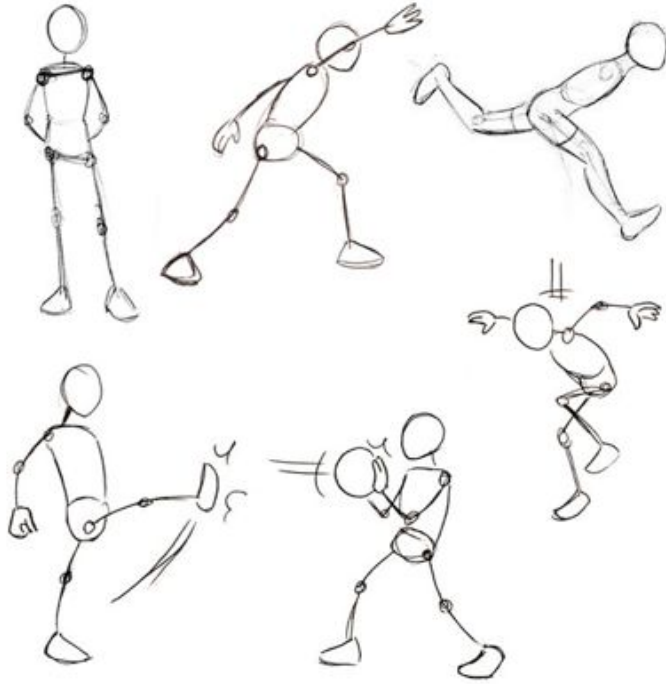
What Solution Did These Students Engineer?



Discuss with a partner:

1. What problem were the students trying to solve for Cillian?
2. In what ways did this design solution make the world more accessible for Cillian? How might it benefit other kids and adults?
3. What ways do you think the students benefited, learned, or grew from this engineering experience?

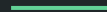
Reflect On Your Group's Project Activity



Discuss with your group:

1. In what ways might your activity be difficult or impossible for some people to do?
2. Brainstorm some initial ideas of what you could engineer (design) so that more people could do your activity?

Explore



What Have Engineers Already Come Up With?



As a group:

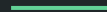
1. Research examples of solutions that engineers have designed to improve the lives of people with disabilities.
2. As you research, record notes in the table in your Student Guide.

Brainstorm a Solution for Your Own Activity



Use your research as inspiration to brainstorm a potential solution to make your Culminating Project more accessible to someone with a disability. Describe in your Student Guide.

Explain



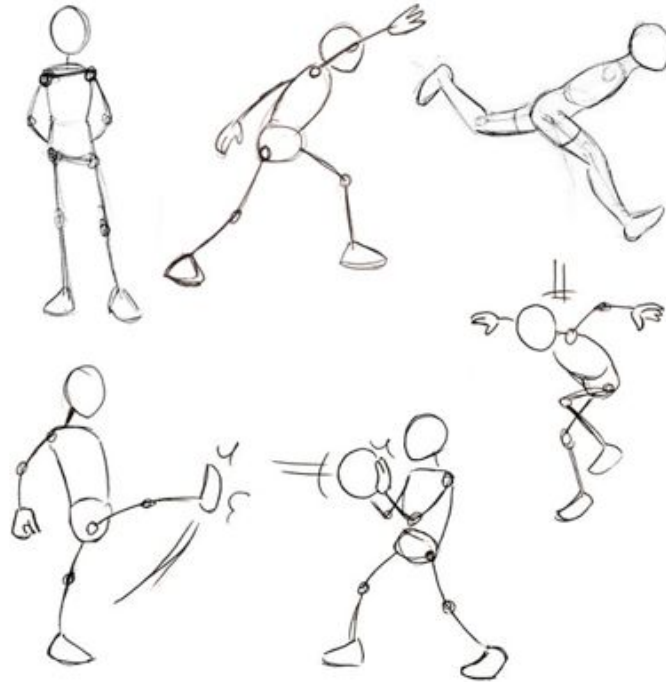
Present Your Solution To The Class



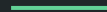
As a group, prepare a 1-2 minute presentation that includes:

- What your activity is
- What might make this activity difficult for someone with a disability
- What your solution is and how it helps to solve a problem
- What research inspired your solution

How Might Some of These Solutions Be Used For Many Different Activities?



Elaborate



Many of these solutions were engineered to make an existing activity more accessible to people with disabilities...



What if we instead decided to always try to engineer products and environments to be usable by all people from the very beginning?

What is Universal Design?



<https://www.youtube.com/watch?v=bVdPNWMGyZY>

Discuss Universal Design

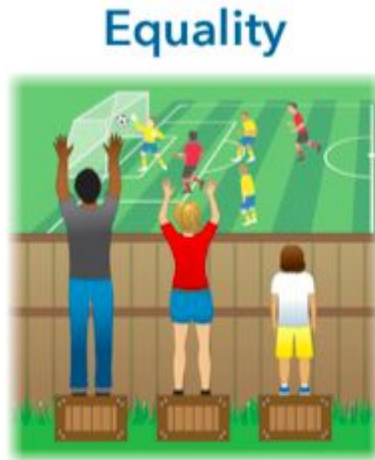


1. Describe the example of Universal Design he used in the video.
2. Can you think of another example you have seen in the world that not only works for people with disabilities but also for everyone?
3. Why do you think Universal Design might be a good idea?

Respond to these questions in your Student Guide with a partner.

Evaluate and Reflection

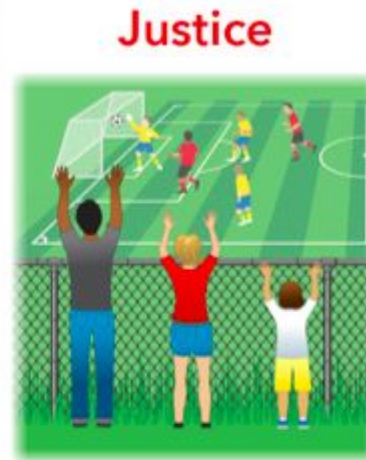
How Can We Use Engineering To Provide More Access for People With Disabilities?



The assumption is that **everyone benefits from the same supports**. This is equal treatment.



Everyone gets the supports they need (this is the concept of "affirmative action"), thus producing equity.



All 3 can see the game without supports or accommodations because **the cause(s) of the inequity was addressed**. The systemic barrier has been removed.

How Can We Use Engineering To Provide More Access for People With Disabilities?

Individually respond to the questions in your Student Guide:

1. Look at the pictures and captions:
 - a. How do you think the photos show the difference between equality, equity, and justice?
 - b. Look at the picture on the left: why can only practicing equal treatment sometimes be a problem?
2. Why do you think it is important for us to practice using equity or justice, instead of just equality?
3. How can engineering be used to promote equity and justice for all human beings?

