6th Grade Curriculum

Platform: Climate Change

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6th Grade Curriculum

Overview

Ocean Discovery Unit

Guiding Concept: Students explore climate change with a focus on carbon sinks. They learn how climate change works, how humans contribute to climate change, how their community is currently prepared to deal with climate change, and how they might build a more resilient community in the future. Students learn about the important of plants in helping to combat climate change. They collect and analyze data on plants in their neighborhood using GIS mapping, do an experiment with phytoplankton, tiny plants that live in the world's oceans, and become influencers, sharing their perspective on climate change and its effects on their community with peers, parents, teachers, and local policy makers through the creation of an online publication.

Science Discovery Process Focus:

- Make a Difference
- Explore & Wonder
- Investigate & Analyze
- Communicate & Review

NGSS Alignment

Next Generation Science Standards:

Cross Cutting Concept:

Systems and systems models – students understand that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. They can also describe a system in terms of its components and their interactions.

Overarching Responsibilities of Lead Instructor:

- Classroom management & timing of lesson.
- Execution of all lesson material in this curriculum.
  - *Italics* – utilize the exact language when teaching
  - Regular – content that should be covered using language of your choice
  - (Parenthesis) – Teaching notes and actions
- Lead discussions & ask guiding questions to get students thinking about science.
- Use Belief and Science Discovery Process exploration language during lesson.
- Provide rules for activities.
- Encourage participation from all students to create an inclusive environment.
- Determine floor management with team BEFORE the start of the lesson.
- Use attention getters whenever necessary. (i.e. transitioning from activity to activity, when giving a set of directions, when bringing the class together to share out, etc.).

Overarching Responsibilities of Assistant Team Lead:

- During lead instructor's introduction and closing:
  - Prep supplies quickly then join the class
  - Participate in any kinesthetic movements
  - Sit with students and model good listening behavior
  - Sit or stand near any students struggling to pay attention
- During hands-on portion:
  - Mentor students in your floor area by asking questions, providing guidance, and providing positive reinforcement
  - Engage students who are struggling

6th Grade Story

Internal – Staff and Teachers

Through the 6th-grade program, students gain a preliminary understanding of climate change, explore how natural sinks, like plants and phytoplankton, can decrease atmospheric carbon dioxide, collect and analyze data on the current state of plants in their community, and consider how they can work to create a community more resilient to climate change now and in the future.

During their classroom day, students build belief that they belong to a community of scientists and learn how plants can be used to mitigate climate change. Students work together on a team building challenge, learn the foundations of climate change, make observations about CO_2 levels across the Earth, learn that plants remove CO_2 from the atmosphere, and consider if green space is equal across San Diego.

During their day at the Living Lab, students build belief that science is something they can do, a scientist is someone they can become, and that they can make a difference by building a community more resilient to climate change, now and in the future. Students collect and analyze data related to the number and types of plants in their community to determine if there are areas that may act as stronger buffers to climate change, they become microbiologists and conduct an experiment to see how human activities impact phytoplankton – an ocean-dwelling plant that acts as one of the world's largest carbon sinks, and share their story of how climate change is impacting themselves, their family and friends, and their community, with teachers, parents, peers, and local policymakers through the creation of an online publication. Additionally, students interview a scientist who shares their career pathway and the challenges and obstacles they have faced to becoming a science leader.

Throughout the Ocean Discovery experience, students enjoy using scientific tools, exploring the world around them, and interacting with science leaders who are reflective of their community.

Community Building Day

In-School Experience

Goal: Students establish belief that they are a unique individual contributing to a community of science.

Visuals:

- 6th Grade Community Day PowerPoint
  - Papi://Curriculum/SI New/Middle School (6-8)/6th Grade/Community Day Visuals
- Science Discovery Process Poster (1)
- NASA: A Year in the Life of Earth's CO_2

Supplies:

- Chart paper
- Sharpies (2)
- Nothing in Common activity
  - Small plastic art bins – each labeled with a team name (12)
  - Inside each plastic bin:
    - Blue crayon
    - Penny
    - Piece of red yarn
    - Toy car (i.e. Matchbox Car or other)
    - Cotton ball
    - Rubber band
    - Small votive candle
    - Piece of chalk
    - Spoon
    - Screw
    - Balloon
- "I'm a Science Leader!" stickers (1/student)
- Maps of City Heights
  - Print maps back-to-back on an 8 x 11 sheet of paper and laminate (1/pair of students)
- Dry erase markers (1/student)
- Dry erase marker solution (1 bottle)
- Rag to clean laminated maps (1)

Timing:

Time	Activity	Learning Cycle
0:00 – 0:05	Introductions	Engagement
0:05 – 0:15	Belonging Activity	
0:15 – 0:25	Climate Change 101	
0:25 – 0:35	NASA: A Year in the Life of Earth's CO_2	Exploration

0:35 – 0:45	Mapping Activity	Guided Analysis
0:45 – 0:50	Self-Reflection	Reflection

Introductions

Lead Instructor Notes:

- € Introduce yourself and staff to teacher.
- € Collect waivers from teacher.
- € Confirm with teacher that students can use their Chromebooks during the lesson.
- € Ask teacher if they would prefer you to write on board or chart paper.
- € Invite teacher to participate throughout and explain when you and staff will need their help during the lesson.

Assistant Team Lead Set Up:

- € Upload 6th Grade Community Day PowerPoint.
  - o Load NASA's A Year in the Life of the Earth's CO_2
- € Project a timer on the SMART board.
- € Prep supplies for Nothing in Common activity.

Timing:

- Introductions: 2 min
- Science Discovery Process & Community Agreements: 3 min

Introductions:

- All staff take 30 seconds to introduce themselves and share their story.
- Introduce Ocean Discovery Institute.
  - Give a very brief overview of the program (2 days, 1 class visit, 1 day at the Living Lab).
- Introduce the concept of being a scientist with Ocean Discovery Institute:
  - Some students have had Ocean Discovery since Kindergarten and for some students it's their first year.
  - When you work with Ocean Discovery – you are a science leader.
    - Ask: What are some things you think science leaders do?

Introduce the Science Discovery Process:

- Science leaders do many things – all of them are included in the Science Discovery Process.
  - (Show Science Discovery Process slide.)
  - This is the process science leaders use to do science!
    - The Science Discovery Process is a cycle.
    - Make a Difference is at the center because science leaders want to make the world a better place.
- Go through each part of the Science Discovery Process and provide a brief explanation.

- Explore and Wonder:
  - Science leaders take time to explore a wonder about the world, they do this by asking questions and making observations using their senses of seeing, hearing, touching, tasting, and smelling.
- Investigate:
  - Those questions and observations lead to ideas that science leaders want to test, so they design investigations and gather evidence.
- Analyze:
  - Once science leaders have gathered lots of evidence, they look for patterns and try to explain what they see – this is called analyzing.
- Communicate:
  - Science leaders know it is essential to share what they learn with other people, so they spend time sharing what they learn in many ways – this is communicating.
- Make a Difference:
  - Through the Science Discovery Process, science leaders often learn new things about the world that can be used to make a difference.
  - Once science leaders have learned something new, it often leads them to other questions and ideas, so the cycle begins again! Science leaders are always working on some part of the Science Discovery Process!

- At Ocean Discovery, we ask all science leaders to Be Your Best Self.
  - (Show Community Agreements slide.)
  - To Be Your Best Self, you should:
    - **Be curious!**
      - Ask questions, make observations, and share your thoughts and ideas.
    - **Be respectful!**
      - Respect people, tools, and the environment around you.
    - **Be safe!**
      - Take care of yourself and others.
- Ask students to give a silent thumbs up if they agree to be their best self when working with Ocean Discovery.

Belonging Activity

Assistant Team Lead Set Up:

€ Pass out and collect supplies for Nothing in Common activity.

Timing:

- Activity Overview (2 min)
- Do Activity (6 min)
- Debrief (2 min)

Activity Overview

- Context of Activity:
    - Being a science leader means being a part of a team.
        - Each science leader brings their own unique thoughts and ideas to their work.
        - Science leaders listen to each other's ideas respectfully and work together.
        - Science leaders are always willing to try new ideas – even ones that aren't their own. You never know what you might learn from someone else!

- Activity Expectations:
    - Goal: Assign all items to a category!
        - (Show Belonging Activity slide.)
    - Expectations:
        - Work as a group to organize the objects in your bin into a minimum of three categories.
        - Each category must have at least two items.
        - All items must be assigned to a category.
        - Everyone in the group must be able to describe the categories items are placed in. Example: All of these items start with the same letter – car, crayon, cup
        - You will have five minutes to work.

Do Activity:

- Divide students into groups of three.
- Pass out a bin to each group.
- Set a large visual timer on the board.
- Allow students to begin.

Debrief:

- Great job everyone!
- (Have 2-3 groups share how they grouped their objects into categories.)
    - After a group has presented ask everyone else:
        - Did any other group have a similar category?
        - Did any other group have different categories?
            - Ask them to share some of the different categories.

- We did this activity to demonstrate that even though we all had the same goal (put all objects into categories) and the same supplies each group of science leaders created different categories to meet the goal.
- Each group created different categories because the members of that group all have different backgrounds, different life experiences, and different ways of thinking.
- These different ways of thinking are called diversity of thought and are extremely valuable in science.
- Different ways of thinking let us tackle problems in different ways and come up with many kinds of solutions. More solutions mean more ways to make a difference.
- If everyone thought the same way, the world would change very slowly and new things would seldom be invented or old ideas improved upon.
- When working with Ocean Discovery it is important that we value all ideas. Never hesitate to share your ideas. Be respectful of others when they share their ideas even if you don't agree or have a different perspective.

Climate Change 101

Overview:

- This year with Ocean Discovery we will focus on something that affects us all – climate change.
- We will all become climate scientists and focus on answering the question: **How can we make City Height more resilient to Climate Change?**
    - (Show Big Question Slide.)
    - Define resilient: ability to prepare for and adapt to harmful events.
    - Redefine question: How can we adapt City Heights to be more prepared for climate change?
- Since we all live or go to school in City Heights, it's important to consider how prepared this community is to deal with climate change.
- We will explore what causes climate change, what are some of the harmful events that could occur due to climate change, and what we can do to prevent climate change and make sure our community is more resilient to climate change.

