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=TwCL0BEUXjs.
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.
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?

**Equality**

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

**Equity**

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

**Justice**

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

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

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
Key Takeaways - Racial Diversity

Blacks and Hispanics underrepresented across most STEM job clusters

<table>
<thead>
<tr>
<th>% of employed in each occupational group who are...</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
</tr>
<tr>
<td>All employed</td>
</tr>
<tr>
<td>STEM jobs</td>
</tr>
</tbody>
</table>

Among those who work in ___ jobs

<table>
<thead>
<tr>
<th>Engineering</th>
<th>Health-related</th>
<th>Physical science</th>
<th>Math</th>
<th>Life science</th>
<th>Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>70%</td>
<td>68%</td>
<td>68%</td>
<td>67%</td>
<td>65%</td>
</tr>
<tr>
<td>12%</td>
<td>9%</td>
<td>16%</td>
<td>14%</td>
<td>19%</td>
<td>19%</td>
</tr>
<tr>
<td>5%</td>
<td>11%</td>
<td>6%</td>
<td>9%</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>8%</td>
<td>8%</td>
<td>7%</td>
<td>6%</td>
<td>7%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Engineering professor demographics

From "Engineering by the Numbers" 2017 report

<table>
<thead>
<tr>
<th>Professor rank</th>
<th>White</th>
<th>Asian</th>
<th>Hispanic</th>
<th>African-American</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full</td>
<td>65%</td>
<td>28%</td>
<td>4%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Associate</td>
<td>60%</td>
<td>31%</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Assistant</td>
<td>54%</td>
<td>37%</td>
<td>4%</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>

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

*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?

<table>
<thead>
<tr>
<th>Claim About Diversity in STEM</th>
<th>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?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of Gender Diversity</td>
<td>(Describe what you saw in Graphs 1 and 2)</td>
</tr>
<tr>
<td>Evidence of Racial Diversity</td>
<td>(Describe what you saw in Graphs 3 and 4)</td>
</tr>
</tbody>
</table>

Individually fill out the graphic organizer in your Student Guide
Class Debrief - Is There Diversity in STEM?

Gender Diversity?  
Racial Diversity?
Elaborate
Why Is There a Lack of Diversity in STEM?

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

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

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

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
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?

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?
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?
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=MRCRiMNjg_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?