Pop-Out 2: Equity in STEM

Unit 2: Extreme Living

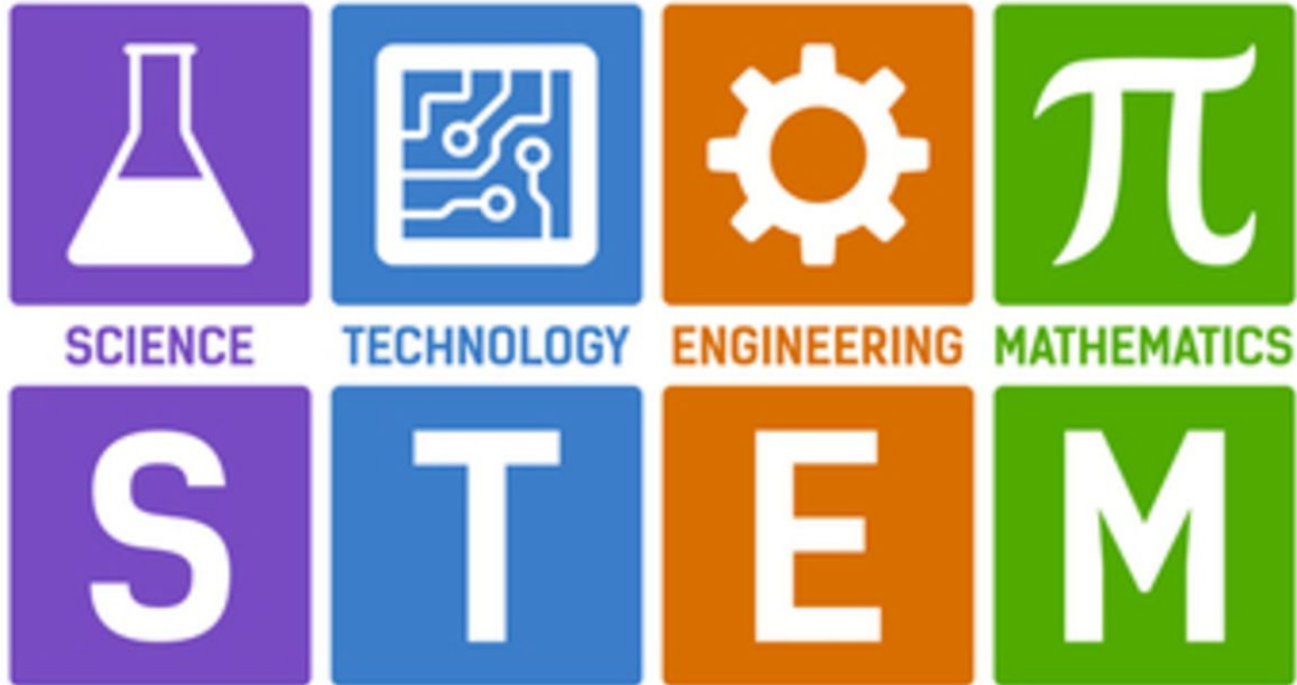
Is there diversity in STEM and
why does it matter?

In Unit 2, your job is to design a product that makes it more comfortable for people to live in extreme climates.



What you are doing is engineering!

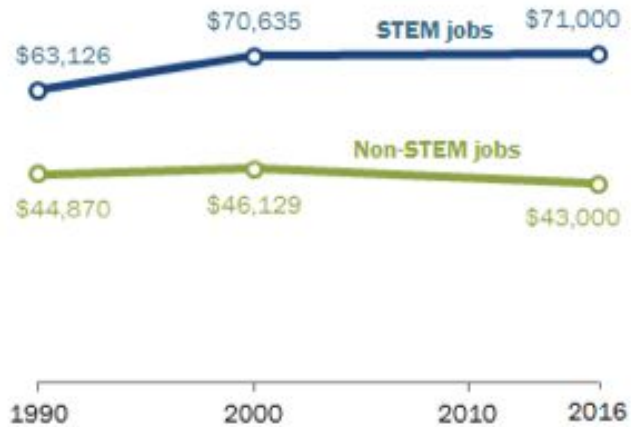
Engineering is part of a larger category called STEM



In STEM - Lots of Jobs Available and Higher Pay

The typical STEM worker now earns two-thirds more than non-STEM workers

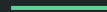
Median annual earnings of full-time, year-round workers ages 25 and older, in 2016 dollars



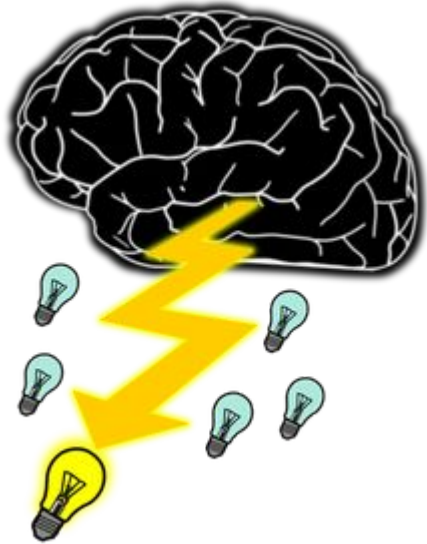
With these perks, you might think all kinds of people decide to work in STEM professions!

But who actually works in STEM fields and why does this matter for the rest of society?

Engage



STEM Innovations Come From The Brains of Engineers...Who Are These Engineers?



Individually, think about when you've acted like an engineer:

1. Do you think you'd come up with a better solution on your own or with others?
2. Do you think you'd come up with a better solution if your team was made up of very similar people or people with different backgrounds, perspectives, and experiences?

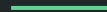
Answer these questions in your Student Guide

Diversity Refers to Difference

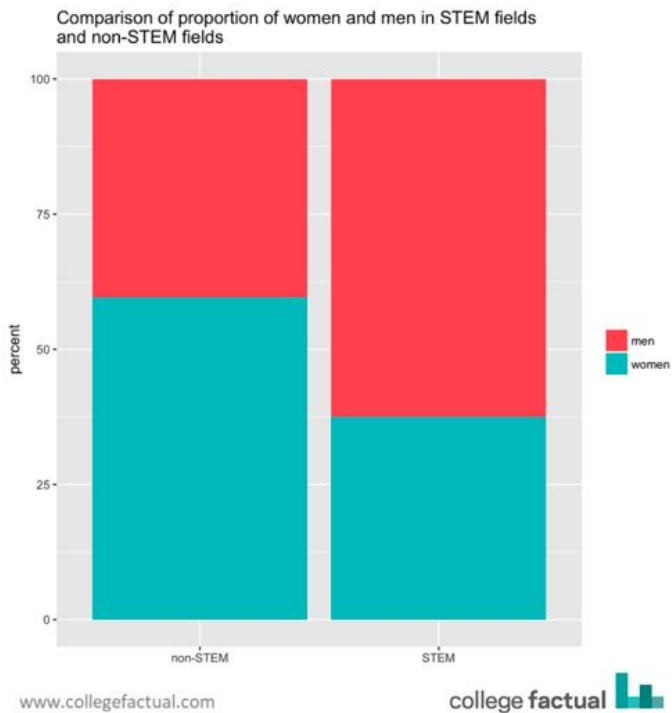


Do you think diversity is important in STEM fields? Why?