Climate Change 101:

- Let's start by understanding what climate change is and how it works.
    - Build on previous knowledge by asking students to share what they already know about climate change.
- Define climate change.
    - (Show Climate Change 101: Definition slide.)
    - Climate change is the change in weather patterns on Earth over a long period of time.
        - Climate change refers to long periods of time – years, decades, etc.
        - Address common misconception: Climate Change only means temperatures are getting hotter. The effects of climate change are causing Arctic winters so be colder. Remember climate change is a CHANGE in WEATHER PATTERNS (hot/cold/wetter/drier/etc.) over long periods of time.
        - Review examples:
            - Today is the hottest day of the year. **Not climate change** – refers to a single day.
            - The average temperature in City Heights has increased every year for the last 100 years. **Climate change** – refers to an increase over an extended period of time – (a century).
    - So now that we know what climate change is, let's figure out how and why it happens.
- How Does Climate Change Happen:
    - (Show Climate Change 101: Atmosphere.)
        - The Earth is surrounded by an atmosphere.
        - The atmosphere is made up of gases.
    - (Show Climate Change 101: Atmosphere Traps Heat slide.)
        - Some of the gases in the atmosphere trap energy from the sun.
        - When energy from the sun hits the Earth, rather than all of that energy being reflected back into space, some of the energy is trapped by the atmosphere.
        - This trapped energy warms the Earth, and this is a good thing.

- The atmosphere's ability to trap heat is one of the reasons the Earth is habitable when other planets are not.
- If there were no atmosphere the average temperature on earth would be 0° Fahrenheit (-18° Celsius).
- Carbon dioxide is an example of one of the gases that traps heat.

o (Show Climate Change 101: Earth Out of Balance slide.)
- For a long time, the Earth was in balance.
- The amount of energy being trapped and the amount of energy escaping created a nice warm place for plants and animals to thrive.

o (Show Climate Change: Humans and Climate Change slide.)
- Humans have put things out of balance by adding more carbon dioxide to the atmosphere.
- Humans add CO_2 to the atmosphere through the burning of fossil fuels (oil, gas, and coal) to create energy (lights, computers, cell phones, etc.) and to power vehicles (cars, planes, buses, etc.).
- Humans have added a lot more carbon dioxide to the atmosphere since the 1880's and unfortunately, we aren't stopping. We have only increased our use of fossil fuels each year.

o (Show Climate Change 101: CO_2 & Temperature Increase slide.)
- By adding more CO_2 to the atmosphere, more heat is being trapped, and the Earth is getting warmer.
- Instead of having a consistent climate, it is getting warmer and warmer and warmer.

o (Show Climate Change 101: Harmful Impacts slide.)
- **It is important to realize that climate change doesn't just mean more hot days!** The fact that the Earth is warming has many more impacts on ourselves, our families and friends.
  - Worsening air quality:
    - Climate change creates conditions which increase the risk of unhealthy ozone levels (smog).
    - **o** Ozone can damage tissue in the respiratory tract, make it more difficult to breath, aggravate breathing conditions like COPD, asthma, emphysema, etc.
  - Increased natural disasters (wildfires, droughts, etc.):
    - **o** Climate change is causing warmer and drier conditions for longer periods of time – droughts.
    - **o** Droughts can lead to increased risk of wildfires because due to warmer temperatures and drier conditions (plants, soil, etc.) fires spread faster and are more difficult to put out.
  - Increased heat related illnesses (heat stroke, heat exhaustion, etc.):
    - **o** When temperatures rise due to climate change more people suffer from heat related illnesses and sometimes have to be hospitalized.
    - **o** This happens more often in low-income communities where people have less access to cool areas (parks, pools) or air-conditioning.

- Sea-level Rise/Flooding:
    - While this may not impact us directly because City Heights is inland, much of San Diego is at risk for sea-level rise which may impact some places we will work in the future or impact places we enjoy spending time at (beaches, piers, etc.)

- These are just a few of the impact from climate change, there are many more. All of these impacts can lead to damaged property, loss of income, negative health effects, and death.
- As science leaders it's important we understand how climate change is impacting us here in City Heights and what we can do about it.

NASA: A Year in the Life of Earth's CO_2

Assistant Team Lead Set Up:

- € Make sure "NASA: A Year in the Life of Earth's CO_2" is up and running and ready to go for Lead Instructor.
  - O Make sure sound is MUTED and Closed Captions are OFF.

Timing:

- Introduce NASA's Computer Model (1 min)
- Play NASA: A Year in the Life of Earth's CO_2 (7 min)
- Process Reflection (2 min)

Introduce NASA's Computer Model.

- Now that we know how climate change works and how humans are contributing to climate change let's look at some data that scientists have collected.
- NASA part of the National Oceanic and Atmospheric Administration has collected data and created a computer model that shows the CO_2 levels around the globe for a single year.
  - (Show A Year in the Life of Earth's CO_2 Question slide.)
    - While watching this computer model think about: What do you observe about CO_2 on Earth?
- Orient students to globe using the video slider:
  - (Show NASA: A Year in the Life of Earth's CO_2 slide.)
    - The earth – point out northern and southern hemisphere, continents (N. and S. America, Europe, Asia, etc.) ocean vs. land, etc.
    - Colors – Blue and purple represent less carbon dioxide and red, orange and yellow represent higher concentrations.
    - Timeline – students need to understand that time is passing and that the entire video represents ONE year. Point out the time tracker. etc.
- We will watch the computer model more than once.

Play NASA: A Year in the Life of Earth's CO_2

Though this activity be sure students notice/understand:

- **CO_2 moves around.**
  - It does not stay where it is produced because it is a gas and moves with air currents.
- **More CO2 in produced in the Northern Hemisphere.**
  - This is due to more landmass (5 out of the 7 continents) in the northern hemisphere = more people creating CO_2
- **There is a seasonal fluctuation of CO2 levels because plants remove carbon dioxide through photosynthesis.**
  - The amount of CO_2 lessens in the summertime due to higher numbers of plants and increased photosynthesis, which removes CO_2 from the atmosphere.
    - N. Hemisphere: June – Sept.
    - S. Hemisphere: Jan. – May
  - The amount of CO_2 is higher in the winter due to less photosynthesis and the release of CO_2 from dying plants.
    - N. Hemisphere: October – May
    - S. Hemisphere: July – Oct.

- While students are watching, pause occasionally to point out the time of year and ask questions.
    - What do you observe about CO_2 on Earth?
        - Scaffolding questions about Point 1:
            - What do you notice about the movement of CO_2 across the Earth?
            - Does CO_2 seem to remain in the same place? Why?
        - Scaffolding questions about Point 2:
            - Is the amount of carbon dioxide the same over the whole earth?
                - Why do you think that is?
            - Where does there appear to be more land? The Northern or Southern Hemisphere?
            - Why do you think more CO_2 is produced over land?
        - Scaffolding questions about Point 3:
            - Do CO_2 levels change depending on the time of year? How? Why?
            - Is there a time of year when there seems to be more carbon dioxide? Less carbon dioxide?
            - What is happening during this season that might make more/less carbon dioxide present in the atmosphere?
        - Scaffolding questions about Point 4:
            - What seems to happen to CO_2 that moves out over the ocean?

Process Reflection:

Though the process reflection be sure students understand:

- Plants can potentially be used to help prevent climate change as they can remove CO_2 from the atmosphere, therefore it is important to consider how many plants we have and whether or not they are protected.

- What is one thing this computer model make you think about preventing climate change?
    - (Show NASA Computer Model Reflection Question slide.)
    - One thing this computer model is making me think about preventing climate change is…
    - Scaffolding questions:
        - Is there a way the amount of CO_2 could be reduced in our atmosphere?
        - Why are plants important in preventing climate change?

Mapping Activity:

Assistant Team Lead Set Up:

- Prepare laminated City Heights maps and dry erase markers for activity.
- Collect maps and markers after activity.
- Use dry erase solution to clean maps for next class.

Assistant Team Lead Teaching Notes:

- Work with students on their map. Potential questions include:
  - What do you observe about the number of plants in City Heights?
    - Where do you see the most plants? Least?
  - From the perspective of climate change, are you concerned about the number of plants in City Heights? Why or why not?

Timing:

- Overview (2 min)
- Mapping Activity (4 min)
- Process Reflection (4 min)

Overview

Importance of plants

- (Show Plants and Carbon Dioxide slide.)
- Now that we know plants can remove carbon dioxide from the atmosphere and therefore could be important in reducing the effects of climate change, let's take a closer look at our community in relation to plants.

Introduce Mapping Activity.

- Each of you will receive two maps of City Heights.
  - A close-up map of one city street and a map of the whole city.
  - You will also receive two dry erase markers.
- You and your partner will use the maps to answer the question: What do you notice about the number of plants in City Heights?
  - (Show City Heights Maps Question slide.)
  - You can use the dry erase markers to draw/write/or make-up your map in any way necessary to help you answer the question.

Mapping Activity.

- Hand out maps and markers.

Process Reflection:

Students should notice/understand:

- **City Heights doesn't have as many plants as some places but also has more than others.**
  - **The canyons are naturally occurring green space.**
  - **The rest of City Heights is fairly developed with homes, commercial buildings, etc. so there are few plants.**
- **As climate scientists we may be concerned about how resilient to climate change City Heights is due to its lack of plants.**
- **As a community we need to think about how to make our community more resilient by increasing the number of plants we have and considering how we care for the plants we do have.**

- What do you notice about the number of plants in City Heights?
  - Scaffold Questions:
    - Are there places there are more plants? Where? Less plants? Where?
    - Are you concerned about the number of plants in City Heights? Why or why not?

- Let's return to the Big Question and do a Think-Pair-Share: How can we make City Height more prepared to deal with Climate Change?
  - (Show Think-Pair-Share slide.)
    - Scaffold Questions:
      - How could we reduce the amount of CO_2 in City Heights?
      - How would you make that happen?

Self-Reflection

Assistant Team Lead Set Up:

- Pass out "I am a Science Leader!" stickers.

Assistant Team Lead Teaching Notes:

- Pair up with any student who needs a partner during the Self-Reflection portion.
- Listen to student responses to self-reflection questions. When appropriate ask follow-up questions such as:
  - What did you learn about climate change today that you didn't know yesterday?
  - What do you think could be challenging about being a scientist?
  - What did you do today that a scientist might do in their job?

Self-Reflection:

- Introduce why we do reflection:
  - Reflection is a part of every Ocean Discovery Institute experience.
  - Reflection allows you to process and share thoughts and feelings about what you have done, thought about, considered and learned today.
  - Reflection can open your mind to new possibilities you hadn't considered before and can highlight ways your thoughts, ideas, and feelings change over time as you learn and experience new things.
  - At Ocean Discovery Institute one of our goals is for students to believe they are science leaders, that you can do science, and that you can make a difference.
  - Let's take a moment to reflect on how our thoughts and ideas about ourselves as science leaders may have changed after today's lesson.
- Pair-Share using the self-reflection question.
  - (Show Self-Reflection Question slide.)
  - After doing science during today's lesson with Ocean Discovery Institute, do you see yourself as a science leader? Why or why not?

