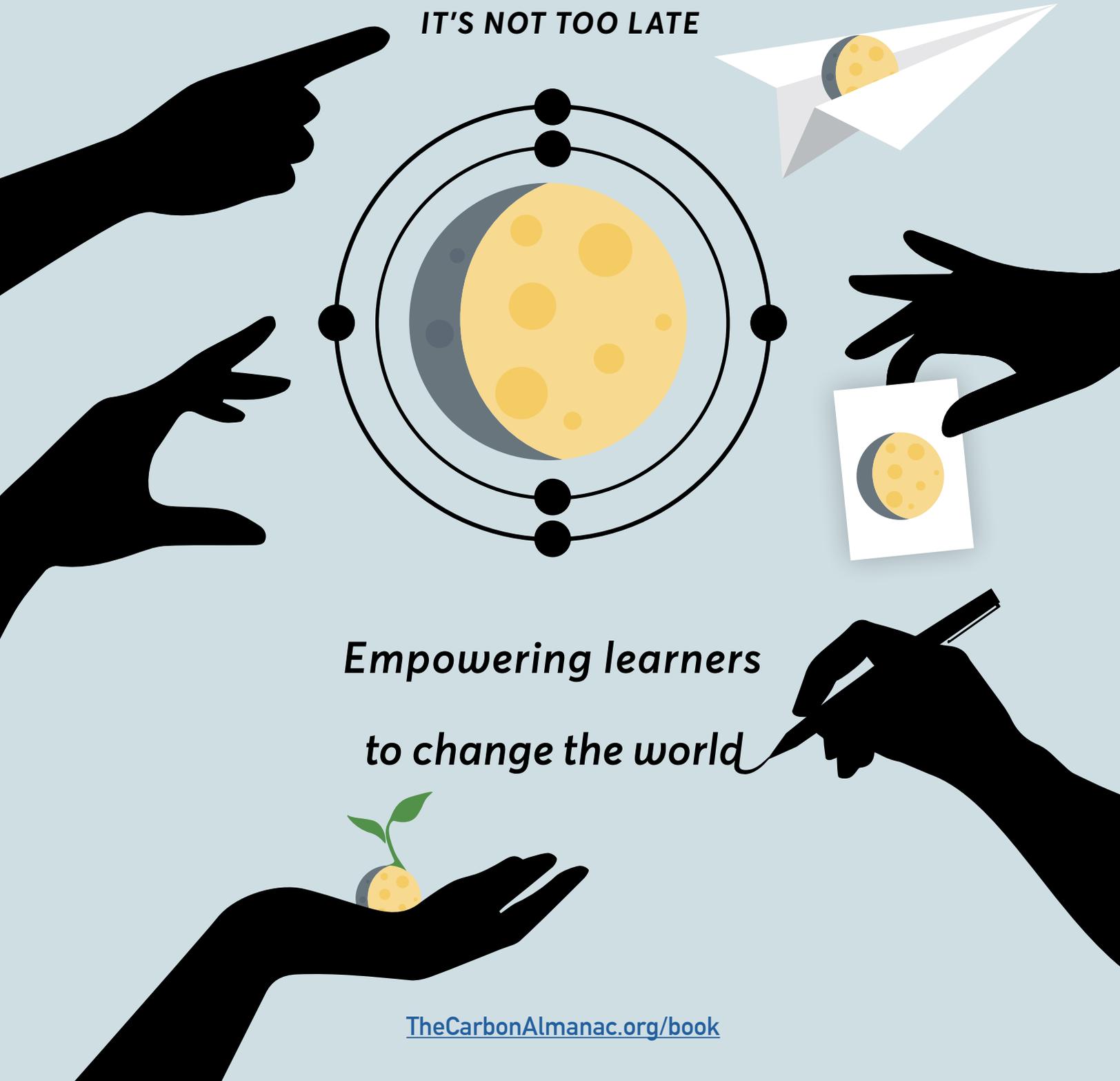


EDUCATORS' GUIDE

a companion to
THE CARBON ALMANAC

IT'S NOT TOO LATE



*Empowering learners
to change the world*

“Tell me and I forget, teach me and I remember, involve me and I learn.”
Benjamin Franklin

EDUCATORS ARE THE GATEKEEPERS OF TOMORROW. Through you, this planet’s children learn how to navigate and improve our complex world.

Welcome to the Educators’ Guide. It’s written for educators, parents and supporters of youth. You belong to a group of curious, creative and committed minds who want to help our children save our planet. *The Carbon Almanac* has been designed to aid you in this monumental endeavor. The activities that follow are meant to inspire your learners to take action, and create a sustainable future...one decision at a time.

Learners become overwhelmed by stories about climate change and traumatized by living through events caused by climate change such as tornadoes, wildfires, tsunamis and shoreline erosion. Stories, pictures and videos are everywhere: on social media, in the news and in their classrooms. *The Carbon Almanac* is the first book that explains everything a learner needs to know about global warming using easy explanations based on facts, not opinions. Some activities directly address these learners’ growing anxiety about their future.

This Educators’ Guide will help you confidently incorporate *The Carbon Almanac* into your climate-related curriculum. Climate change is a serious subject and consequently, *The Carbon Almanac* is a serious read; but, it will also engage and take you and your learners down a path of fun and empowerment.

“Every adventure requires a first step.”
The Cheshire Cat
Alice in Wonderland
Lewis Carroll

(Note: We’ve left an invitation for you at the end of the activities. We hope you accept our offer.)

Your partners of *The Carbon Almanac* Education Team

A NOTE ON GRADING AND GRADES

We have been living in the information age, arguably for decades now. Unfortunately, there are many in the fields of education, and educational administration, as well as those who are politicians and taxpayers who think we are still living in the industrial age. What this means to you, the frontline educational worker, is that you are asked to assess your learners with misaligned measurements and tools.

Those in charge, or their representatives, want proof that the money spent for your salary, school buildings, and school budgets is providing a good return on investment. You know—have known—that this old style of assessment doesn't reveal or measure the acquisition of knowledge or the amount of enduring understanding that is being created in the minds of your learners.

What we're proposing is a pretest/post-test scenario. By comparing the results of the tests, this construct enables an educator to measure the change in a learner's understanding.

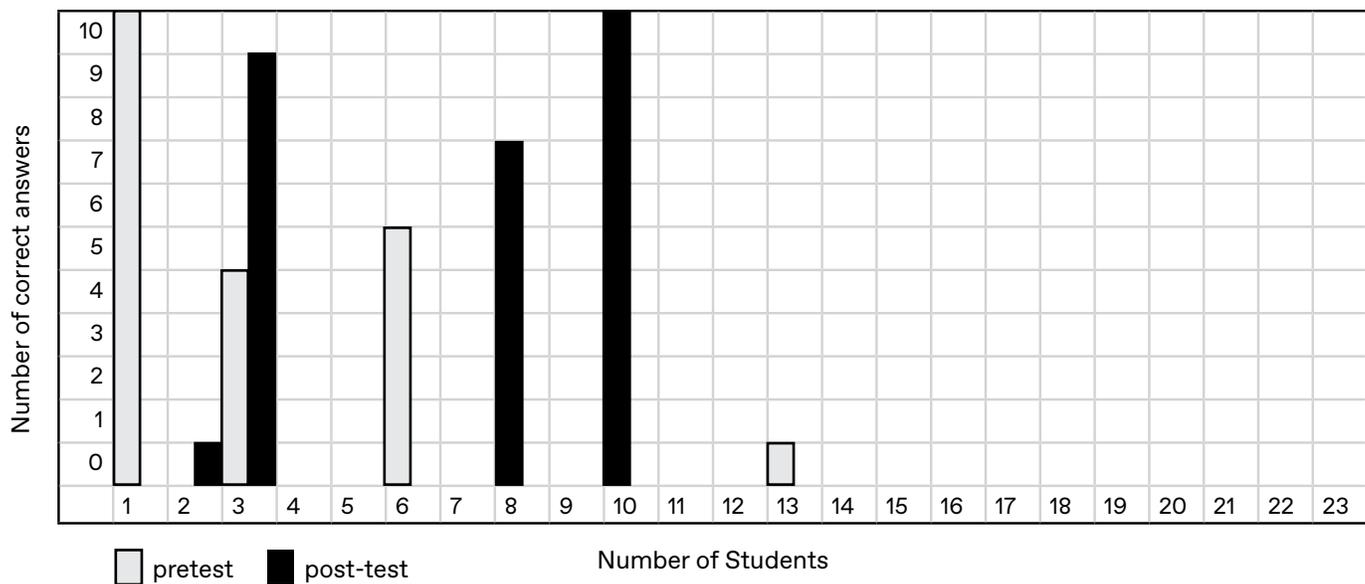
There are two immediate benefits to you:

1. Responsibility of acquiring the knowledge is on the learner, and
2. This practice moves assessment from an industrial to an information age model.

Example (note that the following numbers aren't statistically reliable, rather they are based on observation of human behavior):

- You have a class of 23 learners.
- You pretest them with a 10-question pretest (The pretest is the exact same test you will use for the post-test.)
- 5 questions are True/False, 5 questions are short answers.

The results:



Determining the final grade for this activity/unit:

- C. You can go strictly by the correct number of questions answered.
- D. Or, add a second criteria—effort expended. State this up front, before the activity begins. Observe your learners: for those fully engaged, add 3 points; for those who are somewhat engaged add 1 point; for the disengaged learner, zero points added.

Conclusions:

1. This sort of assessment puts gaining of knowledge on the learner, fostering maturity and an appropriate level of responsibility, and provides a more accurate measurement.
2. The spread of grades will be based on effort expended, not a statistical curve which is an outmoded and inappropriate industrial model.

Subject Key

SUBJECT	ICON	SOURCE
Agriculture		Icon made by Freepik from www.flaticon.com
Arts		Icon made by Freepik from www.flaticon.com
Economics		Icon made by Freepik from www.flaticon.com
Geography		Icon made by Freepik from www.flaticon.com
Literature		Icon made by Freepik from www.flaticon.com
Math		Icon made by Pixel Perfect from www.flaticon.com
Science		Icon made by Freepik from www.flaticon.com
Social Studies/ History		Icon made by Freepik from www.flaticon.com

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SECTION 1

The Beginning

What is carbon, why does it matter, and why should I care?



Dictionary

AGE RANGE: 8+

SUBJECTS: Literature & Science

OBJECTIVES

- To match the correct definition with its word
- To use one of the words from *The Carbon Almanac* in a sentence
- To have fun

DURATION

- 15 -20 minutes at a minimum.
- Note: This activity works best with 10 learners. An explanation for adapting to a larger group is below.

ENDURING UNDERSTANDING:

- Creating a shared vocabulary about the topic of changing climate.

Let's have some fun. We're going to play a game.

ACTIVITIES

- Play Dictionary (see how-to below)
- Write or say a sentence using the chosen word from *The Carbon Almanac*.
- Laugh

HOW TO PLAY DICTIONARY

- Using the article: "Climate Change for Rookies" from *The Carbon Almanac*
 1. Choose several key words like carbon, ecology, climate, etc.
 2. Write each word on a small piece of paper.
 3. Put those pieces of paper into a hat, or box, or bag.
 4. Choose a learner who will randomly pull out one word/piece of paper.
 5. The learner reads the word out to the group.
 6. Everyone, including the learner who chose the word, writes what they think the definition of that word is on a piece of paper
 7. Everyone puts their made-up definition papers in another container
 8. Educator puts in a paper with the correct definition
 9. Read out the definitions (you or the learner who chose the word)
 10. The group votes on which definition they think is correct
 11. Educator announces which one is the correct definition.
 12. Have learners use the word from the Almanac in a sentence—writing it or saying it to a partner or sharing with the group.
 13. Repeat steps 4 - 12 as many times as you choose

OPTIONS FOR ADAPTING FOR A LARGE GROUP

- A. Break into smaller groups if you have another adult/leader who can run the second group
- B. Keeping your group together as a whole, the leader will have to read only a few of the learners' definitions, making sure the correct definition is read along with the made-up definitions.



RESOURCE LIST:

- Copy of *The Carbon Almanac*
- *The Carbon Almanac* - Introduction: Facts and Definitions, p.26/ [756](#)
- Paper and pencils or pens



You Are Brave

AGE RANGE: 12+

SUBJECTS: Arts, Literature, & Social Studies

OBJECTIVES

- Identify the message(s) of the poem
- Analyze the poem for its meaning(s). What is the poet saying to us?
- Evaluate the impact that individual, communities, and countries decisions have had on our planet and its climate.

DURATION

- Two 50-minute class periods

ENDURING UNDERSTANDING

- Learners will identify themselves as global citizens with the power to create change through their choices and actions.

PREPARATION:

You will need to provide each learner with a copy of the poem and the article “*Indigenous Youth Represent Their Culture Demand Action*” from *The Carbon Almanac*, either on paper or electronically.

Search the web for definitions and images of mola art you can share with your learners.

ACTIVITIES:

- Read the poem “*A Brave and Startling Truth*” by Maya Angelou.
- Review how to fill out the worksheet.
- Have learners independently, as a whole group, or in pairs, read the poem and article, completing the worksheet as they go. (Note: webs/maps and molas are to be done individually, not in groups.)
- Group discussion around the topics of being a powerful human being, a global citizen, what does being brave look like, what are the responsibilities of being an agent of change?
- Introduce the topic of doing the web/map worksheet.
- Learners fill out their personal web/map worksheet. Remind your learners that feeling powerful isn’t something that comes from doing large and important things, it also comes from the small, everyday choices we make. The clue for this exercise is how doing this thing makes them feel on the inside about themselves.
- Learners read their copies of: “*Indigenous Youth Represent Their Culture to Demand Justice*”.
- Group discussion comparing the themes of “*A Brave and Startling Truth*” with the themes from the article about the Indigenous Youth.
- Script: Now you will be using the next worksheet to write a letter: In this letter you will pretend you are Maya Angelou. You can write your letter to either Agar or Iniquilipi. Include a quote from the poem and make sure to reference the mola sail. Sign the letter Maya Angelou.
- Learners complete the worksheet: Analyzing the Poem and the Article.
- Script: You all have worked to understand the meaning of a poem and you have read about some extraordinary indigenous youth who are activists against climate change and you’ve examined when you feel powerful. Now is the time to pull all of this together. You will be using your web/maps to create a mola.
- Learners draw their personal molas. Learners display their molas

ASSESSMENT:

- At the educator’s discretion points can be assigned for completed worksheets and participation in discussions to determine a cumulative grade.