Explore



How Diverse Are STEM fields in reality?

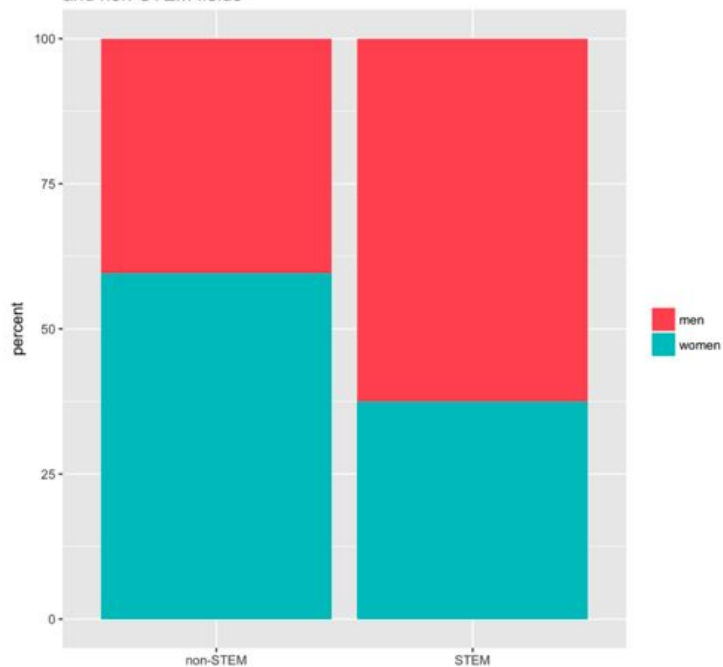


As a group:

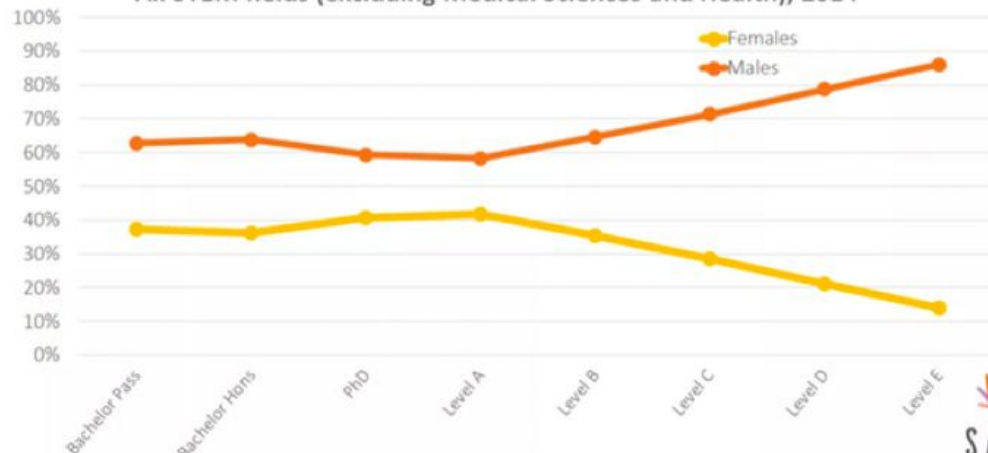
1. Analyze the graphs in the 4 Research Cards to help you answer this question.
2. Discuss the graph analysis questions to help you understand each source of data.
3. Fill in the graphic organizer in your Student Guide.

Key Takeaways - Gender Diversity

Comparison of proportion of women and men in STEM fields and non-STEM fields



Gender representation by student completions and academic level
All STEM fields (excluding Medical Sciences and Health), 2014



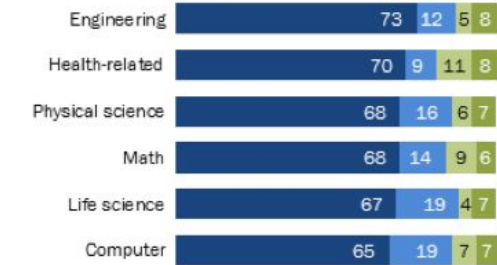
Key Takeaways - Racial Diversity

Blacks and Hispanics underrepresented across most STEM job clusters

% of employed in each occupational group who are ...



Among those who work in ___ jobs



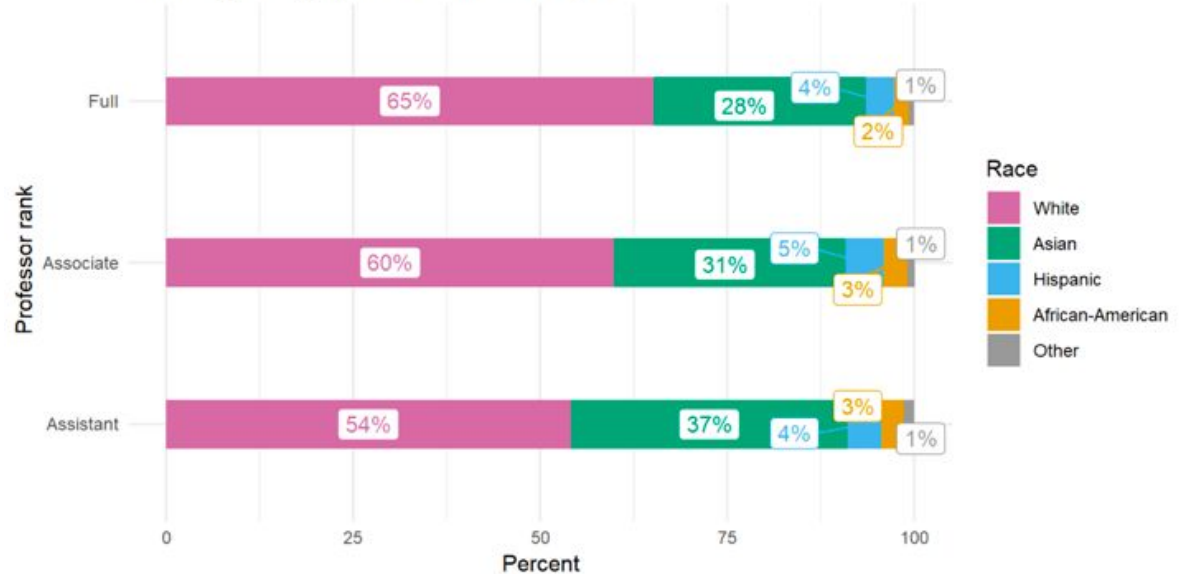
Note: Based on employed adults ages 25 and older. Whites, blacks and Asians include only non-Hispanics. Hispanics are of any race. Other and mixed race non-Hispanics are not shown. Engineering includes architects. STEM stands for science, technology, engineering and math.

Source: Pew Research Center analysis of 2014-2016 American Community Survey (IPUMS).