Closing:

- As science leaders, it is vital that we have a common understanding about climate change and its impacts on us as individuals and on our community.
- Next time we see you will be at the Living Lab, the home of Ocean Discovery Institute.
  - (Show Explore and Make a Difference Day slide.)
  - There we will continue to explore our Big Question: How can we make City Heights more resilient to climate change?
- Excellent work today science leaders! Each of you acted as science leaders today and did science!
  - (Hand out a I am a Science Leader!" sticker to each student.)
- At Ocean Discovery Institute we:
  - BELIEVE that science is something each of you can do and a scientist is someone you can be, that you can

  - ACHIEVE in science and think critically about our world, and you can
  - LEAD in science and make a difference in the world.
- Because we believe this about all of you, we do a "Believe! Achieve! Lead! Go Awesome!" cheer at the end of every program so that you will continue to do awesome things after we leave.
  - On the count of three we will yell "Believe! Achieve! Lead! Go Awesome!"

Exploration & Make A Difference Day

Living Lab Experience

Goals:

- **Explore**: Students build belief that they can recognize and do science and that science is important and relevant.
- **Make a Difference:** Students build belief that they can make a difference and that a career in science is a possibility for them.

Make a Difference Actions:

- (Today) I share my unique story about how climate change is impacting me and my community to help educate and influence others about climate change.
- (Tomorrow) I learn how a career as a microbiologist can help my community become more resilient to climate change in the future.

Visuals:

- Community Agreements poster
- Explore & Make a Difference Day PowerPoint
  - Papi://Curriculum/SI New/Middle School (6-8)/6th Grade/Explore & MAD Day Visuals
- "Manzanita Canyon Plants Coverage" ESRI Map
- Science Discovery Process poster (1/team lead)

Supplies:

General:

- 6th Grade Science Notebooks (1/student)
- ODI Field Trip Volunteer Card (1/adult volunteer)
- Cover sheet & rosters
- Stop signs (2)
- Water jugs (2)
- Reusable cups (1/student)
- Believe survey (1/student)
- Laptops (1/teacher)
- Tables (7) & chairs (6 per table) (only if using Plaza del Sol)
- Computer screen, computer, and speaker (only if using Plaza del Sol and/or The Commons)
- Folding table (4)
- Power strip (4)
- Laminated Signs (1 set/Team Lead)
  - Worsening Air Quality
  - Increases in Heat-Related Illness
  - Increased Natural Disasters
  - Sea-level Rise/Flooding

Explore:

- GPS (33)
- Plant Data Analysis Sheet (1/pair of students)

- Laminated Numbers 1-10 (1 set/Team Lead)
- Laminated Letters (A, B, and C) (10 sets/Team Lead)
- 10-sided dice (1/Team Lead)
- Large Foam Dice (1/Team Lead)
    - With A, B, C written on 2 sides each.
- Explorer Backpacks (1/3 students)
    - Small quadrat (50cm x 50 cm)
    - Transect tape measure
    - Stopwatch
    - Pencils
    - Ruler
    - Clipboard
    - Local Plant ID Guide
    - Binoculars

Science Leader Student Connection

- Things I Can Ask a Scientist poster (2-4)

Lunch

- Trash bag (2)
- Recycling bag (2)
- Large Water Cooler (2)
- Blankets to sit on (10)
- Hand sanitizer (4)
- Compost bins (2-3)

Make a Difference Today Station

- Pencils (1/student)
- Color cards (1 set/student)
    - 6”x 6” squares in red, blue, yellow, green, brown, black, white
    - Hole punched and bound with a metal ring

Make a Difference Tomorrow Station

- Large beaker (25)
- Safety goggles (1/student) = 100 in total
- Acid-base indicator (bromothymol blue) diluted with water 8mL bromothymol blue to 1L of water (40-50mL in each plastic cup) = Need ~100mL every year
- 10 oz plastic cups (the tall ones) (1/ pair of students) = 150 cups
- 3 oz paper cups (1/pair of students) = 150 cups
- Plain white paper (1/ pair of students)
- White vinegar (6mL/ pair of students) = 1.2 L in total
- Baking soda (1/2 teaspoon in each paper cup) = ~450 grams in total
- One side of petri dish (1/ pair of students)
- Graduated cylinder or small beaker (to measure 5-6mL) of vinegar = 100 in total
- Blue tape (1)
- Scissors (1)
- Microscopes (15)

- Small square white boards (15)
- Extension cords (10)
- Power strips (8)
- Phytoplankton sample (from Mike Latz lab at SIO)
- Microscope slides (20)
- Box Kimwipes (1)
- Plastic pipettes (for transferring phytoplankton to slide) (8)
- Micropipettes (8)
- Towels (4)

<u>Self-Reflection</u>

- Self-Reflection Signs individually laminated on 8 x 11" paper (4 sets)
    - Papi://Curriculum/SI New/Middle School (6-8)/6th Grade/Explore & MAD Day Visuals
- Tape (4)

4 Classes

Time	Activity	Class 1	Class 2	Class 3	Class 4
9:45 – 9:55	Arrival/ Welcome	Watershed Plaza			
9:55 – 10:10	Introduction	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
Explore Day					
10:10 – 10:30	Explore Intro	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
10:30 – 11:10	Data Collection	Canyon #1 (10:20-10:35) Street #2 (10:40-10:55)	Canyon #2 (10:20-10:35) Street #1 (10:40-10:55)	Street #1 (10:20-10:35) Canyon #2 (10:40-10:55)	Street #2 (10:20-10:35) Canyon #1 (10:40-10:55)
11:10 – 11:40	Data Analysis & Process Reflection	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
11:40 – 12:05*	Science Leader-Student Connection	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
12:05 – 12:30	Lunch	Rock Amphitheater	Rock Amphitheater	Fisler Family Tree	Fisler Family Tree
Make a Difference Day					
12:30 – 1:15	Make a Difference Tomorrow	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
1:15 – 2:00	Make a Difference Today	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:00 – 2:10	Self-Reflection	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:10 – 2:25	Believe Survey	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:25 – 2:30*	Clean-up/Walk Out	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab

Program Set Up:

Arrival (Amphitheater)

- € Set Out:
  - o Science Discovery Process poster
  - o Community Agreements poster
  - o Ocean Discovery Field Trip Volunteer Cards
  - o Cover sheet & rosters
  - o Stop signs

General (Plaza Del Sol & The Commons)*
if in use

- € Set up tables and chairs.
- € Set up screen, computer, and speaker.

General (All Introduction Spaces)

- € Fill water jugs and set out reusable water cups.
- € Load "Explore and Make a Difference Day PowerPoint".
  - o Connect the speaker (test volume).
  - o Test Zoom.
- € Set up whiteboard + stand at front of the room to function as a word wall.
- € Prepare printed Believe surveys
- € Set up laptops with teacher surveys
- € Set out Explore Backpacks
- € Set up charging station for Chromebooks.
  - o Set up a folding table in an out of the way location that has access to electricity.
  - o Plug in a power strip.
- € Have additional charged laptops ready to go if a student forgets their laptop or charger.
- € Hang a sign in each corner of your Intro Space for the Four Corners Activity
  - o Worsening Air Quality, Increases in Heat-Related Illness, Increased Natural Disasters, and Sea-level Rise/Flooding

Explore Day

- € Set out Explorer backpacks.
- € Prep clipboards w/ data sheet and pencils (1/pair of students).
- € Check that GPS's all have batteries and can be powered on.
  - o Upper left side of map click the small refresh (arrow in a circle) button.

Program Set Up Continued:

Make a Difference Tomorrow

In Leadership, Believe, and Ocean Alcoves, & Elevator Hallway:

- Set- up 3-4 micro-projectors in each space and use power strips and extension cords to plug in.
  - Make sure all cords are secured with tape.
- Set up a small whiteboard under each micro-projector (to project image onto).
- Darken rooms as much as possible (pull down shades, set up black out curtains, etc.)
- Make sure all micropipettes are set to the same volume and set off to the side.
- Have a plastic beaker with ~10 mL of vinegar off to the side (label w/ blue tape "vinegar").
- Have a large plastic beaker labeled "used tips" off to the side.
- Have a sample of phytoplankton available.
  - This will require dividing up the sample so that there is phytoplankton in each location.
- Set slides, plastic pipettes, extra micropipette tips, towels, and kimwipes off to the side.

In SciTech Lab, Eco Lab, Plaza Del Sol, and Commons:

- Set out safety goggles and pH strips on each table.
- Fill eight small beakers with ~ 20mL of seawater each.
  - Label each beaker – "Seawater" w/ blue tape and sharpie.
- Fill eight small beakers w/ 3mL of vinegar and set off to the side.

Make a Difference Today

- Poll Everywhere Protocol
- Login into **www.polleverywhere.com** by indicated space, see card in General Bin
- Locate and click associated 'Activity' for that space/day
  - Indicated by Floor Lead day-of (see whiteboard)
- Hit 'Activate' in upper right-hand corner so students can respond
  - Link will not work if Activity is not activated
- Connect students to WiFi (PowerPoint) and display 'Join by Web' instructions
  - Instructions button at bottom of page
- Students will enter their name upon entering the website, then their response
- Students can only respond once, with 1 response of their choice

Arrival/Welcome/Community Agreements

Lead Instructor Notes:

- Discuss with Ocean Discovery staff who will take on each of the **Arrival Tasks** (see below).
- Ask Jo details about next upcoming camp to share with students.
  - Share these with Instructors.
-

- If walking with school, Trip Lead:
  - Introduce yourself to teachers and volunteers.
  - Take teachers aside and note any students absent on the roster.
  - Sign cover sheet stating they've collected all waivers to the best of their ability.
- If arriving by bus:
  - Two staff should be waiting at bus stop (corner of Thorn & 42nd) 10 minutes prior to arrival time
- (Meet buses or students walking.)
- (Begin Arrival Tasks.)
  - (Note: The below should take place simultaneously so students are getting an intro while the classroom teachers are dealing with rosters.)

  - Trip Lead (1)
    - For bus schools only: Take teachers aside and note any students absent on the roster.
    - Sign cover sheet stating they've collected all waivers to the best of their ability.

  - Team Lead (1)
    - Review Science Discovery Process:
      - When you work with Ocean Discovery – you are a science leader.
      - Science leaders do many things – all of them are included in the Science Discovery Process.
        - (Show Science Discovery Process poster.)
        - This is the process science leaders use to do science!
      - Go through each part of the Science Discovery Process provide a brief explanation.
        - Explore and Wonder:
          - Science leaders take time to explore a wonder about the world, they do this by asking questions and making observations using their senses of seeing, hearing, touching, tasting, and smelling.
        - Investigate:
          - Those questions and observations lead to ideas that science leaders want to test, so they design investigations and gather evidence.
        - Analyze:
          - Once science leaders have gathered lots of evidence, they look for patterns and try to explain what they see – this is called analyzing.

- Communicate:
  - Science leaders know it is essential to share what they learn with other people, so they spend time sharing what they learn in many ways – this is communicating.
- Make a Difference:
  - Through the Science Discovery Process, science leaders often learn new things about the world that can be used to make a difference.
  - Once science leaders have learned something new, it often leads them to other questions and ideas, so the cycle begins again! Science leaders are always working on some part of the Science Discovery Process!