RESOURCES:

- *The Carbon Almanac* - Introduction: **A Brave and Startling Truth**, p. 16,17
- *The Carbon Almanac* - **Whose job is it?: Indigenous Youth Represent Their Culture to Demand Action**, p. 242/120
- Worksheet: Analyzing the Poem and the Article
- Pencil, colors optional and paper

Worksheet: Analyzing the Poem and the Article , p1

Hello Learner! Maya Angelou wrote a poem entitled “A Brave and Startling Truth” which explores the earth’s journey and the relationship it has with the humans who live upon it. In her poem, the idea of peace is shown as a choice that each human makes in his or her own time. She shows her readers that there is power in choice, and she urges humans to be brave and choose to be powerful agents for change.

You are going to read the poem “A Brave and Startling Truth” which is found in the Introduction section of The Carbon Almanac. As you read the poem, consider the themes: Peace, Power of Choice, and Truth. As a global citizen, Maya Angelou sees you as a powerful being, able to bring about great change. Do you see yourself this way? Think about how your day went yesterday. There is no telling how many choices you made in total, but you can probably recall quite a few.

1. List three or four choices that you can recall from yesterday in the box below.

Now, read the poem “*A Brave and Startling Truth.*”

2. Take a moment and review the stanzas, looking for references of the earth. How does the speaker, Maya Angelou, describe the planet?

3. Consider the language Angelou uses to describe the earth. In your own words, write a sentence that sums up how she portrays the earth in this poem.

4. In the sixth and seventh stanza, Angelou writes of the ‘wonders of the world’ and mentions specific landmarks. In the box below, list three of these ‘wonders.’

5. Why does Maya Angelou say at the end of stanza 7 that “These are not the only wonders of the world”? What does she want the reader to realize? Include the line in the last stanza of the poem that answers this question.

Worksheet: Analyzing the Poem and the Article , p2

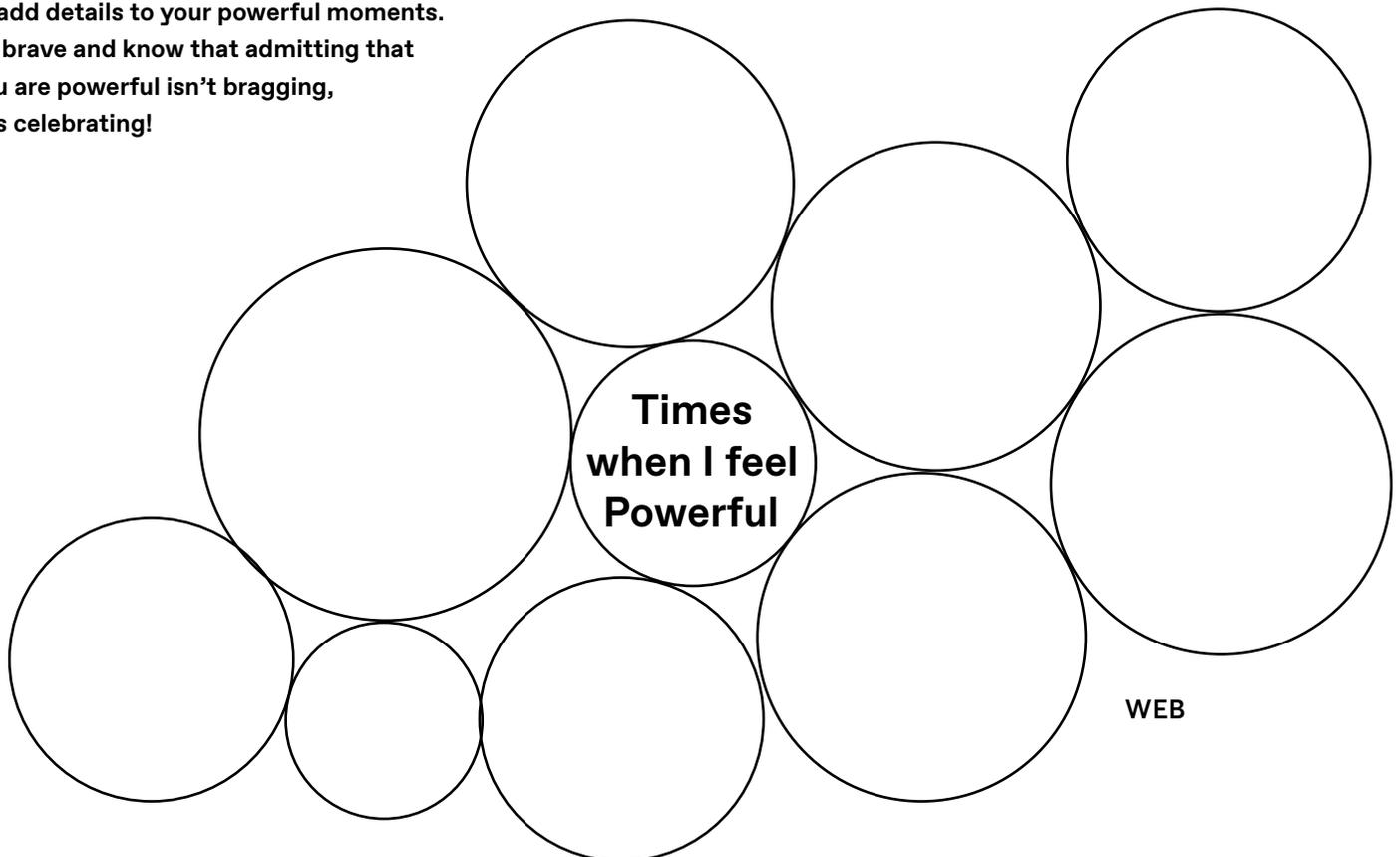
6. Consider the title of the poem "A Brave and Startling Truth." Look at the answer above. Do you think it is brave to realize that you are a powerful being? Explain your answer.

Now that you have read Maya's poem, you are going to examine your life and complete a thinking-map. In the web below, you see the center circle says "Times when I feel powerful." Fill in the surrounding circles with times that you feel your best, when you know you are as beautiful as the natural wonders of the world. It might be when you are in the classroom, on a ball field or court, creating art, singing out loud, reading quietly, or resting in nature.

Complete your web, using the smaller outer circles

to add details to your powerful moments.

**Be brave and know that admitting that
you are powerful isn't bragging,
it is celebrating!**



Worksheet: Analyzing the Poem and the Article, p3

Now that your web is complete, we will read the article “Indigenous Youth Represent Their Culture to Demand Action” in the ‘Whose Job is it?’ section of The Carbon Almanac. As we read, think about Maya Angelou’s poem “A Brave and Startling Truth” and the themes Peace, Power of Choice, and Truth.

Read the article

As you read the article you discovered that “...a group of young activists from Panama’s Indigenous Guna people came together to create a massive handmade “Mola” sail.”

As you read further, you learned that “The traditional colorful handsewn mola cloth appliqué technique used for the sail is unique to the region.”

7. In your own words explain what “mola” might mean.

8. Knowing the above definition, and learning that molas are usually clothing, form an opinion on why the mola in the article was in the shape of a sail. Please write your opinion in the box provided, using context clues to form your answer. Your answer could look something like this: “I believe that the learners in the article formed their mola in the shape of a sail because...”

Recall the poem “A Brave and Startling Truth.”

Contemplate the following quotes:

“It (the mola sail) symbolizes our deep caring of our Mother the Earth with its honoring of the sky, sun, sea, earth and of all living beings. It’s the sail that unites us and moves us forward to fight for the forests, rivers and oceans of our Mother.”

~Agar Inklenia

“We must continue growing stronger in our resolve, smarter in our organization and united in our action with our brothers and sisters of lands close by and far away.”

~Iniquilipi Chiari

Worksheet: Write a Letter to Agar or Iniquilipi and Draw Your Own Mola

We learned that Maya Angelou described the earth as a small but beautiful planet. She highlighted the wonders of the world. She brought attention to how humans are powerful beings, sometimes choosing to use their power to create war, and sometimes using their power to create peace.

Pretend that you are Maya Angelou and the author of "A Brave and Startling Truth." Imagining this, what do you think Maya Angelou would like to say to Agar and Iniquilipi about their mola sail? **Be Maya Angelou and write a letter to either Agar or Iniquilipi. Include a quote from the poem and make sure to reference the mola sail. Sign the letter Maya Angelou.**

Now it is time to make your own mola. Using your web, decide on what form your Mola will take. Is it a traditional mola that is in the shape of a blouse, or is it an untraditional mola in the shape of a sail? Perhaps it is the shape of a soccer ball, or a book, or a tree. Use your web to help you choose a shape. Using the picture of the mola sail in *The Carbon Almanac* article "Indigenous Youth Represent Their Culture to Demand Action" and your web for inspiration, create your own mola in the space provided. Your goal is to create a mola that is unique to you. It should be a visual reminder that you are a powerful person— a person who lives Maya Angelou's "Brave and Startling Truth."

Worksheet Answer Key: Worksheet: Analyzing the Poem and the Article

1. List three or four choices that you can recall from yesterday in the box below.

A: List three or four choices that you can recall from yesterday. Answers may vary.

2. Take a moment and review the stanzas, looking for references of the earth. How does the speaker, Maya Angelou, describe the planet?

A: Small and lonely planet; minuscule and kithless globe; mote of matter; small and drifting planet; wayward, floating body

3. Consider the language Angelou uses to describe the earth. In your own words, write a sentence that sums up how she portrays the earth in this poem.

A: Angelou describes the planet earth as solitary, aimless, and small.

4. In the sixth and seventh stanza, Angelou writes of the 'wonders of the world' and mentions specific landmarks. In the box below, list three of these 'wonders.'

A: Pyramids, Gardens of Babylon, Grand Canyon, Danube, Mount Fuji, Father Amazon, Mother Mississippi

5. Why does Maya Angelou say at the end of stanza 7 that "These are not the only wonders of the world"? What does she want the reader to realize? Include the line in the last stanza of the poem that answers this question.

A: Maya is saying to the reader that the earth is beautiful, and that the people of the earth are beautiful too. She wants the reader to realize the potential that lives in each human. She is saying that people are the greatest wonders of the world. In the poem's last stanza she says "We are the miraculous, the true wonder of this world."

6. Consider the title of the poem "A Brave and Startling Truth." Look at the answer above. Do you think it is brave to realize that you are a powerful being? Explain your answer.

A: Opinion Answer

Note: For the web/map Answers may vary

7. In your own words explain what "mola" might mean.

A: Molans are simple yoke-type blouses richly decorated by intricate needlework. Mola can mean the blouse that is daily wear for Kuna (sometimes spelled Cuna) women but most often refers to its front or back panel. They have been made for about a century.

8. Knowing the above definition, and learning that molans are usually clothing, form an opinion on why the mola in the article was in the shape of a sail. Please write your opinion in the box provided, using context clues to form your answer. Your answer could look something like this: "I believe that the learners in the article formed their mola in the shape of a sail because..."

A: The text informs the reader that the majority of the Guna people live in the San Blas Islands located in the Caribbean Sea. In the next thirty years, the rising sea level may flood the islands. If this happens, the Guna people will have to leave the islands.



SECTION 2

Climate Change for Rookies

What's all this talk about carbon?



How to Live in a Carbon-Neutral World by 2050, OPT 1

AGE RANGE: 8+, 10+

SUBJECTS: Science & Social Studies

OBJECTIVES

- Define the term “net zero.”
- Imagine one small step learners can take as individuals to reach net zero and imagine one bigger step their family, school, town, village, neighborhood can take to reach net zero.
- Create and share artwork of how learners imagine the future will look at net zero.

DURATION

- 1-2 hours

ENDURING UNDERSTANDING

- Impact of human behavior on climate

ACTIVITIES FOR AGES 8 - 10:

- Read *The 10 daily scenes in 2050* as described in “Climate change for Rookies: What is net zero Emissions?” (15 minutes)
- Discuss and brainstorm (Can be done as class or break into small groups) the ways that we as individuals and then as a community contribute to the carbon footprint—not being carbon neutral.
- Each learner draws or paints to illustrate their vision of a net zero future and then displays their work.
- After viewing the displayed drawing and paintings, as a group discuss and analyze the gap between life today and the vision of life in 2050. To keep the discussion moving in a positive direction, ask the learners what steps they think need to happen to make net zero a reality.

ACTIVITIES FOR AGES 10+:

- Read “Net-zero living: How your day will look in a carbon-neutral world” and “Climate Change for Rookies: Climate Change actions from large to small - in layout” (15 minutes)
- Discuss and brainstorm in one group or in small groups ways we as individuals and then as a community contribute to the carbon footprint—not being carbon neutral.
- Learners choose a scene or write a simple script with 10 scenes in total to draw a graphic novel/cartoon-style presentation with a storyline demonstrating the learner’s vision of a net zero future in 2050 and how to create that. These graphic novels can be on paper or electronic.
- Share examples of graphic novels and zines for inspiration.

ASSESSMENT:

- This is a very experiential and kinesthetic integration of complex ideas and concepts. Some of the learners may think of themselves as bad at drawing. Encourage everyone to give it a try. Make it clear the assessment is not based on their drawing ability. What you are looking for is content in their presentations and how well they understand what is being presented in the articles. Encourage them to explain to you in their own words what net zero means.
- Share their work with their classmates, families and the school at large.