"Women and Men in STEM Often at Odds Over Workplace Equity"

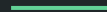
PEW RESEARCH CENTER

Engineering professor demographics From "Engineering by the Numbers" 2017 report



*Other category includes American Indians, Hawaiian/Pacific Islanders and Two or More.
†Data on ethnicity does not include foreign nationals.

Explain

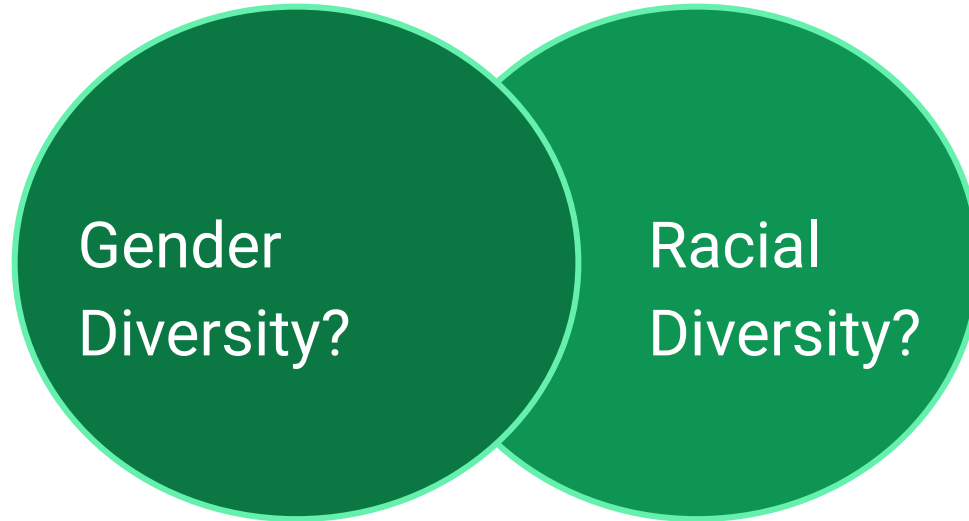


How Would You Explain the Amount of Diversity in STEM To Another Person?

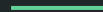
Claim About Diversity in STEM	According to data, would you say there is a lack of diversity in STEM, lots of diversity in STEM, or is it too difficult to tell?
Evidence of Gender Diversity (Describe what you saw in Graphs 1 and 2)	
Evidence of Racial Diversity (Describe what you saw in Graphs 3 and 4)	

Individually fill out the graphic organizer in your Student Guide

Class Debrief - Is There Diversity in STEM?



Elaborate



Why Is There a Lack of Diversity in STEM?

SCALE Pop-Out 2

Article: Why Are We Seeing a Lack of Diversity in STEM?

The data makes it clear that the majority of people studying STEM majors in college and pursuing STEM jobs are white and male. Why is there a serious underrepresentation of women and minorities in STEM?

Representation: First, we need to think about who is likely to see themselves as a scientist or engineer. Can you imagine an adult saying that building a robot or building a car are “boy’s activities”? How often do you see robot toys next to dolls in the girl’s toy aisle at Target? Young girls get these kinds of messages all the time, so many have a hard time picturing themselves doing STEM jobs like these later in life. Also, if children grow up rarely seeing examples of female, black, or Hispanic scientists and engineers, it is harder for them to envision it as a future for themselves. This may lead to more white and male children and fewer female and minority children being interested in pursuing STEM careers.

Access: The second answer to this question lies in the pathway to entering the STEM field, which starts in schools just like yours. Most STEM majors require rigorous math and science courses in high school. Unfortunately females and underrepresented minorities are less likely to take these courses. This may be because a bias against their race or gender keeps adults from encouraging students to take these courses. Some schools don’t even offer these courses. If these female and minority students do not get to take these classes, they have fewer opportunities to become a STEM major in college. This leads to fewer women and minorities with STEM jobs in the future.

Discrimination: Even for those that do make it into a STEM major or a STEM job, women and minorities can still face some major challenges. Many women and minorities in STEM experience discrimination because of their gender or race. They might earn a lower salary, get passed over for a job or promotion, or be treated as if they are less competent or capable. Added to that, women also often experience sexual harassment. All these factors often discourage some people from entering or staying in the field.

Now that we have three potential reasons for the lack of gender and racial diversity in STEM, what can we do about it?

Adapted From the Following Sources:

- o <https://www.nae.edu/69743/Engineering-Diversity-Fixing-the-Educational-System-to-Promote-Equity>
- o <https://www.nature.com/articles/d41586-018-02175-y>

1. Individually, read and annotate the article, “Why Are We Seeing a Lack of Diversity in STEM?”
2. Then with a partner, fill out the table in your Student Guide to:
 - a. Describe three possible reasons for the lack of diversity
 - b. Brainstorm at least one strategy to address each issue described
3. As a class, make a poster of potential strategies

Evaluate and Reflection

Is There Diversity in STEM and Why Does It Matter?

Individually respond to the questions in your Student Guide:

1. What do you think are some benefits to having a more diverse STEM workforce?
2. What do you think are the best ways to address the diversity issue?
3. Do you want to work in STEM when you get older (as a scientist, engineer, or mathematician)? Why or why not?

Pop-Out 3: Genetic Testing - Access Denied

Unit 3: Nature via Nurture

How is genetic testing important for our health and who has access to it?

In Unit 3, you have examined evidence around the nature vs. nurture debate and found that both are at play!

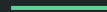


Nature = Genetics

Nurture = Environment

It's easy to look at environment but what about genes?

Engage



Perfect Pitch Is One of Those Traits We Know is Hereditary



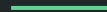
Having perfect pitch means you are able to recognize or make a tone without another reference, like hearing the tone or note on a piano.

But...even if you have the genetic variation, you need early musical training to actually develop perfect pitch!

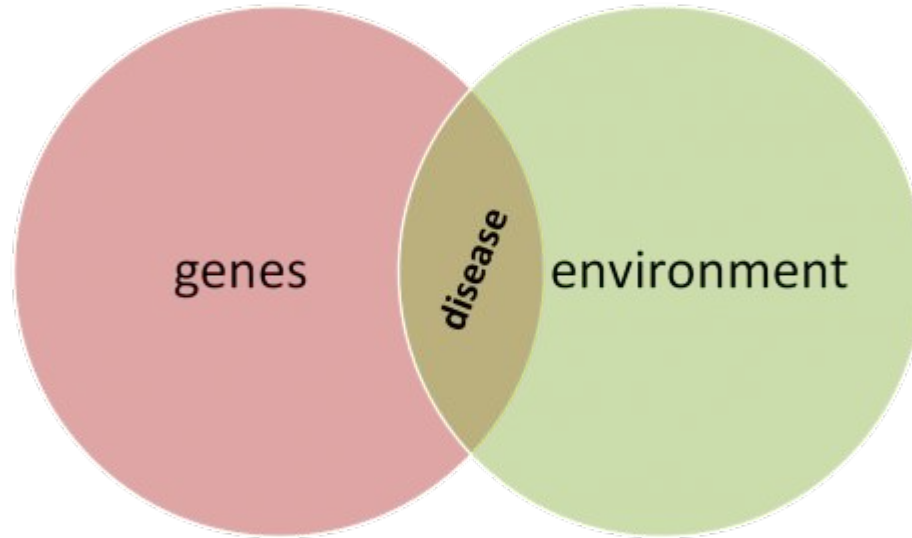


With a partner, discuss and respond to the questions in your Student Guide.