- Review Community Agreements:
  - Working as a team of science leaders we all must agree to follow a certain set of expectations.
  - At Ocean Discovery, we ask all science leaders to Be Your Best Self.
    - To Be Your Best Self, you should:
      - **Be curious!**
        - Ask questions, make observations, and share your thoughts and ideas.
      - **Be respectful!**
        - Respect people, tools, and the environment around you.
      - **Be safe!**
        - Take care of yourself and others.
  - Introduce Living Lab
    - Let students know that even though they will be passing by offices and people that they do NOT need to be quiet. They are welcome to talk in a normal voice.
    - The Living Lab is theirs & should be a place they feel comfortable being themselves & exploring.

- Assistant Team Lead (2)
  - Take lunches to the Achievement Alcove.
  - Students high five Odi statue on the way past.

Assistant Team Lead Teaching Notes:

- € Share your story with students.
- € Help hand out Explorer backpacks.
- € Sit with students during introduction and model good listening skills.
- € Pair up with a student during Four Corners activity.

Introduction

Timing for Eco Lab:	Timing for SciTech Lab:	Timing for the Plaza Del Sol:	Timing for The Commons:
• **Bathroom Break** + Chromebook Charging (4 min) • Staff/Volunteer/LL Intros (3 min) • OL Video + Debrief (5 min) • Review Climate Change (8 min)	• Staff/Volunteer/LL Intros (3 min) • OL Video + Debrief (5 min) • Review Climate Change (8 min) • **Bathroom Break** + Chromebook Charging (4 min)	• Staff/Volunteer/LL Intros (3 min) • **Bathroom Break** + Chromebook Charging (4 min) • OL Video + Debrief (5 min) • Review Climate Change (8 min)	• Staff/Volunteer/LL Intros (3 min) • OL Video + Debrief (5 min) • **Bathroom Break** + Chromebook Charging (4 min) • Review Climate Change (8 min)

Bathroom Break + Chromebook Charging:

- Bathroom Break:
  - Remind students to be their best self and be respectful of the Ocean Discovery bathrooms.
  - Throw trash in wastebasket and keep water in the sinks.
  - Remember someone has to come and clean the bathrooms after the program is over and we want to be respectful of them and their work.
- Chromebooks:
  - Have all students take out Chromebooks and open to check the charge.
  - If charge is less than 30% they should bring their computer to the charging station (show the instructor your charge level).
  - If charge is 30% or higher they should put their Chromebooks back in their backpack.

Reusable Water Cups:

- Show students where water jugs are for the day.
- Explain which cups are clean and what to do with dirty cups.

Staff and Volunteer Intros:

- Staff and volunteer introductions:

- All staff + volunteers take one minute each to introduce themselves and share their story.

Living Lab Intro:

- Welcome students to the Living Lab.
  - Ask if anyone has visited before?
  - The Living Lab is your Ocean Discovery Home. It is a place where you can come to learn science, do homework, participate in activities, and lots of other things.
  - At the end of the day today, I will let you know about upcoming opportunities to return to the Living Lab after today.

Introduce Ocean Leader Video:

- Introduce Ocean Leader Video:
  - Introduce you to someone who grew up in City Heights and participated in Ocean Discovery programs just like you who is now a scientist and studies climate change and its impacts.
  - Meet Vanessa Sandoval, who graduated from UCSD, and works as an environmental planner for the City of San Diego.
  - (Play Ocean Leader video on PowerPoint.)

Debrief Ocean Leader Video:

- Potential whole group questions include:
  - In what ways is Vanessa like you?
  - In what ways is Vanessa studying climate change?
- Think-Pair-Share for the following question:
  - Do you think you COULD be a scientist if you wanted to? Why or why not?
  - Have 2-4 students share their thoughts. Follow up questions could include:
    - What kind of scientist would you like to be?
    - What would you like to study as a scientist?
    - Do you think it is difficult to become a scientist? What would make it difficult? What could you do to overcome those challenges?

Review Program Overview:

- This year with Ocean Discovery we focused on something that affects us all – climate change.
- We trying to answer the Big Question: How can we make City Heights more resilient to climate change?
  - (Show Big Question slide.)
- Let's review what we've learned so far.

Review Climate Change & Four Corners Activity:

- *See Community Day: Climate Change 101 curriculum.*
  - Potential questions:
    - What do you remember about climate change?
    - How does the amount of CO_2 in the atmosphere effect our climate?
  - Words and definitions to add to word wall:

- Climate change

- Four Corners Activity
  - Quick review local impacts from climate change:
    - **It is important to realize that climate change doesn't just mean more hot days!** The fact that the Earth is warming has many more impacts on ourselves, our families and friends.
      - Worsening air quality:
        - Climate change creates conditions which increase the risk of unhealthy ozone levels (smog).
        - **o** Ozone can damage tissue in the respiratory tract, make it more difficult to breath, aggravate breathing conditions like COPD, asthma, emphysema, etc.
      - Increased natural disasters (wildfires, droughts, etc.):
        - **o** Climate change is causing warmer and drier conditions for longer periods of time – droughts.
        - **o** Droughts can lead to increased risk of wildfires because due to warmer temperatures and drier conditions (plants, soil, etc.) fires spread faster and are more difficult to put out.
      - Increased heat related illnesses (heat stroke, heat exhaustion, etc.):
        - **o** When temperatures rise due to climate change more people suffer from heat related illnesses and sometimes have to be hospitalized.
        - **o** This happens more often in low-income communities where people have less access to cool areas (parks, pools) or air-conditioning.
      - Sea-level Rise/Flooding:
        - **o** While this may not impact us directly because City Heights is inland, much of San Diego is at risk for sea-level rise which may impact some places we will work in the future or impact places we enjoy spending time at (beaches, piers, etc.)

  - Explain how the activity works:
    - Everyone will have 30 seconds to consider which of the negative impacts of climate change they are most concerned about:
      - Worsening Air Quality
      - Increases in Heat-Related Illness
      - Increased Natural Disasters
      - Sea-level Rise/Flooding
    - Once the instructor says, "Pick a corner." you will walk to the corner with the sign that shows the impact you are most concerned about.

  - Do the activity:
    - Give everyone 20-30 seconds to think about their answer.

- Give the cue “Pick a corner” when the 30 seconds is up.
- Once all students have landed in a corner initiate a Pair-Share.
    - Have students find someone in the same corner as them to share their thinking with.
        - (Adults in the room should pair up with students.)
    - Ask for 1-2 student volunteers <u>in each corner</u> to share their thoughts.

- Debrief:
    - Assure students that there is no right or wrong answer here.
    - We should be concerned about all these impacts from climate change!

<u>Introduce Science Notebooks:</u>

- To make observations, science leaders need a place to write their observations and ideas.
- Each of you will receive a science notebook.
    - Science leaders use notebooks for recording things they see, for questions, for data, and for thoughts they have.
    - Can be used anywhere- in the lab, in the field, at home.
    - You can write, draw, or sketch in your science notebook at any time today.
    - At the end of this program your science notebook will be yours to take home.
- (Give each student a science notebook.)

Explore Day

Assistant Team Lead Teaching Notes:

- Make sure all adults know which groups they will be working with to record GIS data (2-3 groups per adults w/ a GPS).
- Work with each group to collect their GPS data using a handheld GPS.
  - You will need to walk from group to group because they will need to write down the GPS data for each sample location.
- Monitor students so that they stay within the set boundaries during data collection.
- When students are in the lab and deciding how to collect data walk around and listen to their ideas. Allow students to use whatever methods they devise within reason but help them to consider things like:
  - How much time they have to collect.
  - How they will create equal sampling areas.
- When students are collecting data help them refine their techniques.
- Help students enter data into 123Survey app.

Timing for this station:

Time	Activity	School Timing
0:00 – 0:15	Intro	Intro
0:15 – 0:30	Data Collection Method	
0:30 – 1:15	Data Collection	Data Collection
1:15 – 1:30	Data Input	Data Analysis & Process Reflection
1:30 – 1:45	Data Analysis	
1:45 – 1:55	Process Reflection	

Intro

Teaching Note:

- **One of the goals of this part of the day is for students to explore ways to collect data. Their data sampling methods do not need to be perfect or even scientifically accurate (random, etc.). The idea is for students to be thinking and coming up with ideas on how this data could be collected, so it's okay if the data isn't perfect.**
- **The other goal is for students to realize there are green spaces which exist within their community and these places should be protected and could be models for other parts of the community.**

Intro

- Now that we know that climate change has impacts on all of us and our family and communities let's review what we learned about CO_2 one of the main gases that contributes to climate change.
    - Potential questions:
        - (Show NASA: A Year in the Life of Earth's CO_2 slide.)
        - What do you remember about CO_2?
        - Are there times of the year when there is less CO_2? When? Why?
    - Be sure to cover:
        - CO_2 moves around.
        - There is seasonal fluctuation in the amount of CO2 levels because plants remove carbon dioxide through photosynthesis.
            - CO_2 levels are lower in the summer when there are more plants and more photosynthesis is occurring.
            - CO_2 levels are higher in the winter when plants die off and there is less photosynthesis occurring.
        - The ocean also removes CO_2 from the atmosphere.
    - As science leaders we know that plants can be important in helping to prevent climate change because they remove CO_2 from the atmosphere during photosynthesis.
        - (Show Plants & CO_2 slide.)
    - We also observed that while City Heights has some plants, it doesn't have a whole lot.
        - (Show City Heights Maps slide.)

- Explore Question.
    - **o** Today you will further investigate your community's ability to deal with climate change by answering the question: **Are there places in our community that have more plants and can help reduce the impacts of climate change?**
        - (Point to "Investigate" on Science Discovery Process poster.)
        - (Show Explore Question slide.)
    - ○ You will collect data on plants from two places in your community: a street and a canyon.
    - ○ You will then return to the lab to upload your data through an app, which will create a single map of plants in our community using everyone's data.
    - ○ As scientists we will analyze the data using the map to try and answer our question.
        - (Point to "Analyze" on SDP poster.)

- Data collection.
    - **o** When investigating a question, science leaders must decide how they want to collect data.
    - **o** There are often many ways to collect data to answer the same question.
    - **o** Today, you and your partner will decide how you want to collect your plant data.
    - **o** You will have access to several tools in your Explorer backpack that can be used to collect data. You and your partner can decide which tools to use.
    - **o** You may choose to collect your data differently from another team and that is okay.

- Sampling.
  - One important thing to consider: It is unlikely that you will be able to count all the plants in each location in the time you have. Therefore, you will need to take a sample.
  - Define sample: a small part intending to show what the whole is like.
    - (Show Sample slide.)
    - Example of a sample:
      - If you wanted to count how many shells were on a 100-foot x 50-foot beach, it would be impossible to count all the shell individually.
      - You could take a sample of a smaller area that represents the whole area and count the shells in that area only.
      - Example: you could count the shells in a 10 ft. x 5 ft. area and then multiple by 10 to get an estimate of how many shells there are on the whole beach.
  - Your goal today will not be to count every plant in each area but instead to use a sampling method to collect your data.