RESOURCES:

- *The Carbon Almanac - Climate Change for Rookies: What is Net Zero*, p.30-31/ [755](#)
- *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37/ [757](#)
- [Net-zero living: How your day will look in a carbon-neutral world](#)
- Art materials





How to Live in a Carbon-Neutral World by 2050, OPT 2, P1

AGE RANGE: 8+

SUBJECTS: Science & Social Studies

OBJECTIVES

- Define the term “net zero.”
- Imagine one small step learners can take as individuals to reach net zero and imagine one bigger step their family, school, town, village, neighborhood can take to reach net zero.
- Learn to create stop motion animation

DURATION

- A week or more
- Session duration 2 hours

ENDURING UNDERSTANDING

- Impact of human behavior on climate

ACTIVITIES FIRST SESSION:

- Read “Net-zero living: How your day will look in a carbon-neutral world” and “Climate Change for Rookies: Climate Change actions from large to small - in layout” (15 minutes)
- Discuss and brainstorm ways we as individuals and then as a community contribute to the carbon footprint—not being carbon neutral.
- Watch Guide to Lego Stop Motion (15 minutes)

NOTE: Educator decides whether the final assessment will be a team effort or as individual learners. If the educator creates teams, these learners become small production companies (recommend not exceeding 3 learners per team). These production companies will create stop-motion animations demonstrating their groups’ vision of a net zero future in the year 2050 and demonstrate how humans get to net zero.

It is important to keep these movies single-idea focused. Learners may be used to complex action in what they watch.

Stop-motion is the opposite. For example, in the first frame, a lego figure walks in from the left with an axe over his shoulder and there is a single tree in front of him. A child enters from the opposite direction waving their arms and saying, “Stop! Don’t do that.” The next several frames can be a piece of paper with the child’s voice speaking over what is appearing on camera—this is literally called a voice-over, and the numbers on the paper move and change in front of the camera as the child explains that if we add one tree, we get this much oxygen and carbon reduction; take a tree away, and this happens. The last shots can be the lego figure and a child planting a tree.

- Learners choose a scene or write a simple script with 10 scenes in total. In stop-motion animation, depending on the rate each scene takes 15-30 movements or pictures per scene. A ten-scene movie takes 150 to 300 pictures to complete, as an estimate.



RESOURCES:

- *The Carbon Almanac - Climate Change for Rookies: What is Net Zero*, p.30-31/ [755](#)
- *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37/ [757](#)
- [Guide to Lego Stop-Motion](#)
- [Net-zero living: How your day will look in a carbon-neutral world](#)
- Computers with access to internet for research
- Low-cost effective software package like [Stop Motion Studio](#) which works on Apple and Android/windows-based phones and the company does have school discounts
- Tripod for holding phones
- Smartphone for recording images and sound
- Lego bricks and characters
- Art materials

How to Live in a Carbon-Neutral World by 2050 , OPT 2, P2

ACTIVITIES SECOND SESSION:

- Show examples of storyboards to explain what they are and their purpose in the creative process.
- Learner production teams finalize their script for their stop-motion project and create a detailed storyboard including dialogue, sound effects and music.
- Each group presents their storyboards to the class (5 minutes for each team).
- Fellow learners give feedback to the presenters by asking questions, not criticizing.
- Production teams make corrections to their storyboards based on the feedback of their peers.

ACTIVITIES SECOND AND THIRD SESSION:

- Using a software package, like Stop Motion Studio and their phones, the learners will shoot, edit, and produce a short stop-motion animation that can include sound effects, voice overs, and music. They will also be able to upload their work to a public social media platform of their choosing. (Note: this is the most time intensive and the engaging output for this activity.)

ASSESSMENTS

- Share with class
- Share with others in their community: For example, present at school assemblies, to family members, and community.
- Partnering with the adults in their lives is a good first step into engaging with the wider community that is populated by adult decision-makers. These presentations could lead to presenting to local government officials, business leaders, and others who provide a wider circle for these children to influence.



RESOURCES:

- *The Carbon Almanac - Climate Change for Rookies: What is Net Zero*, p.30-31/ [755](#)
- *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37/ [757](#)
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- Art materials



Goldilocks Tackles Climate Change

AGE RANGE: 8+

SUBJECTS: Arts, Science, & Social Studies

OBJECTIVES

- Gain knowledge about the environment through reading and through the cartoon
- Assess values, attitudes and commitment needed to protect and improve the environment.
- Create new patterns of behavior by identifying, categorizing, and depicting behaviors that they currently exhibit, will exhibit soon, and aspire to exhibit in the future.

DURATION

- One 50-minute class period

ENDURING UNDERSTANDING

- Adopting New Habits combined with Envisioning Future Actions creates Global Citizens committed to protecting and improving the environment.

ACTIVITIES - WITH PRINTED WORKSHEET

- Distribute printed or digital worksheet “Goldilocks Tackles Climate Change.”
- Tell the learners that they are going to learn about current environmental concerns using articles from *The Carbon Almanac*.
- Have learners independently read the opening paragraph of the worksheet. Learners will be directed to read *The Carbon Almanac* article “The Wizard, the Prophet, the Ostrich” in the Introduction section of the Almanac.
- Have learners independently read *The Carbon Almanac* article “Climate change actions from large to small” in the Climate Change for Rookies section of the almanac.
- Learners follow worksheet instructions

ACTIVITIES - WITHOUT PRINTED WORKSHEET

- Tell learners that they are going to learn about current environmental concerns using articles from *The Carbon Almanac*.
- Shares the cartoon entitled “Goldilocks Tackles Climate Change” found in the article “Getting Started with Climate Action.” Class will discuss what is depicted and predict what the assignment might be
- As a class, read the article “The Wizard, the Prophet, the Ostrich”
- As a class, review the lists found on “Climate change actions from large to small”
- Learners will choose two or three actions from each section: Enormous Impacts, Medium Impacts, Small Impacts, and list either as a class or independently. These are actions that the learners find compelling. This can be done on a white/black board, Smartboard, overhead projector, etc.
- Learners refer back to the cartoon “Goldilocks Tackles Climate Change” discussed at the beginning of class. Using the list they created, learners will choose three impacts to illustrate: TOO BIG of an action for now, TOO SMALL of an action for now, JUST RIGHT of an action for now. The learners may choose from any of the three sections as they please.
- Learners will create three cartoons that illustrate their choices.

SHARING AND ASSESSMENT:

- Learners may share their cartoons in whole group discussion, small groups, or pairs.
- Cartoons may be displayed as culminating activity.
- Assessment may be determined by completion and/or based on effort.



RESOURCES:

- *The Carbon Almanac* - Introduction: The Wizard, the Prophet, the Ostrich, p.12/ [002](#)
- *The Carbon Almanac* - Climate Change for Rookies: Climate Change Actions from Large to Small, p.36-37/ [757](#)
- *The Carbon Almanac* - Getting Started With Climate Action, p.303/ [162](#)
- [Generation Carbon, An Almanac for Kids](#), ebook, p.46 - p.52
- Goldilocks Tackles Climate Change” worksheet
- Pencil, colors optional, Paper



WHICH ACTION FEELS JUST RIGHT?

Hello Learner! As you can see in the cartoon above, Goldilocks has ventured out of the woods and is now in the city. She is noticing that the earth needs her help, but some tasks feel too big and some tasks feel too small. This is how many people feel when they are faced with big problems that seem unsolvable. Some people might become so overwhelmed, they decide to pretend the problems don't exist. Does that feel "just right" to you? Probably not! Read "The Wizard, the Prophet, the Ostrich" from p.002 of *The Carbon Almanac*.

You are going to learn about some environmental problems that are affecting the earth today, and examine how you can be a good global citizen like Goldilocks. You will determine what actions you are taking now, and what you can do in the future.

Read through the article "Climate Change Actions From Large to Small" p.757 from *The Carbon Almanac*. Choose two or three problems from each category that interest you and list them in the boxes underneath each category. (Whatever you choose is fine! You can't get this wrong

Enormous Problems	Medium Problems	Small Problems
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Worksheet: Goldilocks Tackles Climate Change ,p2

Now, take another look at the “Goldilocks Tackles Climate Change” cartoon at the top of the page. Some tasks felt too big, some tasks felt too small, and some tasks felt just right. Look at the lists you made above.

TOO BIG: Find a problem that you wish you could change right now, but you know it is “too big” to accomplish at this time. Envision yourself in the future, taking on this challenge when the time comes that it feels “just right.”

TOO SMALL: Identify something that you are already doing to help the environment. You probably are doing more than you think. Do you throw your trash away? Do you recycle cans and bottles? Do you turn out the light when you leave the room? These are only three examples of small things you might already be doing.

JUST RIGHT: Choose a task that you can start doing right now, today, that will help the environment. Like Goldilocks, be realistic and really think about what you can achieve; don’t go too small, but don’t go too big either.

Now for the fun part! In the boxes provided, draw your own “Tackles Climate Change” cartoon. In the first box, draw what you envision yourself doing one day to help the environment. In the second box, draw what you are already doing as a good global citizen, and in the third box, illustrate the new action that you are going to do now to tackle climate change.

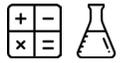
Too Big (For Now!)	Too Small (But Helpful!)	Just Right (for Today!)
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SECTION 3

Here's What's True

The science of the climate crisis



Computing and Carbon

AGE RANGE: 12+

SUBJECTS: Math & Science

OBJECTIVES

- Determine how much carbon is produced from their own and their classmates' daily computer/device usage.
- Compile the Computer Carbon data into graphs and charts.
- Present a plan to reduce the amount of CO₂ their daily computer usage contributes.

DURATION

- In class: 30-minute discussion plus 1-hour work session
- Homework: 30 minutes for research
- Presentations: 30 minutes to 1 hour (depending on the number of learners)

ENDURING UNDERSTANDING

- How much carbon dioxide (CO₂) does our use of computers produce?

ACTIVITIES FIRST SESSION:

1. Discussion: Ask learners to brainstorm what they use their devices for each day; include apps, websites, e-mail.
 - Show learners the data from *The Carbon Almanac* #340 Computing and Carbon; discuss which activities produce the most and least data.
2. As a class, create a fictional learner and do a mock-up of their computer/device usage in a day. Calculate how much carbon this fictional person would produce.

HOMEWORK:

3. Instruct learners to record their computer/device usage for a day (including which websites/apps/games they use and for how long).

ACTIVITIES SECOND SESSION:

4. In class: Have learners determine how much CO₂ their computer usage produces using the websites provided in the Almanac and the additional resources.
5. Using the mock learner from the previous day, demonstrate how to create a pie chart or bar graph of the data they collected (for younger learners) or have the learners work on their own to create a graph of their data (for older learners).
6. Using the data and charts the learners created, devise a plan to reduce the amount of CO₂ their Internet usage contributes daily. This plan can be presented to a small group, the class, or the school.



RESOURCES:

- *The Carbon Almanac - Here's What's True: Computing and Carbon*, p.88/ [340](#)
- [Generation Carbon, An Almanac for Kids](#), ebook, p.10 - p.22
- [The Internet's Carbon Footprint Infographic](#), (or other relevant, up to date websites that provide energy usage of devices and websites)
- [Carbon Emissions Calculator](#)



Build a Carbon-Eating Machine

AGE RANGE: 6+

SUBJECTS: Arts, Economics, & Science

OBJECTIVES

- Define the terms: atom, carbon, carbon dioxide, carbon cycle, consumption, decomposition, carbon sink, and respiration.
- Imagine and then draw, or build out of blocks, paper, or clay a machine that would vacuum excess carbon from the Earth's atmosphere and return it to the soil, plants, or other carbon sinks.
- Write a commercial to promote the benefits of using the carbon vacuuming machine.

DURATION

- 2, 2 hour sessions

ENDURING UNDERSTANDING

- What is carbon and why is it important

ACTIVITIES:

- Read, or listen to the (4) articles then match the listed words to their definitions
- Learner draws or builds a model of their imagined carbon vacuum cleaner, then name, and label the parts of their machine, include a brief process description which includes type of fuel used, does it need an operator, are there any bi-products produced (e.g. water)
- Break into teams of two or three learners:
 - Each group of learners choose which machine they will promote
 - Learners write a script and then produce a stop-motion animation, a video, or enact a 3 minutes commercial advertising the benefits of using their chosen machine.

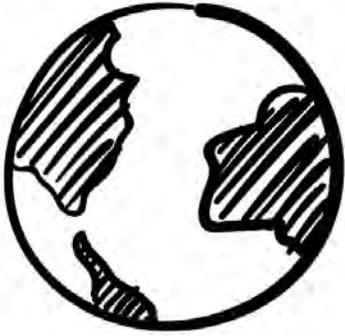
ASSESSMENTS:

- Perform or show their commercials to their class
- Because their machines are imaginary, in a small or large group answer these questions:
 - Can you think of any behaviors that can be done that would stop or slow down the production of greenhouse gases? (e.g. walk or ride a bike or scooter to school)
 - Which of the behaviors from above can they do—as individuals, a class, in their families, as a school—that would slow down or cease the creation of greenhouse gases?
 - Name 3 naturally occurring carbon sinks. Can you include one of those in your home?
- Post all the ideas in the classroom



RESOURCES:

- *The Carbon Almanac - Here's What's True: What is Carbon*, p.40/ [011](#)
- *The Carbon Almanac - Here's What's True: How Much Carbon are We Talking About?*, p.43/ [336](#)
- *The Carbon Almanac - Here's What's True: What is the Carbon Cycle?*, p.44/ [012](#)
- *The Carbon Almanac - Here's What's True: Balance in the Earth's Carbon Cycle*, p.45/ [029](#)



SECTION 4

Scenarios

What's likely to occur if we choose to act (or if we don't)?



Taking the Green Road

AGE RANGE: 12+

SUBJECTS: Geography, Science, & Social Studies

OBJECTIVES: Learn and implement ways a person or group can lower their carbon footprint.

DURATION

- 60 minute session
- 30 minutes for Option A Assessment
- 2, 60 minute session for Additional Activities

ENDURING UNDERSTANDING

- How human behavior can be altered to stop global warming.

INTRODUCTION - WHO SAYS?

There is a global organization called the United Nations (UN). Their mission is to address problems that affect every person and living thing on Earth. The UN knows that the humans living on Earth have been changing the climate of our world. To slow, stop, or reverse that detrimental process of global warming, which leads to climate change, the UN put together a special group of scientists.