Explore



There Are Some Genetic Variations That Can Have a Big Impact on Your Health and Your Children's Health

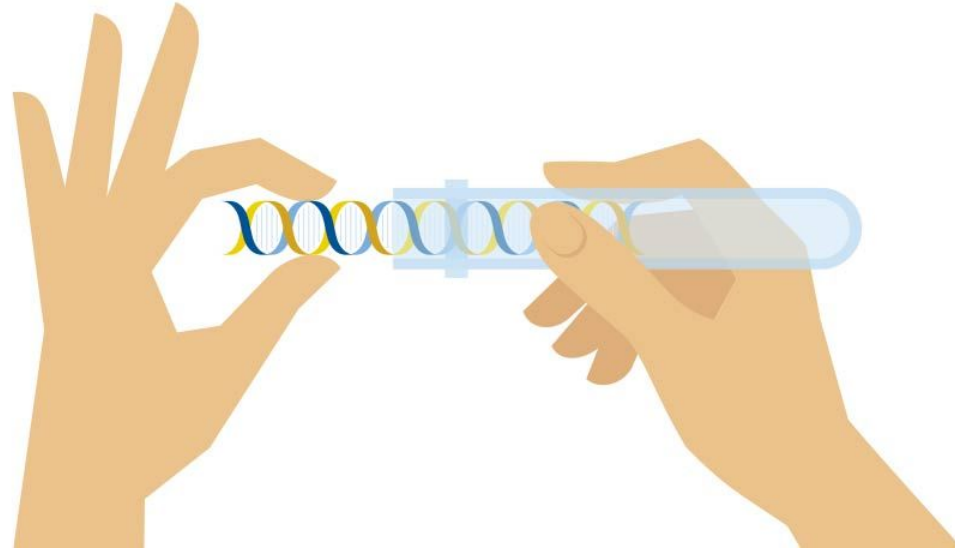


So How Can We Find Out About Our Genetic Makeup?



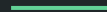
Genetic testing is a medical test that looks for any differences in your DNA code that can cause you to develop and/or pass on certain diseases.

Let's Learn About What Genetic Testing Can Do



As a group, pick one of the patients in your Student Guide and watch a video about their story. Take notes to prepare a presentation about this patient.

Explain



Present Your Patient's Story To The Class



As a group, prepare a short presentation to share your patient's story. Include:

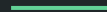
- A background of your patient
- A description of what medical issues or problems your patient was facing
- An explanation of how genetic testing helped your patient and/or your patient's family members

Class Debrief



What are the different benefits of genetic testing? Why is genetic testing important for health outcomes?

Elaborate



Since Genetic Testing Is So Important, It Should Be Available to Everyone...But Is It?

Who Has Access to Genetic Testing?

Genetic testing has been on the rise, helping doctors to prevent, diagnose, and treat more diseases. However, research has shown that minority and low-income groups are much less likely to receive genetic testing.

Research shows that a major reason for this is cost. Genetic testing is very expensive, and private insurance companies will only pay for it if the patient meets specific conditions. For example, an insurance company may only allow someone to get testing for a specific disease if they have other family suffering from the same disease. Other data also shows that minority and low-income groups are less likely to even have that private health insurance. These are just some of the reasons why many people often cannot afford this expensive genetic testing.

Another challenge minority and low-income groups face is not knowing that genetic testing is available or not getting enough understandable information from their doctor. If they don't know that genetic testing is an option, they can't ask for it. For example, research shows that white women are more likely to request genetic counseling for breast cancer than women in minority groups.

Lastly, studies indicate that there is often less trust in the medical system among minority groups. Many individuals report concern about how their genetic test results will be used. For example, research has shown that African American women perceive that there are more risks and limitations to genetic testing than other groups.

How will this affect the health of people in these groups? Is this fair?

Adapted From The Following Sources:

- <https://www.nature.com/articles/gim200997>
- <https://www.healthcarediver.com/news/genetic-testing-threatens-to-widen-health-disparities/424144/>

1. Individually, read and annotate the article, “Who Has Access to Genetic Testing?”
2. Then with a partner, discuss and answer the questions in your Student Guide.
3. Share ideas as a class.

Evaluate and Reflection

How Is Genetic Testing Important For Our Health and Who Has Access To It?



Individually respond to the questions in your Student Guide:

1. How can genetic testing be used for “good”?
2. How might access to genetic testing increase health disparities, or make the world less fair?
3. What do you think could be done to make sure genetic testing is used in a fair way?

Pop-Out 4: A Call For Equity in Climate Action

Unit 4: A Warmer World

Why does Greta Thunberg call
for equity in climate action?

In your Unit 4 Project, you are focusing on a plant or animal affected by climate change



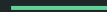
Humans are also suffering the impacts of climate change and it is only getting worse!

Climate Action refers to the efforts we can take to reduce our contributions to climate change and adapt to our situation



Who should be the major players in climate action and why?

Engage



Greta Thunberg - Youth Environmental Activist



What Greta Thunberg Says About The Climate Crisis



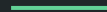
https://www.ted.com/talks/greta_thunberg_the_disarming_case_to_act_right_now_on_climate_change/up-next

Think-Pair-Share



Discuss the questions in your Student Guide with a partner and share ideas out as a class

Explore



Greta and Other Activists Say Equity, or Climate Justice, is Key to Climate Action...But Why?

**CLIMATE
JUSTICE**



First...What Is Equity?



Use what you learned in other Pop-Outs to discuss what you think equity means and record your ideas in your Student Guide.

Decide For Yourselves: What is Fair in Climate Action?