- Explorer Backpacks and Sampling Tools.
  - Review and <u>demonstrate</u> how to use each of the potential tools for sampling.
    - Quadrat – students can choose to gently place a quadrat in 2-4 different places in the canyon and then on the city street and identify and count the plants within the quadrat.
      - (Show Quadrat slide.)
    - Transect – students can choose to lay out a transect tape and stop every 5 or 10 feet to sample the plants to the left and right of the transect.
      - (Show Transect slide.)
    - Stopwatch – students can stand in a location and slowly turn in a circle identifying a counting as many plants as they can in an approximate 5-foot circle around them. Repeat a second time in a different location.
      - (Show Stopwatch slide.)
  - Each of these tools can be used separately or together.
    - You decide how you want to collect data.
    - Your goal is to take a minimum of TWO samples at each location but the more you can do the better.

<u>Data Collection Method</u>

- Explain to student that they will have the next 10-minutes to look through their tools and decide on a data collection method as a group.
  - Important: <u>You must use the same sampling method in both locations – street and canyon</u>.

- Once you have decided on your method for collecting data, everyone in your group will need to fill out the first two boxes on their "Plant Data Collection Sheet" in their science notebook.

- (Have students open to "Plant Data Collection Sheet" in Science Notebook.)
    - Science Leader Names
        - Names of your group members.
    - Describe Sampling Methods
        - Describe in words the methods you will use to collect your plant data, be sure to include which tools you will be using and how you will use them.

- (Break students into groups of 2-3 students.)
    - (Pass out an Explorer Backpack to each group of students.)
    - Allow students to look through their tools and choose a sampling method. Students may choose any method within reason but help them to consider things like:
        - What tools they have.
        - How much time they have to collect.
        - How many samples will they collect.
        - How they will create equal sampling areas.
    - Give a 5-minute reminder so that all students have time to fill out their "Describe Sampling Method" box.

- Data sheet:
    - Review with students how to fill this in.
        - (Have all students open to the Plant Data Collection Sheet in their science notebook.)
        - (Show data collection sheet slide.)
    - For <u>each</u> sample location you will need to record your GPS location.
        - (Show GPS slide.)
        - What is a GPS: Global Positioning System – tells you where you are standing on the Earth.
        - Record this number CAREFULLY or your data will appear in the wrong location on the final map.
            - You need to record <u>all the numbers</u> after the decimal point.
            - Separate Latitude and Longitude w/ a comma (no spaces).
            - Longitude will always be a negative number.
    - (Hand out a GPS to each group.)
        - Have each group practice with their GPS in the classroom.

<u>Data Collection:</u>

- Walk to Location – see timetable above and data collection maps below. (5 min)
    - Set expectations for data collection at each station. Be sure to include:
        - A set of physical boundaries for where data can be collected.
        - The street is off-limits. Students must stay on the sidewalks.

- Give several time reminders throughout the station (10 minutes left, 5 minutes left and 2 minutes left).

- Data Collection: Location 1 (15 min)
- Switch (5 min)
- Data Collection: Location 2 (15 min)
- Return to Lab (5 min)

Data Input

- Introduce uploading data on 123Survey App.
  - (Use 123Survey slide.)
  - Review how to enter data on the app.
    - Touch "Date of Collection" and select today's date.
    - Use the drop-down menu to select "School Name".
    - Type in the number of plants you found in your 1st sample.
      - You will enter each sample individually.
    - Where did you find this plant?
      - CAREFULLY type in your GPS Coordinates.

- Have each data collection group open one Chromebook.
  - Have students connect to ODI Wifi
    - (Show Wifi slide.)
  - Have students open the Survey123 app using the tiny URL.
    - (Show Tiny URL for Survey123 slide.)
      - https://tinyurl.com/odiplants
      - (Once students are all on the Survey 123 app show the GPS Coordinate slide.)

- You will have 15 minutes to input all your data.
  - (Set a timer and let students work to upload data.)

Data Analysis

Instructor Note: Refresh the ESRI Story Map to update data before gathering students.

- Now that we have input our data it's time to analyze it.
  - (Point to "Analyze" bubble on SDP poster.)

- Let's review our research question: **Are there places in our community that have more plants and can help reduce the impacts of climate change?**
  - (Show Explore Question slide.)

- I am going to show you the map that includes everyone's uploaded data.

- (Project "Manzanita Canyon Plant Coverage" ESRI Map onto SMART Board.)
- Orient students to things such as:
    - City Street locations and Canyon locations where they collected data.
    - Clicking on data points to get more information.
    - How to use filters.

- In a moment, I will share a link to this map so that each group can look at it more closely and answer our research question by filling out a data analysis sheet.
    - (Have all students open to "Plant Data Analysis" page in their science notebook.)
    - (Show Plant Data Analysis slide.)

- You will have 10 minutes to analyze data.
    - (Pass out one Plant Data Analysis Sheet to each group.)
    - (Show Tiny URL link to ESRI map slide.)
        - https://tinyurl.com/odiplantmap

- (Set a timer and let students work.)

Process Reflection

Students should notice/understand:

- **Natural environments like the canyon have more plants than man-made environments like city streets.**
- **Canyons and places like it can help buffer/prevent climate change.**
- **City Heights has several canyons, and we can create a more resilient community by protecting our canyons and using them as models for other parts of the community.**

- Review Plant Data Analysis Sheet responses using a Question-Dice format.
    - Question – Dice.
        - Each data collection group will receive a number between 1-10.
            - This number should be placed on the table in the center of the group.
        - Each person in the group receives a laminated letter A, B, or C.
            - This letter should be placed face-up in front of each student.
        - We will be sharing our responses to our Plant Analysis Data Sheet.
        - I will ask a question and then roll this 10-sided dice to see which group will respond and then roll this large foam dice to see which person in the group will respond.
        - (Hand out laminated letters and numbers to each group.)

- (Make sure every student has a letter in front of them before you begin.)

- Go through each question on the Data Analysis sheet.
  - (Have the ESRI Map up.)
  - Roll both dice 3-4 times to get different responses.
  - If time allows, ask for additional volunteer answers.
  - Be sure that students are backing up their responses with data from the map.

- Before the final question discuss outliers and uncertainty within the map.
  - Point out any obvious outliers (points far away, too many plants, etc.)
    - Discuss reasons why these might have occurred.
  - Ask students if there were any challenges in how we collected our data?
    - How could those challenges be overcome?

- For the final question: **Are there places in our community that have better plant coverage and can help reduce climate change?**
  - Be sure to cover:
    1. <u>Protecting what exists</u>.
       - Point out other canyons on the map just like the one they visited today can be found throughout City Heights.
       - It is important that we care for these places because they are a natural buffer for climate change.
       - What are some ways these canyons are negatively impacted?
       - How can we protect these special places in our community?
    2. <u>Adding more plants</u>.
       - Where?
       - Are there limitations to where we can plant?
       - What are those limitations?

Data Collection Maps

Canyon

Street


Myrtle Ave
Joyner Elementary School
42nd St
Street #1
Street #2
42nd St
Van Dyke Ave
Van Dyke Ave
The Corner
Thorn St
42nd St
Van Dyke Ave
San Diego Mobile Brake Service

Science Leader Student Connection

Objective of the Station: Students will meet a science leader, hear about their pathway to becoming a science leader, and have an opportunity to ask questions.

- Provide an overview of the Science Leader Student Connection portion of the program.
    - Today we will meet virtually with a science leader.
        - Learn about their pathway to becoming a science leader, what they do in their work, and how their work is related to climate change.
    - You will also have the opportunity to ask the science leader questions.
        - (Brainstorm questions students want to ask – write these on a whiteboard where everyone can see.)

- Introduce Science Leader.
    - Tell the students who they are about to meet (science leader's name) a science leader who (describe what they do in 1-2 sentences and where they work).
        - (Connect Zoom Call).
    - (Welcome the Science Leader.)
    - (Conduct the interaction as one would an interview.)
        - Interview tips:
            - You may change the order or modify the questions based on the Science Leader's responses.
            - If a Science Leader is answering a question that may need to be wrapped up, you can move to the microphone to signal that you want to speak.
            - After the Science Leader answers a question, reaffirm their point in 1-2 sentences and acknowledge how it ties to the students' experience.
        - Interview questions asked by Team Lead (~10 min):
            - Can you please introduce yourself and tell us about your job and what you love about it? (2 minutes)
            - Tell us about your pathway to your current job. For example, what got you interested in science, your education, etc. (2 minutes)
            - Have you ever faced an obstacle or challenge in your life that you were able to turn into an opportunity? How did you do that? (2 minutes)
            - Students are investigating climate change, carbon sinks (specifically plants), and how their community can become more resilient to climate change. Why do you think this is important? (2 minutes)
        - Student questions (~5-10 min):
            - Give two or three students a chance to ask questions.
            - If needed, remind them about the questions they brainstormed earlier.

    - (Have students say "Thank you!" and all clap for the science leader.)
    - (Disconnect Zoom call.)

Lunch & Bathroom Break

Assistant Team Lead Teaching Notes:

- € Walk around and monitor students while they eat lunch – ask them questions about their experience
- € Hand out hand sanitizer
- € Monitor water cooler and help students refill water bottles
- € Walk around with trash bag when you see students starting to finish up
- € Supervise and encourage clean- up of surrounding area when clean up begins

- Before lunch have students take a bathroom break.
- Refill water bottles.
- Give hand sanitizer to each student before lunch.
- Give students a five-minute warning before clean-up.
- Remind student that we are connected to the ocean through the canyon watershed and that any trash that ends up on the ground here can end up in the ocean so we need to be careful.
- Have students take 2 minutes to walk around and clean up their area.
- Refill water bottles.

Make a Difference Today

Objective: Students share their unique story about how climate change is impacting them and their community to help influence others to combat the effects of climate change.

Teaching Note: Please familiarize yourself with the PEN Writing Guidelines BEFORE beginning this station.

Assistant Team Lead Teaching Notes:
- Review PEN Writing Guidelines before starting the station.

Timing for this station:

Time	Activity	Learning Cycle
0:00 – 0:10	This Makes Me Think Activity	
0:10 – 0:20	Make a Difference	Engagement
0:20 – 0:30	Writing	Exploration
0:40 – 0:40	Choosing Your Story	Guided Analysis
0:40 – 0:45	Process Reflection	Reflection

Teaching Note: This activity is meant to allow students to share their thoughts in creative ways. Switch up the response methods for each statement.
**For Wilson only – you will have 10 minutes less for this station. Suggestions for shortening:*
- *Shorter version of "This Makes Me Think Activity" 10 minutes instead of 15*
- *Shorten "Make a Difference" by 2-3 minutes by shortening the "Influencers section".*
- *Shorten "Choosing Your Story" by 2-3 minutes by skipping the Pair-Share.*

"This Makes Me Think…" Activity:
- Intro
    - Now that we know how important plants are and places in the community that we might want to protect, let's take a little time to broaden our knowledge of plants on a more global scale.
- Directions:
    - We will form two lines.
    - The lines will face each other.
        - Each person will stand across from another person.
    - I will read a statement, you will have time to think about your response, then I will ask everyone to share their response with the person across from them.
    - Your responses will be in different formats.
        - Response formats include:
            - Colors
            - Charades/Acting
            - Verbal

- After sharing your response, you will switch partners and I will share another statement.