This group of scientists is called the Intergovernmental Panel on Climate Change (IPCC). As the Earth warms, our weather patterns change—and not for the better. According to the IPCC, humans have already warmed the planet by at least 1 degree Celsius (or 1.8 degrees Fahrenheit) by burning fossil fuels like oil and gasoline that emit heat-trapping gasses.

How much more Earth warms up in the next hundred years hinges on what we who live here choose to do. The scientists of the IPCC created 5 different stories or scenarios. The scientists imagined 5 different ways these stories could end. The difference among the stories depends on how much we change. The more we change, the better or happier the ending of the story. In this unit, we will look at the first scenario.

You may be saying to yourself, “I am just a young person; I can’t do anything about this.” Not so. When Greta Thunberg began her career as an environmental activist, she was only 11 years old. You are all as powerful as Greta. This world belongs to you. Help us change.

ACTIVITIES - ALTERING BEHAVIOR:

- Read *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37
- Discuss and then create a list of the ways learners can change their personal—as well as classroom—carbon footprint.
- Each learner chooses one change they could make for the next 7 days, and the group votes on 3 changes they could make collectively in the classroom.

ASSESSMENT:

- Option A Classroom: the learners brainstorm what they think would be the effects of the changes they are proposing.
- Option B Homework: the learners log the activity, the change they hope it produces, their family’s reaction to the change.

ADDITIONAL ACTIVITIES (FOR AGES 16+)

- Calculate how much you can individually and/or collectively (as a classroom) reduce your carbon footprint if you change your behavior.
- Write up a school-wide carbon footprint reduction plan and present it to the principal and council.
- Predict the outcome(s) of your proposed plan in reducing your school’s carbon footprint. Discuss what would happen if all the other schools in your town or region also worked to reduce their carbon footprint.



RESOURCES:

- *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37/ [757](#)
- *The Carbon Almanac - Scenarios: Understanding the Five Scenarios*, p. 96/ [039](#)
- Whiteboard and markers, blackboard and chalk, or paper and pen/pencil to record ideas.
- [The Internet’s Carbon Footprint Infographic](#), (or other relevant, up to date websites that provide energy usage of devices and websites)
- [Carbon Emissions Calculator](#)



Creating the World I Want ,P1

AGE RANGE: 12+

SUBJECTS: History, Science, & Social Studies

OBJECTIVES

- Move from climate change as an abstract idea to something concrete with self-directed actions attached that they can achieve.
- Describe the effects of increasing levels of carbon in the earth's atmosphere and link the effects to human behavior.
- Imagine how humans can change in a way that would have a positive impact on the environment in the next 30, 50 or 100 years to move our planet closer to being carbon neutral.
- Predict the effects of the changes they imagine

DURATION

- 4 or 5, 40-minute periods

ENDURING UNDERSTANDING

- Participants imagine a carbon-neutral world they help create.

ACTIVITIES FIRST SESSION:

- Read the two articles in class or as homework:
 - *The Carbon Almanac* - Scenarios: Understanding the Five Scenarios, p. 96/ [039](#)
 - *The Carbon Almanac* - Climate Change for Rookies: What is Net Zero, p.30-31/ [755](#)
- As a group or in smaller groups discuss the concept of Net Zero and why is it important.
- Brainstorm ways to achieve Net Zero, personally, as a family, a school, a town.
- Speculate what happens if we do nothing and keep doing what we've been doing, asking what our world will look like in 30 years?
- As a large group, share key learnings.

ACTIVITIES SECOND SESSION:

- Describe, either in writing or verbally, the effects of increasing levels of carbon in the earth's atmosphere and link the effects they describe to human behavior.
 1. In general (list 3 things, e.g.: driving a car when a bicycle or walking could be used)
 2. Specifically to the learner (list one thing, e.g.: not using a hairdryer, or hanging the wash on a clothesline instead of using a dryer)
- Imagine how humans can change in a way that would have a positive impact on the environment in the next 30, 50 or 100 years to move our planet closer to being carbon neutral.
- Predict the effects of the changes they imagine in objective 2.

Educator: decide if you want your learners to work individually or in small groups moving forward. Also at play here is the learners' sense of time and urgency. We recommend that you allow your learners to decide for themselves what period of time will be covered in their projects: 30, 50 or 100 years.



RESOURCES:

- *The Carbon Almanac* - Scenarios: Understanding the Five Scenarios, p. 96/ [039](#)
- *The Carbon Almanac* - Climate Change for Rookies: What is Net Zero, p.30-31/ [755](#)
- *The Carbon Almanac* -Impacts: Biodiversity Loss and Climate Change, p.135/ [074](#)
- *The Carbon Almanac* - Climate Change for Rookies: Climate Change Actions from Large to Small, p.36-37/ [757](#)
- Art supplies
- Recording equipment /smart phones
- Laptops
- Research materials (websites, articles, books, interviews, etc)

Creating the World I Want_{p2}

ACTIVITIES THIRD SESSION:

- Using the information from the two articles write two different outlines/plotlines - choose a time period 30, 50, or 100 years from today to use for both scenarios:
 1. The first plot line: what will Earth look like in 30 (or 50 or 100) years if we change nothing. These outlines or plotlines indicate essential turning points which lead to your learners' projected conclusion. These can be constructed in outline form or as a timeline.
 2. The second plot line: what will Earth look like in 30 (or 50 or 100) years if we do change. These outlines or plotlines indicate essential turning points which lead to the learners' projected conclusion. Again, these can be constructed in outline form or timeline.

ACTIVITIES FOURTH SESSION:

- Using the scenarios, create one of the following (as individuals or in small groups): All work must be produced from research-based evidence. Multiple sources must be used and cited.
 - A. A short story that compares the two scenarios.
 - B. Stop-motion animations (there are some resources listed in the "How to live in a carbon neutral world by 2050" for stop-motion animation).
 - C. Graphic novel that compares the two scenarios.
 - D. Short videos.
 - E. Build 2 dioramas contrasting the two scenarios.
 - F. Produce a commercial for a product that people living 30 (or 50 or 100) years from now need or value. (This activity requires the learner to draw, illustrate, or build the product before they shoot their commercial).

Note: Provide several periods in-class for learners to gather information and work on their projects.

ASSESSMENT:

- During a class period, learners share their creations and list the reliable sources that were used for the research. As they present their work they should include:
 1. Key point(s) learned by doing their project
 2. What they think could be done in the present time to achieve a more favorable outcome.
 3. What they are willing to do to produce the more favorable outcome.



RESOURCES:

- *The Carbon Almanac - Scenarios: Understanding the Five Scenarios*, p. 96/ [039](#)
- *The Carbon Almanac - Climate Change for Rookies: What is Net Zero*, p.30-31/ [755](#)
- *The Carbon Almanac -Impacts: Biodiversity Loss and Climate Change*, p.135/ [074](#)
- *The Carbon Almanac - Climate Change for Rookies: Climate Change Actions from Large to Small*, p.36-37/ [757](#)
- Art supplies
- Recording equipment /smart phones
- Laptops
- Research materials (websites, articles, books, interviews, etc)



SECTION 5

Impacts

Climate impacts everything around us



Climate Anxiety_{P1}

AGE RANGE: 12+

SUBJECTS: Mental and Emotional Health

OBJECTIVES:

- Learners will be able to identify when they are feeling stressed or anxious
- The learner will apply one or more of the exercises to help them de-stress and lower their anxiety.
- The learner will compare how they felt before doing the exercise and after doing the exercise and determine if they are ready to resume their other activity. If they are not ready they will do another exercise and evaluate again after completing the exercise if they are able to resume their other activity.

DURATION

- Each activity could take 30-45 minutes

ENDURING UNDERSTANDING

- The emotional toll of climate change, which can decrease motivation, providing tools to make emotions more manageable.

In 2021, several academics focused an international survey on young people aged 16-25 and concluded that "the psychological (emotional, cognitive, social, and functional) burdens of climate change are profoundly affecting huge numbers of young people around the world." Of the 10,000 participants surveyed:

- 95% of respondents were at least a little worried about climate change, with 59% of respondents feeling extremely or very worried
- 45% reported that their worries impacted their functioning
- Over 60% of respondents felt sad, afraid and anxious
- Over 50% felt angry, powerless, helpless and guilty

— *The Carbon Almanac*

ACTIVITIES:

GROUP DISCUSSION:

- When we discuss climate change facts, how does it make you feel? Brainstorm a list. (write the ideas on the board or large sheet of paper that everyone can see and refer to)
 - Is there room for optimism?
 - How can we take back some power in this situation?

EXERCISE IN EMPATHY/SONDER:

- Create a second list on the board or on a second piece of large paper. (It is important that all this information is visible to the learners)
 - How do you think other people feel when faced with these numbers?
 - Often young people are angry about the situation they have been left with - can you imagine what emotions decision-makers experience?

RESOURCES:



- *The Carbon Almanac - Impacts: Eco-Anxiety, p.154/ 252*
- The Book of Hope, Jane Goodall, Douglas Abrams, Celadon Books, 2021
- [Exercises for Brain Integration and Stress Management](#)

Climate Anxiety_{P2}

ACTIVITES CONTINUED:

WRITING ASSIGNMENT:

(learner does this individually)

- Pick a person to write to. This could be someone you know, a celebrity, or a fictional character.
- Think about how they might feel about climate change. Are they feeling fear? Anger? Hope?
- Write to them about the issue in a way that inspires them to want to take positive action.

VISUAL ARTS ASSIGNMENT - HOMEWORK:

- individually create a piece of art (drawing, painting, collage, cartoon, sketch) that shows how you might find comfort and inspiration daily in the natural world. It can be an imaginary place, a park in your neighborhood, your backyard, or from a picture you saw--a poster, or a movie.

A reminder that it is ok to be uncomfortable or feel anxious if it moves people forward.

HEALTH/PHYSICAL EDUCATION:

- Notice if this conversation or information from the almanac creates a feeling of stress or anxiety for learners.
- This takes different forms; some will get angry or hyper, others will curl up and not want to hear anymore.
- Try working through the simple Brain Integration activities to get learners moving and ready to receive information. These are activities that can be carried forward to your work with any section of the almanac that makes learners uncomfortable.

Note: The simple Brain Integration activities mentioned above can be found by using the link in the resource section:
[Exercises for Brain Integration and Stress Management.](#)

RESOURCES:

- *The Carbon Almanac - Impacts: Eco-Anxiety, p.154/ 061*
- [Exercises for Brain Integration and Stress Management](#)





Seeing Plants ,P1

AGE RANGE: 6+

SUBJECTS: Science & Arts

OBJECTIVES

- Understand “plant blindness” and the consequences of this condition in relation to food production and food insecurity.
- Identify plant structures and describe their function.
- Draw plant specimens like a botanical illustrator would for a botanist or scientist.

DURATION

- 60 minutes

ENDURING UNDERSTANDING

- To fall in love with plants.

PREPARATION:

The learners must have access to paper copies of the articles or computer access for them to do the required research

People are more familiar with animals than they are with plants. This has been observed so often that this phenomenon is referred to as “plant blindness” in botany and science education literature.

Plants exist in the background of our daily lives and mostly go unnoticed. This may not seem like an important issue. However, public indifference towards plants has consequences. The less people know about plants, the more this affects our botanical capacity. Botanical capacity refers to all factors contributing to, and the usefulness of, plant science education. Botanical capacity is necessary to enhance our understanding of the roles plants play in our lives.

Think beyond native plants and butterflies for a moment. Think food security, climate change, biodiversity, biofuel production, and sustainability. Without the botanical capacity to address these issues, we won’t be able to manage them.

The objective of this activity is to encourage an interest in plants through botanical illustration. Botanical illustrators have worked with botanists for centuries and have contributed significantly to our knowledge of plants.



RESOURCES:

- *The Carbon Almanac - Impacts: Food Production and Availability*, P.116/ [598](#)
- *The Carbon Almanac - Impacts: Agricultural Pests and Diseases*, P.118/ [596](#)
- *The Carbon Almanac - Impacts: Food Insecurity*, P.119/ [067](#)
- *The Carbon Almanac - Impacts: Land and Soil Degradation*, P.119/ [069](#)
- Art Supplies
- Plant specimens

BACKGROUND INFORMATION:

- [Assessing botanical capacity to address grand challenges in the United States](#)
- [Plant Awareness Disparity: A Case for Renaming Plant Blindness, *Plants, People, Planet*](#)
- [Plant Awareness Disparity: Looking to the Past to Inform the Future. *Plant Science Bulletin*](#)
- [Preventing Plant Blindness. *The American Biology Teacher*](#)

BOTANY AND BOTANICAL ART:

- [Parts of a plant. *DK Find Out!*](#)
- [Guild of Natural Science Illustrators](#)
- [Merian and Daughters \(Getty Center Exhibitions\)](#)
- [What Is Botanical Art?, *Royal Botanic Gardens*](#)
- [Botany and Art and Their Roles in Conservation, *Smithsonian Learning Lab*](#)

Seeing Plants ,P2

ACTIVITIES:

RESEARCH (10 MINUTES)

- Ask learners to research the subject of plant blindness and the subject of botanical capacity using articles below.

DISCUSS (10 MINUTES)

- Discuss what the phrase *plant blindness* is describing.
- Discuss what the phrase *botanical capacity* is describing.
- People do not need to go to a botanical garden or a national park to see plants. There are plants in home vegetable gardens, parking lots, and along sidewalks. How does knowing how to grow and care for these plants impact the health and wellness of communities? How does it strengthen a community's managed response to a changing climate?

IDENTIFY (10 MINUTES)

- Identify available plants specimens on your school ground.
- Identify the structures on plant specimens and describe their function. Use resources below to reference.

DRAW (15 MINUTES)

- Draw the stem, leaves, and flowers of available plant specimens in enough detail that a classmate would be able to tell you from which plant it came. This includes descriptions about shapes, textures, and color. Use Botany references below.

RESEARCH (10 MINUTES)

- Research how botanists and illustrators work with each other and what illustrators do that helps botanists and scientists explain their work to others.