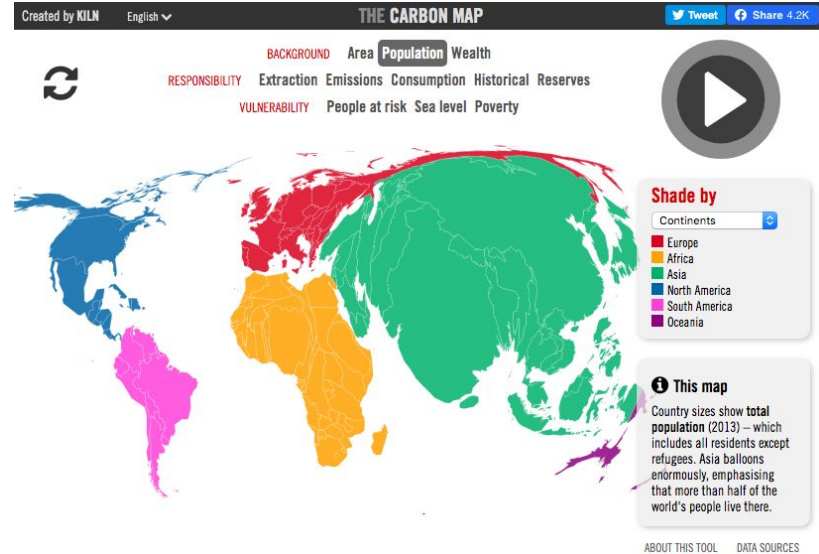
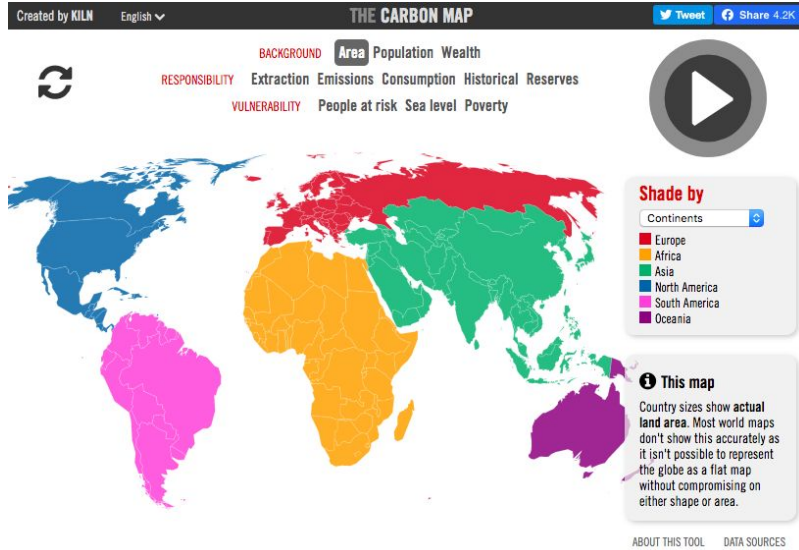
To inform your decision, you will use an interactive carbon map to gather some data

How Does The Interactive Carbon Map Work?



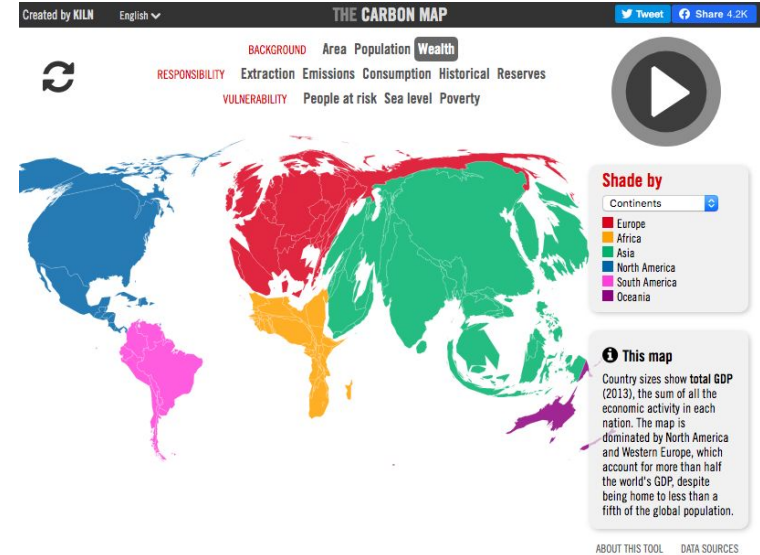
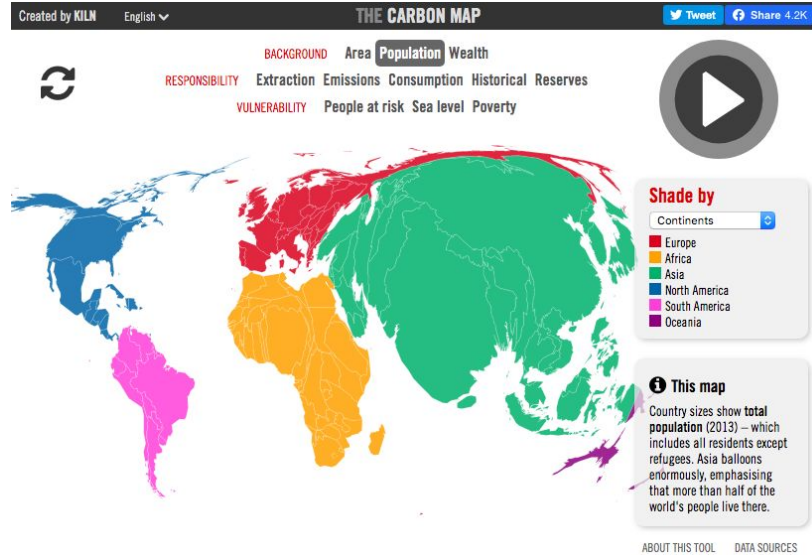
Go to carbonmap.org and watch the introduction video. Summarize what you learn in the box in your Student Guide.

Comparing “Area” Map to “Population” Map



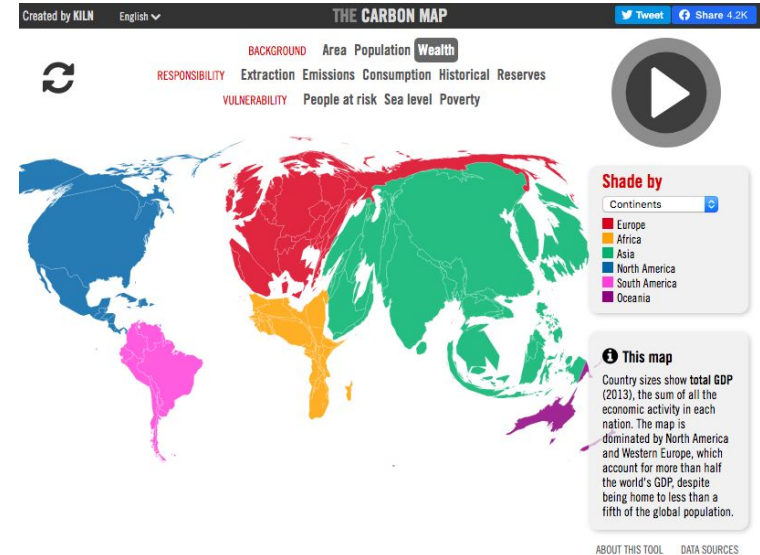
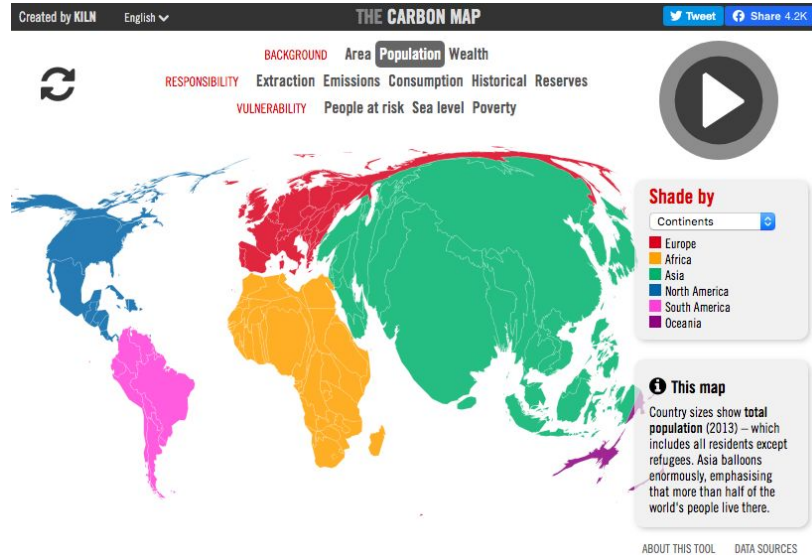
How is the “Population” Map different from the “Area” Map? Write down 1-2 things you notice.