- Set-up
  - Hand out a set of color squares to each student.
  - Divide students into two equal groups (count off 1's and 2's)
  - Have all the "1"s form a line and all the "2"s form a line facing the "1"'s.
    - Include all adults in the lines.
    - Even the lines out so that everyone is facing someone.
- Activity
  - Choose a response format and read a statement from the slide show.
    - (Use This Makes Me Think slides.)
    - Example: "The United States constitutes 5% of the world's population and contributes 22% of the world's carbon emissions." Choose two color squares that represent what this statement makes you think.
    - Give all students 20-30 seconds of think time.
    - Ask all the 2's to hold up their color squares and tell the person across from them why they chose those colors.
    - Then ask all the 1's to share their response.
    - Ask a few students to share with the group.
  - Reposition students so everyone is facing a different person.
    - Example: I want all the 1's to shift two people to the left.
  - Choose a different response format and read another statement.
    - Ask 1's to share first, etc.
  - Repeat until all statements have been read or time runs out.

- Statements
  - The world has lost one-third of its forests – an area twice the size of the United States. This land is now used to grow crops and graze animals for food.
  - A group of science leaders found that plants are photosynthesizing 12% more in 2020 than they were in 1982! In that same time period, global CO_2 concentrations in the atmosphere increased about 17%.
  - The United States constitutes 5% of the world's population and contributes 22% of the world's carbon emissions.
  - Science Leaders believe that plants could be genetically manipulated to store more carbon in their roots. This would mean their decomposing tissue would be incorporated into the earth, rather than being released into the air like dying leaves.
  - Heat deaths increased 56% between 2018 and 2021. Heat was a contributing factor in almost 1,600 deaths in the United States in 2021.
  - Copper dust comes off brakes of cars each time brakes are used. This dust falls on the street and gets washed down to the ocean through the watershed when it rains. Copper

is harmful and can kill phytoplankton. In 2010, California and Washington passed laws mandating a reduction in the amount of copper used in automotive brake pads.
- A Trillion Trees is a non-profit organization whose goal is to protect and restore one trillion trees worldwide.

Make a Difference:

- Overview
  - We have learned how climate change works, how people are contributing to climate change, how climate change in impacting each of us, how climate change is impacting our community, and thought about ways our community could be more prepared to deal with climate change in the future.
  - Now it is time to consider how you can take all this knowledge and make a difference today.
    - (Point to Make a Difference on Science Discovery Process poster.)
  - As science leaders, it is important to share your thoughts and ideas about climate change with other people because it can help someone who doesn't have the same knowledge understand what climate change is and why we should be concerned about it. It is also important for people outside of our community to understand how climate change is impacting City Heights and the people who live, work or go to school here.
  - When we share our experiences with others, we can help other people understand a perspective other than their own, and maybe even influence them to help make a difference too – this is called being an influencer.
    - Define influencer: a person with the ability to influence others.
    - (Add "Influencer" to word wall.)

- Influencers.
  - Influencers come in many shapes and sizes and can use their skills, fame, and knowledge to influence people to make the world a better place.
  - Let's take a look at a couple of examples.
    - (Show Influencers slide.)
      - Athlete – Lionel Messi (Argentinian soccer player)
        - Uses his fame to raise money for his charity: Leo Messi Foundation which helps children affected by war, violence, poverty or severe illness.
      - Athlete – Serena Williams (American Tennis Player)
        - Uses her fame to raise money for UNICEF to help educate children in poverty, created a resource center in LA to provide resources to people who are victims of violence, etc.
      - Scientist – Neil deGrasse Tyson (Astrophysicist and Director of NYC's Hayden Planetarium) – 1.6 million followers on Instagram
        - Uses his fame to educate people about science and space.
      - Scientist – Ayana Elizabeth Johnson (Scripps Institution of Oceanography graduate, marine biologist, and co-founder of the climate initiative The All We Can Save Project) - 109K followers on Instagram
        - Uses her fame to educate people about climate change.
      - Actress – Michelle Yeoh (first Malaysian actress to win an Academy Award)

    - Uses her fame to support and educate others about endangered tigers and AIDS.
- Musician – Bad Bunny (Puerto Rican singer and songwriter who made the first all-Spanish record to reach No. 1 on the Billboard 200)
    - Uses his music to promote his heritage and call attention to social issues: the devastation of Puerto Rico after Hurricane Maria, domestic violence, LGBTQ rights, etc.
- Musician – Rihanna is a Barbadian singer, actress, and businesswoman. Sold over 250 million records world wide she is the 2nd best selling female artist of all time.
    - Uses her influence to raise money and awareness for AIDS/HIV awareness, cancer research, domestic violence, police brutality, and women's rights.
- Politician – Mayor Todd Gloria
    - He is the first person of color and the first openly gay person to serve as San Diego's mayor. He uses his political influence to educate others on the importance of combating climate change and create legislation to make San Diego more resilient to climate change.

- You as an influencer.
    - Not all influencers need to be famous athletes or have a huge Instagram following.
    - As a science leader you are an influencer.
        - You know things about climate change that others do not.
        - You know ways people can make a difference that other people may not know.
        - It's important that your share this knowledge if we want everyone to work together to help prevent climate change.

- Uniqueness.
    - You are also all unique.
        - Everyone in this room has different ideas and experiences related to climate change.
        - Use that to your advantage. When you share your ideas with people who have different ideas or who have had different experiences than you, you can become an influencer.
        - You can tell them something they didn't know before or influence them to behave in a different way by sharing your ideas and experiences related to climate change.
    - Each of us have the potential to influence other people to help prevent climate change and create a more resilient City Heights. Each of you can be an influencer and make a difference in the world today.

- Online publication.
    - Rather than use Facebook or Instagram because that is too difficult to coordinate with such a large group, we are going to share our stories through an online publication.

- Online publications are a place where people look to get the most up to date information and learn about what is happening in the world.
  - (Show example of online publication slide.)
- Today you can share thoughts on how climate change is impacting you personally, your community, how humans contribute to climate change, how we can help reduce climate change, or any other thoughts you want to share.

- Distribution of online publication.
  - The online publication will be shared with you, your teachers, your parents, local politicians, urban planners, and people involved in the field of climate science in San Diego.
  - One of the people who will receive the online publication is Todd Gloria the Mayor of San Diego.
  - Being the mayor of San Diego means that Mayor Gloria is an influencer like you.
  - Climate change is one of the mayor's most important initiatives and he is very interested in hearing about what you have learned from your data gathering and analysis today!
  - Mayor Gloria has recorded a message for you.
  - (Play video of Todd Gloria.)

Writing:

- In order to help you write your story, you will be responding to three prompts.
- Review writing guidelines.
  - (Show Writing Guidelines slide.)
  - Today is about sharing your story.
  - Keep your pen moving until we tell you to stop.
  - Don't worry about spelling, grammar, or perfect writing!
  - Put down the first thing that comes to your mind.
  - There are no wrong answers
  - Remember, don't stop writing.
- Have all student open to the "Make a Difference" page in their science notebook.
  - Show them the word bank to use as a resource while they are writing.
- Have students open to "Make a Difference Today" in their science notebook.
  - Write "#1" at the top.
  - You will be given your 1st writing prompt on the board.
  - You will have three minutes to respond to Prompt #1 in your notebook.

- Show students Prompt #1 on SMART board and read it out loud.
  - Prompt #1: **What concerns do you have about how climate change is impacting City Heights?**
    - Sentence stems:
      - One thing that concerns me is…
      - Climate change has impacted my family by….
      - One way climate change has impacted me is…
    - Give students a warning when 1 minute is left.

  - Prompt #2: **What can people do to prevent climate change?**
    - Sentence stems:

- One thing people can do to prevent climate change is…
- If everyone did…… it would help lessen the effects of climate change because…
- Community leaders could organize people to….

- Give students a warning when 1 minute is left.

- Prompt #3: **What would you want to tell the president about climate change and its impacts?**
  - Sentence stems:
    - One thing I would tell the president about climate change is...
    - I want the president to know how climate change is impacting my (community/family/friends) because…
    - I think the president should do……...to help fight climate change.

- If several students appear to be struggling, pause the writing for a moment and ask a couple of students to share what they have written so far to provide inspiration.

Choosing Your Story

- Introduction:
  - You will now choose which response you want to share with the world in our online publication.
  - Remember our goal is to be influencers so you want to choose the response you wrote which best shares your perspective or experiences and could influence someone to care about you, climate change, and/or your community.
    - Try to choose a response that you think will resonate with someone else – the response that would make other people think, the one could interest some else, the one that could make someone feel something.
    - When we spark feelings – interest, sadness, compassion, happiness, excitement, fear, etc. we have an opportunity to influence someone.

- Choosing Your Story:
  - (Give students two minutes to choose and circle the prompt they want to share.)

- Pair-Share:
  - Share the response you are going to place in the online publication.
  - Be your best self. When listening to someone else's response remember that person is being vulnerable and it's important to respect that and provide them with positive feedback.
  - (Pair up students to share.)

- Poll Everywhere:
  - You will now type the response you chose into Poll Everywhere.
    - You are free to add more to your response when you type it in.
    - If you finish typing in your response early you may illustrate your response page during the remaining time.

- (Have students open their Chromebook.)

- Have students connect to internet.
  - (Show Wifi slide.)
- Have students navigate to Poll Everywhere website: www.polleverywhere.com
  - (Show Poll Everywhere slide.)
  - Review directions:
    - Go to website: https://www.pollev.com
    - Type **Ocean Discovery** in username box
    - Type your name
    - Type response you want to share
- Walk around and look for:
  - Students who are struggling to get started.
- When timer is up. Make sure all students hit the "done" box and close their computers.

Process Reflection

- Discuss the importance of communicating knowledge.
  - (Point to Communicate on Science Discovery Process poster.)
  - This week your teacher will receive a link to the online publication you created.
  - Your teacher will share the link with you.
  - Be an influencer - share the link and the online publication with family and friends.
  - It's important that everyone work to help prevent climate change. One way to make sure others get involved is by sharing your knowledge and experience with others!
  - Remember one of the main jobs of scientists is to share their knowledge with others.
- Choose a few students (as many as time allows) to share their response to one of the prompts.
- Let students know that while there wasn't a lot of time to share today you will get more time back at school when you receive your online publication.

Make a Difference Tomorrow

Objective: Students become microbiologists who study how climate change is impacting microorganisms in the ocean that can help prevent climate change. Students consider how close their community is to the ocean and how we can help protect these microorganisms to create a more resilient community.