DISCUSS (5 MINUTES)

- How did drawing plants help you see them differently?
- Why is it important to see plants and understand the role they play in our lives?



RESOURCES:

- ***The Carbon Almanac - Impacts: Food Production and Availability*, p.116/ [598](#)**
- ***The Carbon Almanac - Impacts: Agricultural Pests and Diseases*, p.118/ [596](#)**
- ***The Carbon Almanac - Impacts: Food Insecurity*, p.119/ [067](#)**
- ***The Carbon Almanac - Impacts: Land and Soil Degradation*, p.119/ [069](#)**
- Art Supplies
- Plant specimens

BACKGROUND INFORMATION:

- [Assessing botanical capacity to address grand challenges in the United States](#)
- [Plant Awareness Disparity: A Case for Renaming Plant Blindness, *Plants, People, Planet*](#)
- [Plant Awareness Disparity: Looking to the Past to Inform the Future. *Plant Science Bulletin*](#)
- [Preventing Plant Blindness. *The American Biology Teacher*](#)

BOTANY AND BOTANICAL ART:

- [Parts of a plant. *DK Find Out!*](#)
- [Guild of Natural Science Illustrators](#)
- [Merian and Daughters \(Getty Center Exhibitions\)](#)
- [What Is Botanical Art?, *Royal Botanic Gardens*](#)
- [Botany and Art and Their Roles in Conservation, *Smithsonian Learning Lab*](#)



SECTION 6

Solutions

Creating the world we want



Carbon and Fast-Fashion_{P1}

AGE RANGE: 12+

SUBJECTS: Arts, Economics, & Science

OBJECTIVES

- Define Fast-fashion and Greenhouse emissions.
- Examine your buying habits.
- Design a garment: shirt, jacket, pants, shorts, skirt, or dress, from used clothes.

DURATION

- 60 minutes in class, plus additional time out of class

ENDURING UNDERSTANDING

- The effect of fashion on the planet

ACTIVITIES:

READ (10 MINUTES):

- Read "Fast Fashion and Carbon" from *The Carbon Almanac*.
- After reading, ask learners to make 3 lists:
 - 1) garments they want to buy.
 - 2) garments they or their parents have purchased for them within the last 6 months.
 - 3) how often they purchase new garments.

DISCUSS (20 MINUTES):

- How does the production of garments affect greenhouse emissions?
NOTE: Production is defined by growing the plants or making the substances that are used to make synthetic fabric, running the machines that sew the garments, and the costs of running the facilities where the garments are produced. These costs cover electricity, heat, insurance for employees and maintenance of the building that houses the operation.
- How does the transportation of garments from the manufacturing location to the consumer affect greenhouse gases?
- How does the disposal of garments affect greenhouse emissions?
- How do logistics affect greenhouse emissions?
- Why has the production of garments doubled since 2000? How has the supply impacted this increase? How has the demand impacted this increase?
- What is the role of the consumers?

SMALL GROUP ACTIVITY (15 MINUTES):

- Building on answers to the last question from above (the role of consumers), have small groups discuss:
 - Can you imagine yourself purchasing fewer clothes?
 - What things can you do to make your current clothes last longer (this doesn't include growing out of the size of garment)?
 - What can you do if you get bored with your clothes (swap, resale, remake)?

WHOLE GROUP SHARING (15 MINUTES):

- Discuss responses from subgroups with the whole class.



RESOURCES:

- *The Carbon Almanac - Solutions: Fast Fashion and Carbon, p.162/ 101*
- Old garments and imagination
- Chapter twelve: "A Better Business Plan" from "This Is Marketing" by Seth Godin
- [How fast fashion adds to the world's clothing waste problem](#), documentary

Carbon and Fast-Fashion ,P2

Educators will need to decide how long the learners will have to complete the homework.

ASSESSMENT(PART 1) - HOMEWORK:

Learners choose:

1. To design a garment or to alter an existing garment.
2. Write a paper with at least 3 high-quality sources of data (more is encouraged), on the subject of Fast-fashion and the Greenhouse effect.
3. Write a business plan using a peer-to-peer business model and principles to increase the lifecycle of the garment (resale, swap or barter, or rental are examples). This document must also provide at least 3 or more data resources. An excellent place to start would be to look at the resource list below.

ASSESSMENT (PART 2) - PRESENTATION:

1. Learners who alter or create garments share their design documents and/or pattern pieces, as well as the completed garment with the class (if the learner has had outside help constructing the garment, they should be clear about that) and talk about what they have learned (e.g. to use a sewing machine, or sew by hand.) The learner hangs tags on their garment guesstimating how much greenhouse gas their project generated, and how much greenhouse gas they prevented being generated by reuse or repurposing.
2. Learners who write papers give a 5-minute talk to their peers about Fast-fashion and the Greenhouse effect (points here are for research and suggesting inventive solutions).
3. Learners who create a business plan pitch their idea to their classmates and provide documentation that traditionally is used by entrepreneurs such as a statement of the problem you're solving, your partners, how much you will need to get your business up and running, how you plan on letting consumers know you exist.



RESOURCES:

- ***The Carbon Almanac - Solutions: Fast Fashion and Carbon, p.162/ 101***
- Old garments and imagination
- Chapter twelve: "A Better Business Plan" from "This Is Marketing" by Seth Godin
- [How fast fashion adds to the world's clothing waste problem](#), documentary



Edible Insects

AGE RANGE: 12+

SUBJECTS: Arts, Literature, Science, & Social Studies

OBJECTIVES

- Identify the barriers to eating insects, which is called entomophagy.
- Prepare and taste an alternative protein source like a cricket or vegan burger.
- Compare the taste, texture, and how you feel after consuming an alternative protein source with a beef or chicken and predict how likely you are to change your diet to include at least one alternative protein source a week.

DURATION

- Each activity could be 30-45 minutes

ENDURING UNDERSTANDING

- Insects as viable sources of nutrition that are much better for the environment than eating meat.

In many countries around the world, eating insects is very common, but in North America, it might sound strange or 'gross'. This is because it's not part of our culture yet, but this is changing.

— *The Carbon Almanac*

Read some of the information from the almanac about the prevalence of entomophagy worldwide.

ACTIVITIES:

DISCUSSION:

- In whole group or small groups discuss and write down the groups ideas on:
 - the barriers to eating insects
 - ideas that would make people more open to the idea of eating insects

RESEARCH:

- Using a computer, The Carbon Almanac, or another resource provided by your educator, research the topic of edible insects to discover if entomophagy is a good nutritional source.
- Choose one insect and research it
- List the nutritional information you find about your chosen insect
- Create a visual representation (graph, pie chart, etc) showing clearly the difference in resources consumption and carbon emissions between cattle and a chosen edible insect, i.e. crickets.

TASTE TESTING (REQUIRES ACCESS TO A KITCHEN SPACE):

- Prepare with the learners or ask for volunteers to prepare the cricket burgers at home and bring in for the group to sample (the recipe is in the Carbon Almanac)
- Ask another volunteer to prepare some vegan burgers to sample
- Conduct a taste-testing

ANALYSIS:

- List five literary characters that you know from stories or novels that you have read.
- After each character's name answer the questions:
 - Do you think this character would be willing to try something new?
 - Then after that answer, explain why or why not they would be willing to try something new.



RESOURCES:

- *The Carbon Almanac: Solutions: Edible Insects*, p.208-209/ [104](#)
- [Generation Carbon, An Almanac for Kids](#), ebook, p.36
- [2016 study comparing nutritional stats of various meats and insects](#)



Food Waste and Food Loss

AGE RANGE: 12+

SUBJECTS: Science & Economics

OBJECTIVES

- Recognize ways that food is wasted.
- Apply 3 ways to limit food waste in their households
- After two weeks, evaluate how successful they have been in reducing food waste within their households

DURATION

- 3, 30-45 minute sessions

ENDURING UNDERSTANDING

- Human food waste can be reduced.

ACTIVITIES:

- In *The Carbon Almanac* (in paper or as an ebook) read the section on food waste and solutions. You will need to provide ample time for the students to do this.
NOTE: Educator explains the concept of per capita
- Research in small groups or individually on-line or library how much food is wasted in their country.
- Learners create charts displaying how much food is wasted in their country.

DISCUSSION:

- Discussion Questions/Topics:
 - What is a carbon footprint?
 - What is the carbon footprint of food?
 - Learners brainstorm ways foods can be treated so that it can be preserved. Write their ideas down and display them. (pickling, stewing, freezing, drying are examples)
 - Ask your learners how many of them have eaten: dried fruit (for example), or a pickled vegetable (go down the list)
 - Think about what you had to eat this morning. Did you eat it all? Why didn't you eat it all? (write down their responses)
 - Now, I want you to think about that food that was leftover this morning, can you think of a way that it could have been saved for later consumption? (write down their ideas)
- Put up the learners charts about the room that show the amount of food waste created in their country.
- Give the learners enough time to look at everyone's work.
- Come back together as a group and ask the learners what they noticed, what did the charts reveal to them?
- As a class, predict how many days it will take an average household to fill a school bus with food waste.

HOMEWORK

- For the next two weeks I want you to log how much food your household throws away. Make sure to let your parents know this is a school assignment.

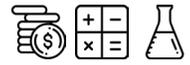
ASSESSMENT:

- After two weeks each learner tells the class one instance where they used the lesson to prevent food waste.



RESOURCES:

- *The Carbon Almanac - Solutions: Food Waste and Food Loss*, p.201/ [031](#)
- flipcharts and markers or digital documents for displaying the results of the class discussion



I Didn't Eat the Whole Thing, PART A

AGE RANGE: 10+

SUBJECTS: Math, Science, & Economics

OBJECTIVES PART A

- Define the following terms: greenhouse gas, food waste, climate change, portion.
- Examine personal food consumption and waste (this can be done for one meal, like breakfast or lunch by using the matrix below, or learners can track what they consumed and what was left over for a week—one matrix per day).
- Assess current eating habits and choose an alternative strategy for lowering the amount of food sent to the landfill.

DURATION

- 50-minute session

ENDURING UNDERSTANDING

- Food makes up the largest percentage of landfills; composting is part of the solution to lower greenhouse gas production.

ACTIVITIES:

PREPARATION/HOMEWORK:

- Learners read, or listen to someone read, the articles listed (doing this as preparation/homework for this unit relieves the stress on the slower readers or the educator can choose to carve out time within the unit to ask learners to read the articles.)

DISCUSSION (10 MINUTES)

- Play the Dictionary activity in Section 1, using only terms that apply to this subject. The aim is to create a common language to be used throughout this unit.

INDIVIDUAL OR GROUP ACTIVITY (10 MINUTES)

(if you have younger learners who will have difficulty filling out and doing the math involved, you can choose to do this as a large group activity).

- Each learner fills out the table/matrix listing what they ate so far today. Each item listed (e.g. bread, mayonnaise, apple) is given 10 points.
- In groups, learners share how much of the food they were given ended up as waste and how much in compost. (Example: only 1/2 the apple was eaten, so 5 points goes in the eaten column, & 5 goes in the not eaten column. Then depending on what happened to the other half of that apple, those 5 points will end up in compost or landfill.)
- Learners brainstorm ways to lower their number in the waste/landfill column and raise their number in the composting column. This exercise is meant to create a direct link for them between their choices and the world they wish to help preserve.

SHARE OUT (10 MINUTES)

- Come back together as a larger group and share “aha” learnings with the entire class.

ASSESSMENT (15 MINUTES)

- Each learner writes up a personal strategy. They should include:
 - What motivated them to make this choice, which will serve to remind them that their choices have consequences.
 - Rate themselves on how successful they think they will be at making this change.



RESOURCES:

- *The Carbon Almanac - Solutions: Composting*, p.212/ [260](#)
- *The Carbon Almanac - Here's What's True: Agriculture and Meat Production's Role in Climate Change*, p.76/ [022](#)
- *The Carbon Almanac - Solutions: Food Waste and Food Loss*, p.201/ [031](#)
- Worksheet: Eating Habits

Worksheet: Matrix to Analyze Eating Habits for: I Didn't Eat the Whole Thing

Day One	Points (Eaten)	Points (Not Eaten)	How much to Landfill?	How much Composted?
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Breakfast

Lunch

Dinner

Totals landfill vs Compost



Compost-ables, PART B, P1

AGE RANGE: 10+

SUBJECTS: Agriculture & Science

OBJECTIVES PART B

- Define carbon sink, compost, soil, photosynthesis and carbon footprint.
- Analyze whether or not a food is compostable.
- Build a composting unit.

DURATION

- 2, 30-minute sessions
- Additional 30 minute sessions for assessment

ENDURING UNDERSTANDING

- Composting is an easy solution to decreasing the production of greenhouse gasses.

ACTIVITIES FIRST SESSION, PART B:

PREPARATION/HOMEWORK:

Learners read, or listen to someone read, the articles listed (doing this as preparation/homework for this unit relieves the stress on the slower readers or the educator can choose to carve out time within the unit to ask learners to read the articles.)

INTRODUCTION (10 MINUTES):

One of the ways families and individuals can help solve the problem of generating greenhouse gas—particularly methane from food waste—is to use the organic matter generated by their household for compost. For smaller households, mechanical composters are readily available.

Think of composting as the natural breaking down of organic materials. The term organic in this instance doesn't refer to farming practices that do not use chemical fertilizers or pesticides. It refers to organic compounds as opposed to inorganic compounds. Organic compounds always have a carbon atom while most of the inorganic compounds do not. Almost all the organic compounds contain carbon-hydrogen or a simple C-H bond in them. Telling the difference between organic compounds and inorganic compounds is easy. Organic compounds result from activities of a living entity—think of a flower, an apple, or you.