Comparing “Population” Map to “Wealth” Map



How is the “Wealth” Map different from the “Population” Map? Write down 1-2 things you notice.

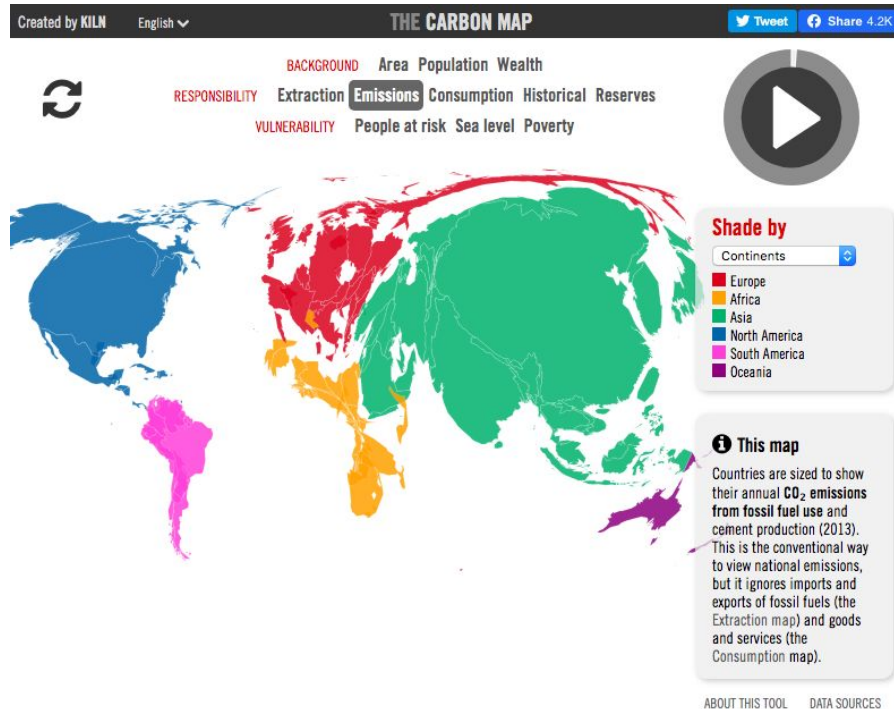
Comparing “Population” Map to “Wealth” Map



Compared to their population size, which continents have more wealth than you would expect? How could you explain this?

Explore The Interactive Carbon Map In Your Group

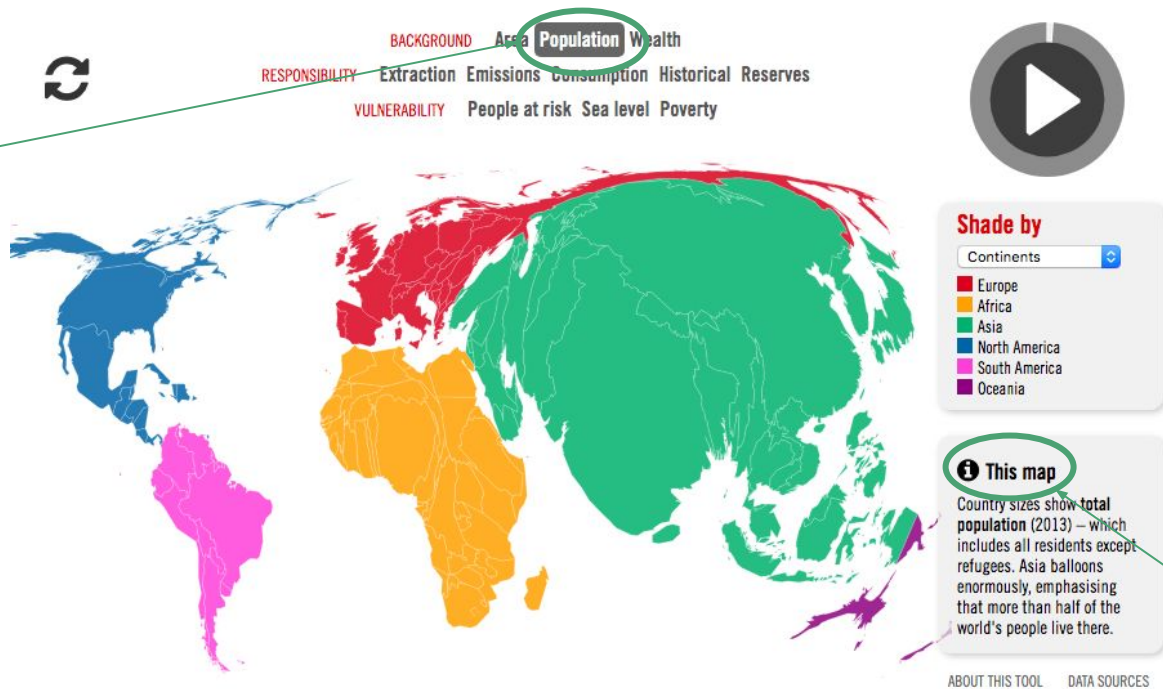
The rest of the Maps will show you which continents are most responsible for climate change and which are most vulnerable to the impacts.



1. Follow the directions in Your Student Guide.
2. Fill in the table in your Student Guide with your analysis.
3. Discuss the “Questions to Consider” to help you come to conclusions.