Timing for this station:

Time	Activity	Learning Cycle
0:00 – 0:05	Make a Difference Tomorrow Intro	Engagement
0:05 – 0:30	Ocean Acidification Experiment	Exploration & Guided Analysis
0:30 – 0:40	Phytoplankton Observation	Exploration & Guided Analysis
0:40 – 0:45	Process Reflection	Reflection

Make a Difference Tomorrow

- Review.
    - We have learned how climate change works, how people are contributing to climate change, looked at how plants can help prevent climate change, and how our community could be made more resilient to climate change.

- Computer model of CO_2 levels on Earth.
    - Let's go back to our computer model.
    - (Play NASA's Computer Model slide.)
    - Have students focus on the oceans this time.
        - Ocean is a sink – it absorbs CO_2 from the atmosphere.
        - Can you imagine this? The ocean absorbing carbon dioxide gas molecules from the air? Let's see if we can create it!

- Ocean Acidification Experiment
    - Pass out all materials.
    - Have students put on your safety goggles.
    - Pour 1 1/2 fluid ounces (40–50 mL) of acid-base indicator solution into each of the two clear plastic cups.
    - Add 1/2 teaspoon (2 grams) of baking soda to the paper cup.
    - Tape the paper cup inside one of the clear plastic cups containing the indicator solution so that the top of the paper cup is about 1/2 inch (roughly 1 centimeter) below the top of the plastic cup. Make sure the bottom of the paper cup is not touching the surface of the liquid in the plastic cup—you don't want the paper cut to get wet. The second plastic cup containing indicator solution will be your control.
    - Place both clear plastic cups onto a sheet of white paper and arrange another piece of white paper behind the cups as a backdrop (this makes it easier to see the change).
    - Carefully add 1 teaspoon (about 5-6 mL) of white vinegar to the paper cup containing the baking soda (image below). Be very careful not to spill any vinegar into the indicator solution. Immediately place a Petri dish over the top of each plastic cup.

- Record Observations:
  - What occurred in the smaller cup?
  - What did you observe of the liquid in the larger clear cup?
  - Why did these changes occur?
- Label the parts of the experiment on your page.
  - Write down each word beside the arrows.
  - The liquid in our large plastic cup represents what? … The "ocean"
  - The space above represents our "atmosphere".
  - What is being released from our paper cup? … "Carbon dioxide"
  - Draw carbon dioxide molecules in the cup and draw an arrow showing the carbon dioxide going into the "ocean"
- Ocean Acidification
  - When the ocean water (H_2O) absorbs CO_2 from the atmosphere a chemical reaction takes place and forms carbonic acid (H_2CO_3).
    - (Show Ocean Acidification slide.)
  - Carbonic acid is an acid.
    - When we add acid to the ocean, we make the ocean more acidic.
  - Humans have been adding more and more CO_2 to the atmosphere which is causing the ocean to slowly become more acidic.

- Microbiologists.
  - Congratulations you all have officially become microbiologist.
  - Now let's consider how each of us might make a difference in the future.
    - (Point to Make a Difference on Science Discovery Process poster.)
  - One way we can help make our community more resilient to climate change is to consider a career in Microbiology.
    - Define Microbiologist – someone who studies living things that are microscopic.
    - (Add Microbiologist to the Word Wall)
  - Microbiologists study living things that are only big enough to see under a microscope-like phytoplankton!

- Phytoplankton.
  - (Show Phytoplankton slide.)
  - Define Phytoplankton: microscopic plants that live in the ocean.
    - (Add Phytoplankton to Word Wall.)
  - CO_2 that gets absorbed by the ocean gets used up by microscopic plants that live in the ocean called phytoplankton.
    - (Show next Phytoplankton slide.)
  - These tiny marine plants photosynthesize and take CO_2 put of the ocean just like plants do on land do.
  - There are billions of phytoplankton in the ocean so they can use up a lot of CO_2 and are therefore very important to helping to prevent climate change.
  - As microbiologists, you will be making observations of phytoplankton!

- Microscopes.
    - Demonstrate the main controls.
        - Focus knob
        - Location for slide
    - Try not to touch or bump the table or the image will shake and become unclear or shake.
    - We will record our observations.
        - Draw and write a few words to describe what you see when the phytoplankton are under “normal conditions”.
        - Do the same after you have added the acid under “acidic conditions”

- Describe Demo
    - We will do a demonstration using the Science Discovery Process to answer the question: Will increased ocean acidity impact phytoplankton?
        - (Point to Explore and Wonder on Science Discovery Process poster.)
        - (Show Plankton Question slide.)
    - I will start by observing some phytoplankton under normal conditions with our video microscope attached to our monitor.
    - We will then add an acid to the water to simulate the impacts of climate change – increasing ocean acidification and observe what happens.
    - As microbiologists it will be important to record our work.
        - (Show Phytoplankton Experiment Datasheet slide.)

- Hypothesis.
    - The first step of Investigating is to make a hypothesis.
        - (Point to “Investigate: on Science Discovery Process poster.)
    - Define Hypothesis: An educated guess.
        - (Add Hypothesis to World Wall.)
        - Have each student will in their hypothesis on their worksheet.
            - I think phytoplankton (will/will not) be impacted by increased acidity because….

- Debrief.
    - What did you observe/notice about the phytoplankton after we added the acid?
    - Let’s analyze our data.
        - (Point to Analyze on Science Discovery Process poster.)

- (Use the space on their worksheet to create a t-chart ("Phytoplankton Still Living" and "Phytoplankton Dead") and collect data from all groups.

- Ask student to accept or reject their hypothesis and explain why on their datasheet.
  - Explain that science leaders never change their hypothesis even if they weren't correct.
  - Science leaders can learn just as much from a hypothesis they reject.
  - Choose 2-3 students to share if they accepted or rejected their hypothesis and why.

Process Reflection:

Students should notice/understand:

- Adding acidity was harmful to the phytoplankton.
- As science leaders we should be concerned about how climate change is causing our oceans to become more acidic and that will affect phytoplankton.
- Killing off phytoplankton impacts our ability to fight climate change because phytoplankton use CO_2 during photosynthesis.
- The world's oceans are not yet acidic enough to kill phytoplankton, so it is very important that we consider how to help prevent this from happening.
-

- Making Connections
  - Let's put this all together. Potential questions include:
    - How did increasing the acidity of the water impact phytoplankton?
    - What does this tell you about how increasing ocean acidity levels?
    - Why do we care about what happens to phytoplankton?
      - The world's oceans are another climate change buffer as they absorb between 25-50% of the carbon dioxide created by humans from burning fossil fuels. Much of this carbon dioxide is taken up by microscopic plants (phytoplankton) that live in the ocean.
    - Do you think rising ocean acidity could impact other plants and animals that live in the ocean? How?
    - How does the ocean get more acidic?
  - Show connections slide when students have put everything together.

- Make a Difference
  - So, what do we do about it?
  - It's important to realize that we created a very acidic ocean for our phytoplankton today.
    - This was an extreme example.

- The oceans are not yet that acidic so we have time to change what is happening!

- How can we make a difference?
  - (Show Make a Difference slide.)
  - Using a Think – Pair – Share format have students answer the question.
- Make a difference in the future:
  - Become a scientist who investigates climate change, how to prevent it, and shares this knowledge with the world (i.e. microbiologist, climate scientist, environmental planner (like Vanessa!), conservation biologist, etc.)
- Make a difference today:
  - Use less fossil fuels:
    - Use less energy: turn off lights and computers when not in use, unplug chargers when not in use, etc.
    - Use less gas: walk, ride bikes, skateboards, etc. take public transit like buses or trains when distances are greater, etc.
  - Educate others:
    - Explain to other people (family, friends, etc.) what you know and what they can do to help.

Self-Reflection

Assistant Team Lead Teaching Notes:

- Help students to find the corner they want to be in for each question.
- Participate in activity. Join a student during the think-pair-share portions.

Teaching Note:
**For Wilson only – you will have 5 minutes less for this station. Suggestions for shortening:*

- *Use less Three Corners Activity statements.*

Getting Involved

- Now that we know about climate change and it's impacts to our community, our friends and family, etc. some of you may be interested in staying involved.
- Here are three local groups working to help make City Heights more resilient to climate change.
  - (Show Local Groups slides and share information.)
  - San Diego 350 Climate Connection
    - SanDiego350 is a non profit organization working to prevent the worst impacts of climate change and climate injustice through education and outreach, public policy advocacy, and community engagement.
    - There are several student teams you can get involved with including: Youth4Climate, Youth v. Oil Campaign, and the Eco Club Coalition. They also have student and adult groups focused on Eco Justice.
  - San Diego Canyonlands
    - San Diego Canyonlands is a nonprofit based in City Heights. Since 2008, we have played a major role in restoring San Diego's canyons and creeks to their natural habitat. Through stewardship volunteer events and our habitat restoration field crew, we are dedicated to promoting, protecting, and restoring the San Diego canyons and creeks.

Review Self-Reflection.

- As scientists it is important to always be checking in with ourselves to see how our thoughts and ideas change over time – this is called reflection.
- Taking time to reflect is an important part of being a scientist.
- Let's take a moment to reflect on how our thoughts and feelings about doing science, being a science leader, and making a difference have changed or stayed the same.

Three Corners Activity

- Explain how the activity works:
  - You will project a statement on the board.
  - Everyone will have 30 seconds to consider whether you "Agree," "Disagree" or are "Unsure" about each statement.
  - Once the instructor says, "Pick a corner." you will walk to the corner that most accurately describes how YOU feel about the statement.
    - (Point out signs around the room.)

  - Consider your own thoughts and feelings during this activity. It's okay to agree or disagree with a friend.
  - We would expect to see people in every corner for every statement – there is no wrong answer here. As science leaders, it is important to share how we interpret what we are learning with other science leaders.
    - There is uncertainty in science, not all science leaders agree about all things.
- Project the first statement and give everyone 20-30 seconds to think about their answer.
- Give the cue "Pick a corner" when the 30 seconds are up.
- Once all students have landed in a corner, initiate a Pair-Share.
  - Alternate between having students find someone in the same corner to share with and someone from a different corner to share with.
    - (Adults in the room should pair up with students.)
  - Ask students to turn and face their partner. Each partner will have 30 seconds to share.
  - After giving the first student 30 seconds to respond, the lead instructor will prompt the second student to speak.
  - The instructor can then ask for 1-2 student volunteers from each corner to share their thoughts.
    - When students are sharing, they may choose to share their own thoughts or their partners.
    - When you have students partner with students from a different corner, consider asking them to share what they learned from someone with a different opinion.
- Statements:
  - I can do science.
  - I can be a science leader in the future if I want.
  - I think science is important.
  - I feel like I can do something about climate change.
  - I think climate change impacts me, my family, and/or my community.
  - I can see myself coming back to the Living Lab.
  - I can see myself getting involved with San Diego Canyonlands or San Diego 350 Climate Connections or an environmental club at my school.
- Have students return to their seats and sit down.