RESOURCES:

- *The Carbon Almanac - Solutions: Using Agriculture as a Carbon Sink*, p.202/ [218](#)
- *The Carbon Almanac - Solutions: Drip Irrigation*, p.204/ [248](#)
- *The Carbon Almanac - Solutions: Backyard Regeneration*, p.210/ [108](#)
- *The Carbon Almanac - Solutions: Forests Support Food Security*, p. 213/ [250](#)
- Worksheet: Eating Habits
- 1 empty 2-liter soda bottle per learner (rinsed, label removed and top cut off 2" below the neck of the bottle (keep the top).
- Sharp knife.
- Nail.
- Shredded newspaper.
- Dirt from outside. Learners can bring in soil from home, purchase soil from a store, or dig it up from somewhere on the school grounds. The poorer the soil quality, the better.
- Compostable vegetation (yard waste or non-meat food).
- Handful of dry leaves.
- Spray bottle full of water.
- A journal of some sort to keep notes of changes. This can be paper and pencil or computer, educator's choice.

Compost-ables , PART B, P2

ACTIVITIES FIRST SESSION, CONTINUED.

What makes great compost:

- **Brown matter:** Brown matter includes materials such as twigs, branches, paper, and cardboard—basically anything dry or woody. In most cases, items in the “brown” category will be naturally brown, but there are certainly exceptions to that rule. Brown matter contains carbon, which provides energy for the beneficial microbes in the compost.
- **Green matter:** When it comes to composting, green matter refers to natural waste products that were recently growing and have moisture. This could include things like fruit and vegetable waste and grass clippings, but materials such as coffee grounds are also considered to be green matter.
- **Water**

What is better to leave out of your compost:

- Consider what goes into your composter and the potential harm it can do to your plants. Most animal byproducts need to be left out of your composter:
- Meat, fish, egg, dairy, and poultry products (the exception here is eggshells, dry them first and break them into small pieces before putting them into your compost).
- Oils, both cooking and vegetable oils.
- Coal or charcoal ash which could contain substances harmful to plants.
- Leaves, twigs, and the fruit from black walnut trees which contain the toxin juglone, which is known to harm many plants.
- Trimmings from plants previously treated with pesticides.

GROUP ACTIVITY

- Play the Dictionary activity, using only terms that apply to this subject. The aim is to create a common language to be used throughout this unit. (*Compost, carbon sink, organic matter, carbon sequestering.*) **(10 minutes)**
- Using the matrix, analyze what the learner(s) had for breakfast or lunch (depending on the time of day) in terms of how much of what they did not eat can be composted. This includes peelings from fruit and vegetables, bread, noodles, protein, etc. **(20 minutes)**

ACTIVITIES SECOND SESSION, PART B

BUILD A COMPOSTER:

for younger learners prep the bottles ahead of time so they won't have to use the knives. (10 minutes)

- Use a nail to punch 10 holes into the sides of the bottle. Scatter these holes randomly about the bottle. Do not punch holes in the bottom
- Fill the bottle with alternating dirt, newspaper and leaves.
- Spray with water.
- Begin to add the compostable vegetation.
- Put the top of the bottle into the bottle as a funnel for water (keep a towel over top when not in use).
- Label the bottle with the learner's name.
- Put in sunlight.
- Stir every couple of days.
- Add more compostable vegetation and soil regularly.

Compost-ables - Germination (Optional Activity), PART B, P3

DURATION

- 30-minute sessions for assessment as desired
- Additional 30 minute sessions for germination activity

ENDURING UNDERSTANDING

- Transferring carbon back into our soils

ASSESSMENT ACTIVITIES:

- Have the learners make a simple log to write down and/or draw their observations. Each section of the log should begin with the date and time of day the observation was made.
- For a week, or longer, schedule a time during the day that the learners will tend their composters (add moisture, stir the contents, and add more dirt or matter) and write down or draw the changes they see and smell in their logbooks.
- At the end of the week, gather the entire group to share key learnings.

To extend the period of time for this activity—say, 3 weeks or a month—once the compost has decayed, the next step would be to test the composted material by germinating seeds.

GERMINATION ACTIVITIES:

- When the decay is advanced (this could take several weeks, depending on your climate) give each learner 3 seeds to drop into their bottles (vegetable, herb, or flower).
- The educator also plants 3 seeds in plain dirt in a pot and keeps it in the same location as the composters. Water the seeds when the learners water their seeds, and in general, care for the potted, no-compost seeds as the learners are caring for their seeds.
- For the next 2 weeks, learners should keep the compost moist but do not stir it.
- Have the learners log what is happening.
- Share in a large group what has happened over this period, especially comparing what has happened to their seeds and what has happened to the educator's seeds planted without compost.
- Have the learner take their composters and plants home to share with their families and to stimulate conversations about family composting.



RESOURCES:

- *The Carbon Almanac - Here's What's True: Agriculture, Forestry, Land Use*, p. 68/ 013
- *The Carbon Almanac - Solutions: Using Agriculture as a Carbon Sink*, p.202/ [218](#)
- *The Carbon Almanac - Solutions: Drip Irrigation*, p.204/ [248](#)
- *The Carbon Almanac - Solutions: Backyard Regeneration*, p.210/ [108](#)
- A log or journal of some sort to keep notes of changes. This could be paper and pencil or computer.



Greenwashing Theater

AGE RANGE: 12+

SUBJECTS: Arts, Literature, Math, & Science

OBJECTIVES:

- Describe the process of 'Green Washing'
- Compare a company or product that uses a green washing strategy vs a company or product with environmentally sound practices.
- Predict what will happen if we continue to support companies that Green Wash vs companies that are conscientious, honest about their practices, and good stewards of our resources which includes their employees.

DURATION

- 2 hours (could be split into 2 sessions)

ENDURING UNDERSTANDING

- Supporting companies that don't Green Wash

Some organizations have had great success in decreasing the impact of the goods and services they provide. However, corporations that hide harmful practices behind the appearance of environmental stewardship are practicing "greenwashing."

PREPARATION:

Provide time for students to read *The Carbon Almanac - Solutions: Greenwashing and Recycling Theater*, p.160

ACTIVITIES:

DISCUSSION:

- On board or on large sheets of paper write down learner responses to these questions/topics:
 - Define the process of Green Washing
 - Why would an individual or company use green washing?
 - List of types of jobs or products that would benefit or gain favor with the public or in the market by presenting themselves as "Green".

INVESTIGATE:

- We've been thinking globally, let's move our focus to the local--our own school.
 - If the school has recycling bins do the learners know where the material goes? If not, how can they find out?
 - Let's make 2 lists. On one side write down those things that are marketed to us or our parents as 'sustainable', 'eco-friendly', or natural. This list can include: food, clothing, household goods, anything we buy.
 - Now next to each item let's think about the advantages to a person or company for telling us they are eco-friendly
- Pick a product you or your family use that says it is eco-friendly
- Research and write down the company's claims (lower phosphates, made from 50% recycled material, etc)
- Learners write a letter or email to the president of that company requesting the data to support its claims.
- If the company responds, compare the data you receive from them with the claims in its advertising, marketing materials or product packaging.
- If the company doesn't respond, what can you do? Write them again, or check with a local consumer protection agency.
- Discuss how it feels when you receive no response. What choices do you have as a consumer? You do have power because you can tell your friends what happened, or post on line what happened when you asked your questions. Do not exaggerate. Tell the facts. Truth is powerful.

ASSESSMENT:

- Have the learners write a reflection about this experience.



RESOURCES:

- *The Carbon Almanac - Solutions: Greenwashing and Recycling Theater*, p.160/ [089](#)
- *Generation Carbon, An Almanac for Kids*, ebook, p.32



Replacing the Automobile

AGE RANGE: 12+

SUBJECTS: Economics & Social Studies

LEARNING OUTCOMES

- Identify the transportation modes that create the most greenhouse gasses and thoughtfully present possible alternatives to the automobile.

DURATION

- 50 minutes

ENDURING UNDERSTANDING

- Automobile alternatives for the 21st century

READ (10 MINUTES):

- Ask learners to read
 - The Carbon Almanac - Solutions: Electric Vehicles, p.167/ 100
 - The Carbon Almanac - Solutions: Energy-Efficient Cars, p.169/ 226
- While reading, ask learners to think about the last time they traveled anywhere NOT in a car.

DISCUSS (15 MINUTES):

- As a full class or in small teams, discuss “Replacing the automobile.”
 - How does the use of the automobile affect greenhouse gas emissions?
 - Where are electric vehicle sales the most robust? Why?
 - What alternative modes of transportation could work in your life?

RESEARCH (10 MINUTES):

- Using the discussion questions as a prompt, ask learners to begin researching ways they can reduce their dependence on the automobile.
- Instruct learners to keep a list of alternative modes of transportation.

SHARE OUT (10 MINUTES):

- As a full class, ask for several learners to share one item of interest from their research.

HOMEWORK (5 MINUTES):

- “A Letter to the Mayor”: Based on what you’ve discovered, your task is to write a single page letter to the mayor of your town (500 words or less).
 - Explain to your mayor how your community can reduce its dependency on the automobile.
 - Be polite and professional.
- Optional: Have the class send emails to the mayor instead of letters.
- Extension or Enhancement Activity: Encourage learners to make connections with local government and business leaders by sending emails or calling local representatives who are already advocating for automobile replacements (such as bicycle shop owners).



RESOURCES:

- *The Carbon Almanac - Solutions: Electric Vehicles*, p.167/ [100](#)
- *The Carbon Almanac - Solutions: Energy-Efficient Cars*, p.169/ [226](#)



How Much Do Your New Pants Really Cost? P1

AGE RANGE: 12+

SUBJECTS: Math, Science, & Social Studies

OBJECTIVES

- Define the terms: Greenwashing, lifecycle, greenhouse gasses.
- Identify, examine, and analyze the positive and negative changes to carbon emissions from purchasing new garments.
- Come up with a personal clothes-buying strategy based on lowering the volume of greenhouse gasses.

DURATION

- 90 minutes

ENDURING UNDERSTANDING

- Becoming a thoughtful consumer is important to the health of our planet

PREPARATION:

- Advance homework: Have the learners read or listen to someone reading the articles listed above aloud.
- Ask learners to bring a garment to class with labels detailing:
 - composition of materials used in manufacturing the garment
 - country where the garment was produced
 - washing and care instructions.

PRESENTATION (10 MINUTES):

Present the product life-cycle framework/pie chart (next page)

Some definitions the learners will need to complete this activity:

- *natural fiber*: either plant or animal-based; examples include cotton, silk, linen, wool, or hair (camel hair, mohair, & angora).
- *synthetic*: made from chemicals that are derived from coal, petroleum, or natural gas; examples include polyester, nylon, spandex, synthetic furs or leather, polar fleece, and others.
- *hybrid*: a mix or blend of natural and synthetic fibers.

PARTNER OR GROUP WORK (30 MINUTES):

- Each learner looks at the tags on their own garments and shares with their partners:
 - The composition of the material , Country of manufacture, Care instructions
- Learners build a matrix on paper or computer for each garment as shown on next page (this can be done together).
- Learners answer questions with guesstimates.
 - How long will they wear this item?
 - Will you replace this garment?
 - If no, then explore what happens when you discard the garment.
 - If yes, then guesstimate how much greenhouse gas the purchase will put into the Earth's atmosphere when you buy a new garment.
- Each learner formulates a strategy to maximize their wardrobe while lowering greenhouse gasses.

PRESENTATION (30 MINUTES):

- Each group presents their "aha" moments about their habits.

ASSESSMENTS:

- Each learner writes down their personal strategies and submits to the educator.

RESOURCES:



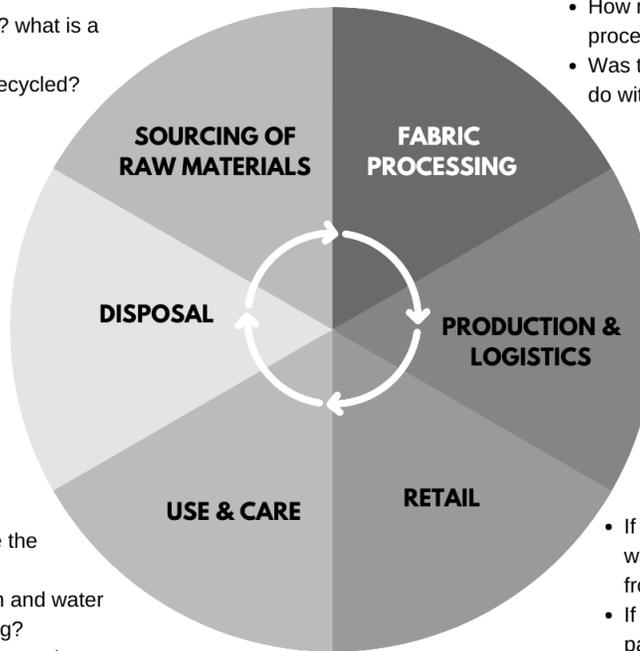
- *The Carbon Almanac - Solutions: Fast Fashion and Carbon*, p.162/ [101](#)
- *The Carbon Almanac - Solutions: Greenwashing and Recycling Theater*, p.160/ [089](#)
- *The Carbon Almanac - Here's What's True: The Plastic Lifecycle*, p.78/ [027](#)
- *The Carbon Almanac - Here's What's True: The True Cost of Plastic*, p.79/ [346](#)
- *The Carbon Almanac - Here's What's True: Recycling Paper*, p.89/ [372](#)
- *The Carbon Almanac - Here's What's True: CO2 Emissions from Global Shipping*, p.83/ [373](#)
- Ask learners to bring one piece of fashion clothing with composition labels

How Much Do Your New Pants Really Cost? P2

- If it's cotton: where does the water used in cotton production come from?
- if it's not cotton: is it synthetic? what is a synthetic fabric made of?
- If it's recycled: how is was it recycled?

- Was it any chemical used in the dyeing process?
- How much energy and water the dyeing process did require?
- Was the piece of fabric used in full? What to do with the waste?

- Can the garment be recycled?
- Can it be reused?
- What happens if it goes to the garbage? What happens in the landfill?



- Where was the garment made of?
- How was the garment shipped from the place of production to the place of retail? What was the CO2 emission?
- What is the packaging of the garment? What is CO2 impact of the packaging?

- For how long can you use the garment?
- What is the CO2 emission and water consumption from washing?
- If it's "dry-clean only" what are the chemicals used & CO2 emission from the cleaning process?