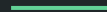
Helpful Hints

For each map, click back to the “Population” map to make comparisons



Check out the “This Map” box for useful information

Explain



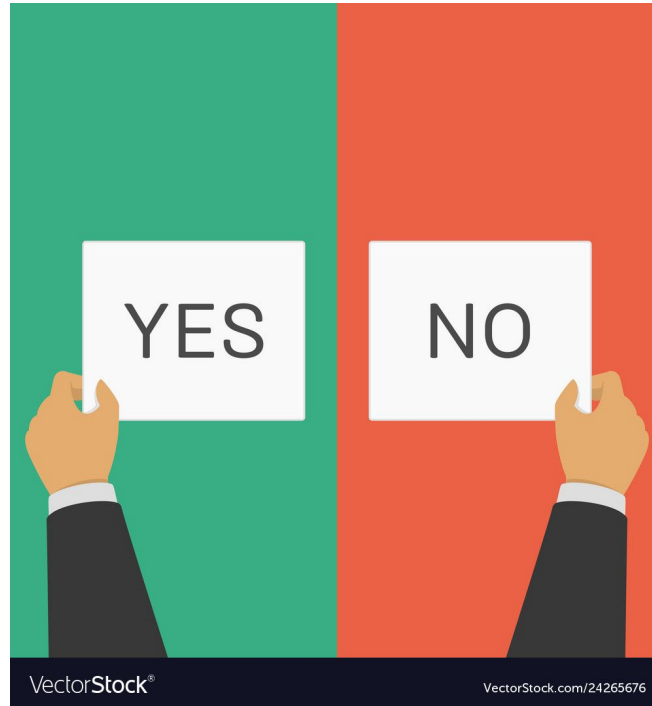
Take a Stance: Do We Need Equity in Climate Action?



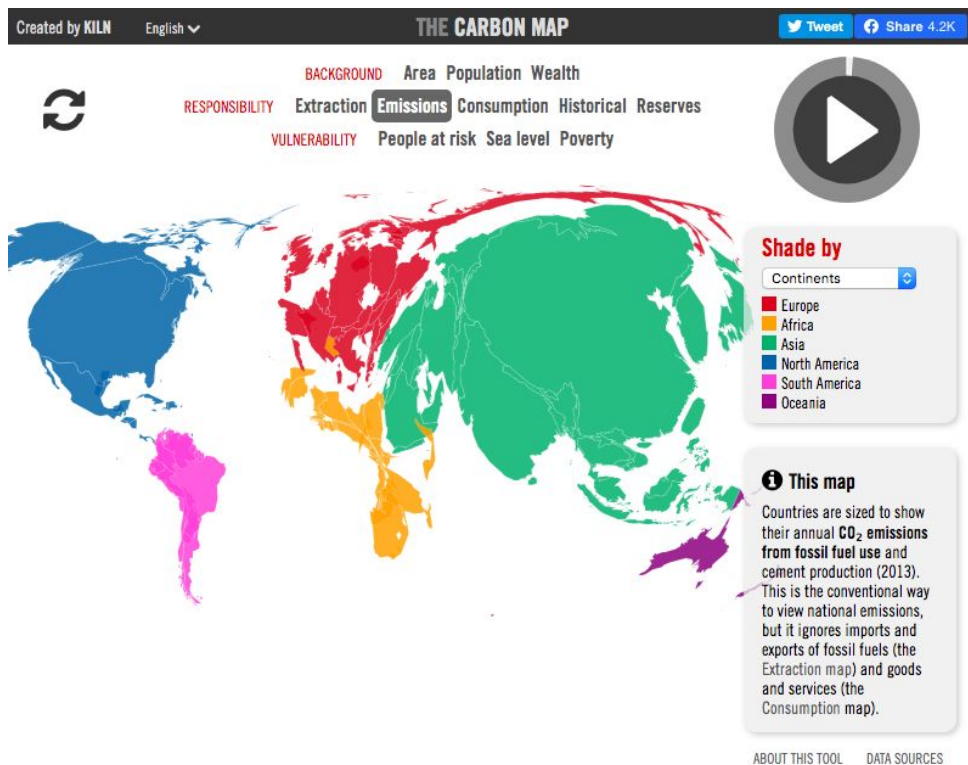
As a group, prepare for a class discussion in which you will:

- Vote on whether you think equity should be considered in climate action
- Use map data to justify why you think equity should or shouldn't be an essential piece of climate action
- Explain what you think it would mean to have equity in climate action

Let's Vote: Do You Think Equity Should Be Considered in Climate Action?



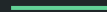
Why Or Why Not? What Did The Data Show?



What Would It Actually Look Like To Have Equity in Climate Action?



Elaborate



This Will Require a Lot of Cooperation!



The Paris Climate Agreement attempted this in 2015 - signed by 195 countries

Where Does the US Stand With the Paris Climate Agreement Now?



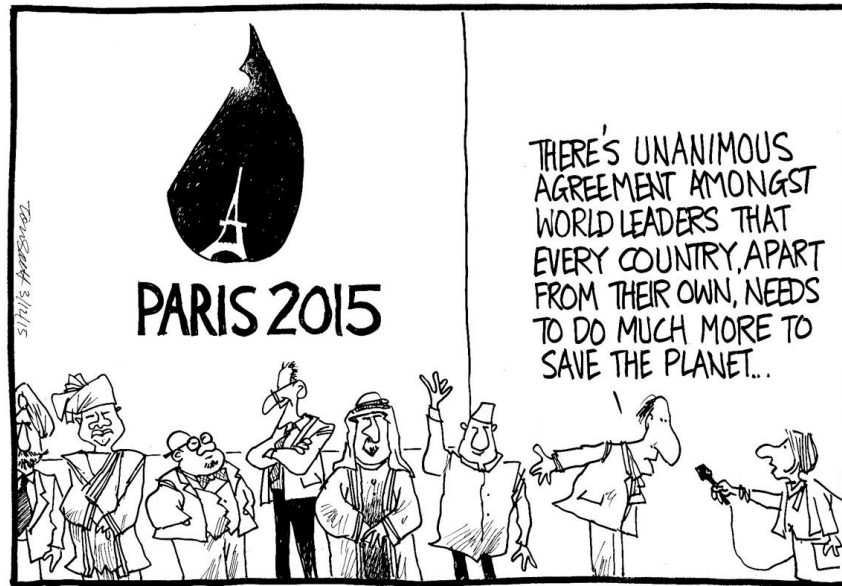
https://www.youtube.com/watch?v=MRCRiMNg_kM

Post - Video Class Discussion

- What was the goal of the Paris Climate Agreement?
- What did President Trump decide to do about the Paris Climate Agreement?
 - How could this affect global climate action?
- Do you agree with this decision?
 - If you don't agree, what would you do differently and why?

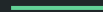


How Would You Make a Better Climate Agreement?



The Paris Climate Agreement calls for equity, but doesn't lay out a specific system to ensure it. What would you include in a climate agreement like this one to make sure it is fair and equitable?

Evaluate and Reflection



Why Does Greta Thunberg Call For Equity in Climate Action?



Individually respond to the questions in your Student Guide:

1. Why do you think there should be equity in climate action?
2. What do you think are the best ways to achieve equity in climate action?
3. Think back to Greta Thunberg's speech in the first video. What do you think you could do as a young environmental activist like Greta?