Clean-Up & Goodbye

- Invite students back to Living Lab for next upcoming camp.
- Look around you on table and floor – pick up any trash you see.
- Note: While clean-up is happening also do a quick bathroom break before student begin walk or get on buses.
- Push in chairs at tables.
- Walk students to the Plaza del Sol (because the Watershed Plaza may be occupied by arriving After-School Camp students).
- Thank you for being your best self today!
- At Ocean Discovery Institute we **BELIEVE** that science is something you can do and a scientist is someone you can be, that you can **ACHIEVE** in science and think critically about our world, and you can **LEAD** in science and conservation and make a difference in the world. Because we

believe this, we do a "Believe! Achieve! Lead! Go Awesome!" cheer at the end of every program so that you will continue to do awesome things after we leave.

- On the count of three we will yell "Believe! Achieve! Lead! Go Awesome!"
- Have students line up and give Odi a high-five on the way out.

Staff Clean Up

Trip Lead: Determine who will do each of the below activities. Check when complete.

1 GENERAL ITEMS - IMMEDIATE

Take any cups in the "dirty" bin and run them through the dishwasher
- Dry and put away

Mop student bathrooms, take out trash and place "Caution Wet Floor" sign up

Mop student bathrooms, take out trash and place "Caution Wet Floor" sign up

2 WATERSHED PLAZA/DISCOVERY GALLERY

Return stop signs, walking maps, and completed rosters to transitional storage

Check out teachers at reception using visitor screen.

3 SCI TECH LAB/ECO LAB/PLAZA DEL SOL/THE COMMONS

Put away all supplies in designated storage location

Turn off SmartBoard
- Log out of Zoom
- Close PowerPoint and Videos

Return computers & Smartboards to storage area (Plaza del Sol and The Commons only)

Return hand sanitizers and pencils to cabinet

Put away laptop and charger into cabinet

Sweep tables, chairs, and floor (mop as necessary)

Close back doors if room will be empty

Take out trash as necessary

4 THE COMMONS/OUTDOOR AMPITHEATER

Fold blankets and put back in bin and use hand cart to return to storage.
- Place bin with blankets on shelf in the wetsuit porch
- No need to wash blankets unless there was a large spill. If this is the case, start the wash load with the blanket and notify the Floor Lead.

Pick up any trash left behind by students

Sweep trash and food waste

Empty trash and replace bags

Ensure rope fence is up

5 GENERAL ITEMS – POST TRIP

Organize Explorer Backpacks

- Remove any trash
- Make sure all explore day tools are in good shape.

Turn in completed rosters and waivers to Program Manager or Program Coordinator

Turn in Believe surveys to collection box

Debrief with Program Manager

- Report any broken or missing supplies
- Report any supplies with low inventory remaining
- Share good student stories
- Report any issues/coaching to avoid these in the future

Do a final check of all areas to ensure everything is properly cleaned, put away, and reset for after school programming

Rainy Day Plan

Floor Manager will determine when rainy day plans need to be utilized.

Additional supplies:

- Ponchos (1 per student)
- Large plastic bins w/ lids for storing/transporting ponchos (4)

1 Pre-Arrival

Place "Caution Wet Floor" sign in the Ocean Discovery Gallery.
Relocate outdoor areas:

- Group using Plaza Del Sol will set up in the Kitchen & eat lunch in the Kitchen.
- Group using The Commons will split in half and set up in the Believe and Leadership Alcoves & eat lunch in those locations.
  - Be aware that these locations will be set up for Make a Difference Tomorrow day (micro-projectors) so space will be limited.

Place a broom and pan in each location where lunch will be eaten.
Discuss rotations for Make a Difference Day for schools with four classes (see schedule below).

11:40 – 12:40	Lunch & Student-Science Leader Connection	Eco Lab	Sci Tech Lab	Kitchen	Believe & Leadership Alcoves
12:40 – 1:35	Make a Difference Day	Make a Difference Today: **Eco Lab**	Make a Difference Today: **Sci Tech Lab**	Make a Difference Tomorrow: **Kitchen Ocean Alcove & Elevator Hallway**	Make a Difference Tomorrow: **Leadership & Believe Alcoves**
1:35 – 2:30		Make a Difference Tomorrow: **Leadership & Believe Alcoves**	Make a Difference Tomorrow: **Kitchen Ocean Alcove & Elevator Hallway**	Make a Difference Today: **SciTech Lab**	Make a Difference Today: **EcoLab**
2:30 – 2:50	Self-Reflection	Believe & Leadership Alcoves	Kitchen	SciTech Lab	Eco Lab
2:50 – 3:00	Believe Survey	Believe & Leadership Alcoves	Kitchen	SciTech Lab	Eco Lab
3:00 – 3:10	Clean-up/Invite back	Believe & Leadership Alcoves	Kitchen	SciTech lab	Eco Lab

2 Arrival

Take out ponchos and bring them to the bus stop.
Greet students and teachers on bus:

- Give each student a poncho to wear on the bus.
- Explain that this is their poncho for the day and they must keep it with them all day.

Take students to their Intro location to review Community Agreements.
Floor manager:

- Walk to all Introduction stations and have teachers:
  - Note any students absent on the roster.
  - Sign cover sheet stating they've collected all waivers to the best of their ability.
- Take adult chaperones aside and discuss expectations for the day (see curriculum above).

3 MAKE A DIFFERENCE TOMORROW

See rotations schedule above.

4 MAKE A DIFFERENCE TODAY

No Changes

5 EXPLORE DAY

Rain: Students will put on ponchos during outdoor sections.
Student will eat in the location where they finish their first activity with the exceptions for:

- Fellow Bay #1 will eat in the Kitchen.

6 LUNCH

- Fellow Bay #2 will eat in the Ocean Alcove and area surrounding the staircase.

Make sure students clean-up trash and use broom and pan to sweep up before starting the next activity.

7 DEPARTURE

Have students put on ponchos to walk to the bus.
After all students have boarded the bus have two adults on each bus collect the ponchos and put them in the bins to carry back to the lab.

8 CLEAN UP – POST TRIP

Spread ponchos out in the SciTech and Ecolab and leave them to dry out.
See Clean Up Protocol above

PEN Writing Guidelines

Make a Difference Today

There are no expectations with these exercises. No right or wrong way to do them. The purpose is to provide a space for free expression for the students. It's through creative expression that we see a universal experience. It's through our personal stories that we learn and share empathy.

Writing practice is just that—practice. There are only 3 rules which aren't even rules. Please share and remind the kids of these rules:

> When you hear the prompt, write it at the top of your page.
> Then…
> 1. Put down the first thing that comes to your mind.
> 2. Keep your hand moving until I (the teacher) tell you to stop.
> 3. Don't worry about making it perfect because this is just the first draft, just practice.

The prompts are arranged in a particular order with the intention to build on their own ideas and impressions about environmental justice and carbon sinks, and nature in general, most especially from a personal view.

Time allotments are set for each prompt. Let them know how much time they have, that you'll give them a one-minute warning when time is almost up. The time allowed also provides the sense of the deadline and how much time they have to express themselves. They will often get to the heart of the matter faster if they have a tighter time frame. If it looks like they students are bored and have put down their pens, remind them to keep their hand moving.

Encourage them to put down on the page anything at all. Repeatedly remind them that it does not have to be perfect, that it will not be graded, that there are no expectations. Each group will be different with what they do and don't respond to.

It's often helpful at the beginning of the session to make them feel empowered with the blank page by reminding them that this is a time of free expression, that freedom of expression is what the 1st Amendment of the Constitution protects. We all tell stories all the time, when we come home from school and tell about our day, when a friend tells you how they feel, when you hear about something that happened in the news—those are all stories. It's how we learn about each other. It's how we learn to understand and care about one another. Stories are how we learn empathy.

You may not get through all the prompts in the amount of time allotted. If you see they are all busy writing, feel free to let them go another couple of minutes. If they look bored, you can stop a little sooner. If you have time left at the end you can ask them to talk about which prompts they were most interested in and why.

Instructor Resources

Climate Change 101

- **Video with Bill Nye (4 min):** https://www.youtube.com/watch?v=EtW2rrLHs08
- **Climate 101 (From the Climate Reality Project):** https://www.climaterealityproject.org/climate-101
- **7 Questions about Climate Change You Might be Embarrassed to Ask:** https://www.climaterealityproject.org/blog/7-questions-about-climate-crisis-you-might-be-embarrassed-ask
- **The Difference Between Weather and Climate:** https://www.climate.gov/news-features/videos/climate-science-101-what-difference-between-weather-and-climate

San Diego Climate Action Plan:

- Refers to Communities of Concern and how climate change will impact them more.
    - https://www.sandiego.gov/sustainability/climate-action-plan

Carbon sinks:

- How the Earth's Sinks Have impacted Global Climate Change: https://futureearth.org/2019/04/03/long-term-data-on-atmospheric-carbon-dioxide-reveals-an-intensification-of-carbon-uptake-by-northern-hemisphere-vegetation/#:~:text=The%20Northern%20Hemisphere%20is%20also,southern%20half%20of%20the%20planet.

Ocean Acidification:

- Overview by NOAA:
    - https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification

Carbon Cycle:

- Short video on how carbon is cycled around our planet and how humans are changing that cycle.
    - https://youtu.be/lWEvBLlUa2E

Archive

(Old Wilson Schedule before busing change.)

WILSON: 4 Classes

Bus

Time	Activity	Class 1	Class 2	Class 3	Class 4
9:15 – 9:25	Arrival/ Welcome	Watershed Plaza			
9:25 – 9:45	Introduction	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
Explore Day					
9:45 – 10:15	Explore Intro	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
10:15 – 11:00	Data Collection	Canyon #1 (10:20-10:35) Street #2 (10:40-10:55)	Canyon #2 (10:20-10:35) Street #1 (10:40-10:55)	Street #1 (10:20-10:35) Canyon #2 (10:40-10:55)	Street #2 (10:20-10:35) Canyon #1 (10:40-10:55)
11:00 – 11:40	Data Analysis & Process Reflection	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
11:40 – 12:05*	Science Leader-Student Connection	Eco Lab	SciTech Lab	Plaza Del Sol	The Commons
12:05 – 12:25*	Lunch	Watershed Plaza	Rock Amphitheater	Plaza Del Sol	Fisler Family Tree
Make a Difference Day					
12:25 – 1:10*	Make a Difference Tomorrow	Plaza Del Sol Leadership Alcove & Ocean Alcove	The Commons Believe Alcove & Elevator Hallway	Eco Lab	Sci Tech Lab
1:10 – 1:55	Make a Difference Today	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
1:55 – 2:10*	Self-Reflection	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:10 – 2:20	Believe Survey	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:20 – 2:25*	Clean-up/Invite back	Plaza Del Sol	The Commons	Eco Lab	Sci Tech Lab
2:25-2:30 PM	Bus Pick Up	Walk to Bus Stop			