- If purchased in a physical store, how was the place of retail? CO2 emission from the place of retail?
- If it's purchased online, how was the package? CO2 emission from the package and the delivery?
- What are the Exchange & Return conditions?

Sample Matrix with some possible answers shown

	Raw Material	How was raw material produced?	Fabric produced	What kind of equipment was used to make and then transport fabric & fuel used?	Guesstimate how much greenhouse gas was generated
Fabric	<i>Polymer</i>	<i>Mixing of macroglycol With diisocyanate- it is a totally human-made product</i>	<i>Spandex</i>	<i>A multitude of processes and machinery is used to produce this fiber, then the fiber is spun and finally woven.</i>	<i>(add together the greenhouse gasses from farming plus the factory equipment to arrive at your guesstimation)</i>
Country of manufacture	<i>Viet Nam</i>			<i>Truck to port, cargo ship, truck to retailer</i>	
Care instructions			<i>Wash in cold water</i>	<i>Water heater, washing machine, dryer or clothesline</i>	



Schools and Solar Power/Solar Energy

AGE RANGE: 12+

SUBJECTS: Science & Social Studies

OBJECTIVES

- Identify the benefits of using solar energy
- Compare and analyze a period of time in their day with and without electricity
- Predict the benefits and disadvantages of using solar energy

DURATION:

- First session 3 hours
- Next sessions 30-45 minutes

ENDURING UNDERSTANDING

- The importance of moving away from fossil fuels to produce electricity and towards alternative means: solar, wind, and water.

One study reported, "If all the K-12 schools in the US were completely powered by the sun, it would eliminate CO2 pollution equivalent to shutting down 18 coal-fired power plants.

— *The Carbon Almanac*

ACTIVITIES FIRST SESSION :

- Read the section from *The Carbon Almanac* - Whose Job is it?: Schools and Solar Power, p245/ [116](#)
- For a 2 hour period in the school day, to be determined by the Educator, you and your learners will not use anything that requires electrical energy. This includes: phones (battery power), calculators, lights, computers, electric pencil sharpeners, any device that is plugged in or uses batteries to store electrical energy.
- Set a timer so that everyone can monitor themselves.
- During the 2 hours ask the learners to log each incidence of non-use and a one word feeling about not using that device. (Example: calculator, frustrated)
- At end of the two hours have the learners write a short reflective essay answering:
 - How it felt not to have lights, music, a computer?
 - There are many learners around the world who do not have lights, computers, calculators, how do you think they feel?
 - How did not having access to electricity change your experience of doing your work these past two hours.
 - Have them include a paragraph on their own conclusions to this experiment.

SOLAR POWER:

- Read the section *The Carbon Almanac* - Solutions: Solar Energy, p.174/ [091](#)
- Learners write a page answering the questions: What do solar panels do? Do solar panels work on cloudy days and why?

DISCUSSION:

- As a class, look up the [average sunny days per year](#) in your city, or compare a few cities in different parts of the world.
- Notice how your school is situated.
- If you were going to mount panels on your school, where would they have the most impact? Why?



RESOURCES:

- *The Carbon Almanac* - Whose Job is it?: Schools and Solar Power, p245/ [116](#)
- *The Carbon Almanac* - Solutions: Solar Energy, p.174/ [091](#)
- [National Geographic PDF](#) - How Solar Panels Work
- Internet access to look up [this calculator](#) or equivalent average sunny days per year



SECTION 7

Whose job is it?

The roles of government, business, and individuals in creating change



The Spirit of Change ,P1

AGE RANGE: 12+

SUBJECTS: Arts, Literature, & Social Studies

OBJECTIVES

- List the qualities of a change-maker.
- Identify messages that change-makers say or do.
- Create an electronic post/artwork/program “in the spirit” of their work.

DURATION

- 3, 30-45 minute sessions
- Additional time for sharing assessments

ENDURING UNDERSTANDING

- How change makers/leaders make change

PREPARATION:

Read articles as homework activity or provide class time for learners to read the articles before the session.

- 354/Climate change for rookies: What is climate change?
- 139/Global climate youth activists
- 142/Influential artists and climate
- 143/Leaders of civics programs addressing environmental issues

INTRODUCTION

Our weather and climate are changing and not for the better. Human behavior is responsible for most of this change. People, young and old, are organizing a social movement all over our planet to stop or reverse some of these changes.

There have been other social movements throughout history: for human rights, voting rights for African-American citizens, equal pay for equal work, and women’s rights to name a few. An important element of a social movement is leadership.

Political leaders are critical of social movements because they upset the status quo, inspire commitment, mobilize resources, create and recognize opportunities and devise strategies. They also frame demands and influence outcomes.

Xiuhtecatl Martinez (pronounced shu-tez-cot) is an example of a young leader of the environmental social movement. He is an American environmental activist and a hip hop artist.

Xiuhtecatl’s message: Inspire youth to become leaders and take action while raising awareness on climate issues (Quote: “The biggest challenge we face is shifting human consciousness, not saving the planet. The planet doesn’t need saving. We do.”)

Xiuhtecatl uses his hip hop music to convey his message.

[Website](#) • [Instagram](#) • [Speeches on YouTube](#) • [interviews](#)

Xiuhtecatl’s Style: down-to-earth talking directly to youth, authentic



RESOURCES:

- *The Carbon Almanac* - Climate Change for Rookies: What Is Climate Change?, p.20/ [354](#)
- *The Carbon Almanac* - Leading the Way: Global Climate Youth Activists, p.274/ [139](#)
- *The Carbon Almanac* - Leading the Way: Influential Artists and Climate, p.282/ [142](#)
- *The Carbon Almanac* - Leading the Way: Leaders of Civics Programs Addressing Environmental Issues, p.280/ [143](#)

The Spirit of Change P2

ACTIVITIES:

GROUP DISCUSSION:

Whole group or small groups. Use the following questions:

- What is a leader?
- Who do you think of when I say the word leader? [Note: at this point in the unit, the learners' answers may not be environmental leaders]
- What makes them "environmental leaders"?
- What are some of the characteristics of this leader?
- How does leadership apply to climate change?
- What is the style of the people on your list?
- Why you are drawn to their message (both spoken and demonstrated or shown)

RESEARCH:

- Ask the learners to choose one leader that inspires them from the articles (or from the web) - one they personally identify with because of the leader's message and style:

Note: You know your learners and classroom resources best. Time and access to resources such as computers or phones for research will affect when the learners can complete their assessments.

- Learners consult and document 2 other resources about that person (so they have a total of 3 resources), it can be another article in *The Carbon Almanac*, an online posting or article, a magazine, a youtube video of a speech they gave, anything that exposes the learner to the person's message.
- Learners identify their chosen leader's:
 - Message
 - The media they are using
 - The group/community they are talking to/targeting
 - The style they are using

CREATION

- Learners create samples based on and inspired by the work of the leader they have chosen, such as but not limited to:
 - a post on social media (TikTok, Instagram, blog post, etc.)
 - an artwork (photography, installation, painting, song, etc.)
 - an activity (event at school, day of action, etc.)
 - a program (peer-support group, waste reduction program at the cafeteria, educational campaign, etc.)

SHARING ASSESSMENTS WITH THEIR COMMUNITY:

- Display or perform in a public space such as a library, school function, town square
- Post to a social media platform (using hashtags #CarbonAlmanacLearning, #EDUCarbonAlmanac)

Note: Rubric for assessment Is based on the effort put in their chosen project, how well learners were able to identify the message, the media they are using, the target group/community, and the style used.

ONE STEP FURTHER:

If your learners are deeply engaged in this idea of environmental activism, lead a brainstorm session about other potential local and digital venues to share the work they created.



RESOURCES:

- *The Carbon Almanac - Leading the Way: Influential Artists and Climate*, p.282/ 142
- [Earth.org 10 Inspiring Climate Activists List](#)
- [NAAEE Change Fellowship](#)



Environmental Report Card; Pass or Fail?

AGE RANGE: 8+

SUBJECTS: History & Social Studies

LEARNING OBJECTIVE

- Define the phrase Carbon Footprint
- Explain the importance of Carbon Footprints
- Analyze a scenario to assess its carbon footprint

DURATION

- 50 minutes

ENDURING UNDERSTANDING

- To become aware that our actions have consequences

ACTIVITIES:

- Read the articles “Footprints and Labels” and/or “Individual Carbon Footprint and Collective Action” from *The Carbon Almanac* and devise a definition for the environmental term “carbon footprint”.
- Read a short story or a novel assigned by Educator.
- Analyze a literary work and determine the carbon footprint of the story in terms of travel, food, and shelter.
- Determine the scale of the carbon footprint of the literary work and assign it a pass or fail grade.

With worksheet, learners work independently - without worksheet, can work as a group lesson or complete analysis on paper using these prompts:

- List examples of travel, food, and shelter from the literary work.
- Form and express an opinion in sentence form that relay whether the characters created large or small carbon footprints.
- Illustrate written ideas.
- Evaluate the literary work using learned information.



RESOURCES:

- *The Carbon Almanac - Solutions: Footprints and labels*, p.216/ [212](#)
- *The Carbon Almanac - Whose Job is it?: Individual Carbon Footprint and Collective Action*, p.260/ [119](#)
- Short Story or Novel of Educator’s Choice
- “Environmental Report Card; Pass or Fail” worksheet
- Pencil, colors optional

Worksheet: Environmental Report Card; Pass or Fail? P1

Hello! You have just read a novel or short story, and your educator has assigned you this lesson so you can assess the *CARBON FOOTPRINT* of the literary work. (Get excited! You are going to give the novel or short story a grade!)

Your first task is to understand the concept of carbon footprints. To accomplish this, read the article “*Foot Prints and Labels*” or “*Individual Carbon Footprint and Collective Action*” from *The Carbon Almanac*.

Your second task is to write a sentence defining the term “carbon footprint”. Use your own words. (No pressure—just write enough to show that you understand the main idea.)

Now take a minute and think about the novel or short story that you have read. If the literary work mentioned travel, food, and shelter, you will be able to complete this assignment.

Let’s Get Started!

Transportation: Transportation is the movement of goods and persons from place to place and the various means by which such movement is accomplished.

Ask yourself: How did the main character(s) get to where he or she needed to be?

If your character traveled by plane, that used a lot of fuel and created a large carbon footprint. If he or she traveled by car, that’s better than a plane but not as good as mass transit, such as buses, trains, and subways. Maybe they traveled by horse. If your character traveled by bike, foot, skateboard or scooter, they created a small carbon footprint.

List the ways your character traveled.

Did they create a large carbon footprint or a small carbon footprint? Go back to *The Carbon Almanac* article and think about your list. Once you get your thoughts together, write two or three sentences that support your opinion. Your answer could look something like this...” In the novel/short story_____ the characters mostly traveled by walking, which indicates that they had a small carbon footprint. An example from the literary work that supports this idea is _____.

Worksheet: Environmental Report Card; Pass or Fail? p2

Draw a picture in the space provided of an energy-efficient (small footprint) way your character(s) traveled, making sure to include a depiction of the setting (time and place) in your illustration.

Food: Food is any nutritious substance that people or animals eat or drink or that plants absorb in order to maintain life and growth.

Ask yourself: Did your main character(s) consume food? When was food mentioned in your literary work? Was this food processed and packaged, like chips and candy bars? Did it create waste? That creates a big carbon footprint since it is made in a factory that pollutes the environment, and also ends up in a landfill. Perhaps the food was prepared in a restaurant, or in a home. Can you guess or do you know how the food was cooked? Was the food gathered from a home garden or foraged in the woods?

List the times food is mentioned.

Did the food create a large carbon footprint or a small carbon footprint?

Go back to *The Carbon Almanac* article and think about your list. Once you get your thoughts together, write two or three sentences that support your opinion. Your answer could look something like this... "In the novel/short story _____ the food mentioned was prepackaged and made in factories, which indicates they created a large carbon footprint. An example from the literary work that supports this idea is _____."

Draw a picture in the space provided of a time where food is mentioned in your novel and indicate through your illustration if the food created a large or small carbon footprint.

Worksheet: Environmental Report Card; Pass or Fail? p3

Shelter: Shelter refers to where humans and animals go to protect themselves from the elements.

Ask yourself: Where did your main character(s) go to shelter themselves from the weather? Some shelters or homes are made with concrete and steel, which create large carbon footprints in production and disposal. Electricity which powers lights, appliances, computers and air conditioning systems also put out a large footprint. Did your novel take place inside big buildings, or were your characters out in nature?

List the shelters/buildings from your story.

Did the shelters create large or small carbon footprints?

Go back to *The Carbon Almanac* article and think about your list. Once you get your thoughts together, write two or three sentences that support your opinion. Your answer could look something like this: In the novel/short story _____ the character spent equal amounts of time in nature and in his school classroom, which indicates both small and large carbon footprints. Two examples from this literary work that support this are _____.

Draw a picture of a shelter from the novel in the space provided.

Great work! Now it is time to give your novel a grade! Forming your opinion on what you have learned from *The Carbon Almanac* article, did what you read Pass or Fail its environmental assessment? Write three to five sentences supporting your answer.

Whole Almanac

Get engaged



Carbon Celebrity

AGE RANGE: 12+

SUBJECTS: Arts, Literature, & Social Studies

OBJECTIVES

- Using platforms like TikTok, Instagram and YouTube to create TED Talk-style presentations about a topic in *The Carbon Almanac* that you are concerned or inspired by.

DURATION:

- This is an extensive project-based activity. You the educator must decide how much class time you will devote to this unit. Minimum time requirements would be 90 minutes per day for a week.

ENDURING UNDERSTANDING

- Using my voice responsibly to make a positive impact on something I care about.

Many school districts require that learners practice public speaking to their peers once a year. This assignment would allow the learner to pick a platform that they enjoy and a topic from *The Carbon Almanac* that they want to explore and tell more people about.

Note: This activity could also be done simply as a presentation in front of a class without the social media component.

ACTIVITIES:

- As a group make a list of topics from *The Carbon Almanac* that you'd like to share with others (write the list on the board or on a large piece of paper)
- Next to each topic say why you want to share it (this is also done in a group)

The learners need to be divided into production teams, educator decide how you want to accomplish this. Production teams should be no larger than 3 learners per team. A team could be determined by a common interest or topic from the almanac.

- Team Meetings
 - Objective for this first meeting is to choose the one idea they will focus on.
 - Future meetings will work on script writing and story boarding as prep. Eventually these meetings will be working on production issues of costume, location scouting, equipment, and so forth. Finally leading to filming and editing.
- Presentation of work to class (and others: school assemblies. Depending on school policy the learners could consider uploading their work to a social media platform using the hashtags #CarbonAlmanacLearning#EDUCarbonAlmanac)

ASSESSMENT:

- Learner self-assessment and reflection: Why did you choose the subject that you did? List three important things that you learned. What changes have you made as a result of this assignment?

SHARING AND ASSESSMENT:

- If exhibits and presentations are possible, make plans as a group and identify timeline, audiences, etc.
- The sharing can be for a class audience, the whole school, etc. depending on chosen scope.



RESOURCES:

- ***The Carbon Almanac*, any article**
- **[Generation Carbon, An Almanac for Kids eBook](#)**
- Access to social media, or view on a projector or TV screen in class
- Recording equipment /smart phones
- Laptops
- Tripod for holding phones



Making a Map of Opportunity_{P1}

AGE RANGE: 8+

SUBJECTS: Math, Science, & Social Studies

OBJECTIVES

- Define the following terms (if you choose different articles, change the list of words for the learners to explain): carbon, hydrogen, soil health, United Nations, greenhouse gas, carbon footprint, carbon sink.
- Draw and label a map of the school footprint, including the grounds,
- Evaluate your school buildings and grounds.

DURATION

- The educator decides how long to spend on this activity. The range can be a portion of your school day to a month or more depending on how many subjects you want to integrate into this experience.

ENDURING UNDERSTANDING

- Learners awaken and become curious about their role in climate change and decide to use their creativity to make positive change.

PREPARATION:

This is a selection of articles that span the different sections of *The Carbon Almanac*. Feel free to choose any articles you'd like; the objectives and activities will work for each.

The goal of this unit is to awaken your learners' curiosity about their role in climate change in their neighborhood and give them hope that they can make things better for everyone. We know—a tall order for children—and yet to awaken their hearts and minds is to unleash an explosion of creativity and positivity that can change our planet's trajectory and you are the essential element to make that happen.

These articles can be assigned as homework, or allot time within the class day to have the learners read them. For the younger, slower readers, or sight-impaired learners, having you or someone read them aloud would work as well.

- **What is Carbon, p.40, 011**
- **Temperature Change on Earth, p.50, 366**
- **Carbon Inequality, Climate Change, and Class, p.81, 357**
- **Water Stress, p.126, 587**
- **Using Soil to Store Carbon, p.234, 254**
- **Footprints and Labels, p.216, 212**
- **Indigenous Youth Represent Their Culture to Demand Action, p.242, 120.**
- **Wealth and Greenhouse Gases, p.259, 132**
- **Individual Carbon Footprint and Collective Action, p.260, 119**



RESOURCES:

- *The Carbon Almanac - Here's What's True: What is Carbon, p.40/ [011](#)*
- *The Carbon Almanac - Here's What's True: Temperature Change on Earth, p.50/ [366](#)*
- *The Carbon Almanac - Here's What's True: Carbon Inequality, Climate Change, and Class, p.81/ [357](#)*
- *The Carbon Almanac - Impacts: Water Stress, p.126/ [587](#)*
- *The Carbon Almanac - Solutions: Using Soil to Store Carbon, p.234/ [254](#)*
- *The Carbon Almanac - Solutions: Footprints and Labels, p.216/ [212](#)*
- *The Carbon Almanac - Whose Job Is it?: Indigenous Youth Represent Their Culture to Demand Action, p. 242/ [120](#)*
- *The Carbon Almanac - Whose Job Is it?: Wealth and Greenhouse Gases, p.259/ [132](#)*
- *The Carbon Almanac - Whose Job Is it?: Individual Carbon Footprint And Collective Action, p.260/ [119](#)*
- Pencils and erasers
- Blank paper, or a notebook dedicated to this project

Making a Map of Opportunity_{p2}

ACTIVITIES:

1. Read your chosen article/s
2. Tour the school building and grounds. If your class is large, you could split them up into teams. You may choose to expand the area the learners investigate to gather their data, such as the neighborhood the school resides in or transporting them to a different locale such as a park or a multi-use development. Additionally, you could involve outside community resources such as forest rangers and experts from your city who are involved in maintaining the health of the community's water supply. Literally, the field is open regarding who you choose to involve in this unit, as long as they are engaging and can assist the learners in growing their understanding of the ecosystem that is their community.
3. Draw and label a map of the school or alternative chosen area. Learners indicate on their map:
 - o 2 carbon sinks (note: a carbon sink could be as small as a violet growing on the desk of the principal's admin, or a weed growing up through a break in the playground asphalt);
 - o 3 places on the school property that generate greenhouse gases,
 - o identify 3 types of living things, and
 - o indicate beside each of the 3 living things if they use or transform carbon or add to the carbon footprint.

ASSESSMENT:

- o Learners present their maps to the classmates and make recommendations that would decrease the carbon footprint in the areas listed below:
 - o in the classroom,
 - o the school building as a whole,
 - o or the school grounds
-
- (Optional) Under your guidance, the learners pull together a "Reduction in the Carbon Footprint" proposal and make a formal presentation using their maps and suggesting changes (to their classroom or the entire school) to the:
 - o The principal and/or
 - o School board or supervisory council



RESOURCES:

- *The Carbon Almanac - Here's What's True: What is Carbon*, p.40/ [011](#)
- *The Carbon Almanac - Here's What's True: Temperature Change on Earth*, p.50/ [366](#)
- *The Carbon Almanac - Here's What's True: Carbon Inequality, Climate Change, and Class*, p.81/ [357](#)
- *The Carbon Almanac - Impacts: Water Stress*, p.126/ [587](#)
- *The Carbon Almanac - Solutions: Using Soil to Store Carbon*, p.234/ [254](#)
- *The Carbon Almanac - Solutions: Footprints and Labels*, p.216/ [212](#)
- *The Carbon Almanac - Whose Job Is it?: Indigenous Youth Represent Their Culture to Demand Action*, p. 242/ [120](#)
- *The Carbon Almanac - Whose Job Is it?: Wealth and Greenhouse Gases*, p.259/ [132](#)
- *The Carbon Almanac - Whose Job Is it?: Individual Carbon Footprint And Collective Action*, p.260/ [119](#)
- Pencils and erasers
- Blank paper, or a notebook dedicated to this project



Resources

Get engaged

An Invitation

To: The Educators of the learners of planet Earth

From: *The Carbon Almanac* Education Team

We are in a relay race. It is a race to stop or reverse the impact of human changes on our planet's climate. We the Education Team of *The Carbon Almanac* hope you have found the activities useful in helping your learners understand what is happening to our world.

Our team was composed of educators, instructional designers, parents, curriculum developers and experts in many fields and from many countries. This means there is experience behind these activities, but no field testing because we did not have the time to do so. Production timeline constraints of this companion volume also limited our ability to prepare an activity for each article. That is where you come in. By sharing this guide with you, we are handing the baton off to you. We have included a blank form and some instructions to help you construct more activities.

We would love to hear from you as you use and improve upon these lesson plans, and create new ones. As you engage with us and these activities, you are joining a network of committed climate warriors. By sharing your work with others, you and your learners are passing the baton and bringing us all closer to net zero.

To share back with us the lessons you create, use the template we are providing [here](#) (make a copy of the template to edit and create your lesson plan) and upload it [here](#). We will be pulling the best activities from the submissions to be included in future editions of the Educators' Guide and featured on *The Carbon Almanac* website.

With the utmost respect and gratitude,

Your Partners of *The Carbon Almanac* Education Team



Educators Template Document - Example

AGE RANGE: Age of the learners

SUBJECTS: Math, Science, & Social Studies

OBJECTIVES

Example

- Define the following words
- Discuss what part humans play in the warming of the Earth’s atmosphere
- Diagram a carbon sink

DURATION:

- (this is usually filled in after everything else is completed)

ENDURING UNDERSTANDING

- How to convert a page(s) from *The Carbon Almanac* into an activity for your classroom.

Pages from *The Carbon Almanac* that will provide context for the topic to be explored:

ACTIVITIES: THE ACTIVITY OR ACTIVITIES RELATED TO EACH OBJECTIVE

Example

- Read the pages that you have chosen for this lesson (this portion can be homework or time allotted in class for the learners to do the reading).
- Discuss what activities they do that add to global warming and what activities they do that neutralize or eradicate greenhouse gases.
- As a group, make a diagram of a carbon sink and label the parts.

ASSESSMENT: ASSESSMENTS CAN BE ORAL, DRAWN, PERFORMED OR WRITTEN.

Example

- Each learner draws and labels a carbon sink.

OBJECTIVES EXPLAINED

What are they? And why use them?

Learning objectives are precise statements that express tangible benefits expected to result from the activity/ instruction. The benefits are indicated in terms of what the learner is to accomplish. Learning objectives provide a framework for devising ways for the learner and the educator to evaluate whether a learner has accomplished the objective or not



RESOURCES:

- **At least one copy of *The Carbon Almanac***
- Paper and pens or pencils for each learner

Educators Template Document - Example

OBJECTIVES EXPLAINED CONTINUED:

Learning objectives fall into 3 categories:

1. **Psychomotor:** this category refers to the coordination of the skeletal muscles; anything that requires physical activity falls under this heading.
2. **Cognitive:** this category receives the most attention in an educational environment. It involves brain activity—thinking, predicting, solving.
3. **Affective:** this category concerns itself with attitudes, values and emotions.

Objectives build on one another. For example, you would not ask a learner to define a subject that is new to them because they don't have the vocabulary to do so. Therefore, the first or lowest level objective would be related to learning the definitions of words that are unique to this discipline.

Bloom's taxonomy is a method of sequential classification of progressively higher-order functioning in the cognitive domain. Below is a list of verbs you may choose to use to construct your cognitive objectives. The lowest cognitive level would be knowledge, while those that follow: comprehension, application, analysis, synthesis and evaluation all build on the levels before it and require more complex mental functioning.

Below is a sample of cognitive verbs that are broken down according to their level.

- **Knowledge verbs:** arrange, define, list, match, order, memorize, label, repeat, recognize, order
- **Comprehension verbs:** classify, discuss, locate, recognize, sort, translate, review, select, indicate
- **Application verbs:** apply, choose, illustrate, practice, sketch, solve, use, demonstrate, employ
- **Analysis verbs:** analyze, compare, diagram, inventory, calculate, differentiate, contrast, criticize
- **Synthesis verbs:** arrange, formulate, synthesize, write, manage, design, propose, plan, construct
- **Evaluation verbs:** judge, estimate, evaluate, value, defend, support, argue, select, judge, assess

RESOURCES:

- **At least one copy of *The Carbon Almanac***
- Paper and pens or pencils for each learner



Lessons from *The Carbon Almanac* - Topics Matrix for Educators

Subject	1. Introduction	2. For Rookies	3. Here's What's True	4. Scenarios	5. Impacts	6. Solutions	7. Whose Job Is it?
SCIENCE:							
Biology	Beyond the Polar Bear - Animals on the Edge of Extinction, page 13, 367.	What is Climate Change? page 20 & 21, 354	Natural Sources of Carbon Dioxide in the Atmosphere, p42, 028	The Five Scenarios Outlined by the IPCC, page 94, 033	The Impact of Climate Change on Indigenous Peoples, page 111, 595	Developing Plant-Based Alternatives, page 203, 099	Saint Kateri Habitats, page 262, 130.
Anatomy and Physiology		Climate Change In Front of Your Eyes, page 28 & 29, 079.	What is Carbon? 40-41, 011	Ocean Acidity, page 105, 679.	What is Biodiversity, page 134, 065.	Agricultural Pests and Diseases, page 118, 596.	Forests Support Food Security, page 213, 250.
Chemistry		The Greenhouse Effect, page 22, 753.	The True Cost of Plastic, p79, 346	Understanding the Five Scenarios, page 96, 039.	Long-Term Wildfire Impacts: Effects of Smoke, page 148, 085.	Building Materials That Sequester Carbon, page 220, 265	Cloud Seeding, page 258, 117
Physical/Earth Science		What is Climate Change? page 20 & 21, 354.	Natural Sources of Carbon Dioxide in the Atmosphere, p42, 028,	Shifts in the Atlantic Ocean's Currents, page 102, 683.	The Impact of Thawing Permafrost, page 142, 486.	Chocolate and Climate, page 206, 233.	Schools and Solar Power, page 245, 116.
Physics			Where Does All the Carbon Go? p70, 365	10-, 50-, 100-, and 1000-Year Climate Events, page 100, 680	Shoreline Erosion, page 141, 078	Low-Carbon Concrete, page 218, 213.	
Environmental Science	The Wizard, The Prophet and the Ostrich, page 12, 002.	The Greenhouse Effect, page 22, 753.	What is an Ecosystem?, p55, 352	Shifts in the Atlantic Ocean's Currents, page 102, 683	Water Stress, page 126, 587	Green Steel, page 217, 224	What Are Cities Doing? (The C40), page 244, 126.
Forensic Science			Natural Sources of Carbon Dioxide in the Atmosphere, p42, 028	The Five Scenarios Outlined by the IPCC, page 94, 033	Energy Production and Negative Health Impacts, page 146, 605.	Footprints and Labels, page 216, 212	Youth-Led Climate Litigation, page 249, 134
Astronomy			How Much Carbon Are We Talking About, p43, 336.		Impact of Commercial Space Travel, page 153, 082	Generating Energy from Ocean Tides, page 182, 098.	
MATH:							
Workplace Math		How Much is a Metric Ton? page 25, 754.	Our Choices Can Have a Lethal Impact, p60, 341	Understanding the Five Scenarios, page 96, 039	Population Growth, page 109, 581	The Drawdown Rankings, page 158, 245	The Positive Impact of Sustainability on Investor Returns, page 248, 131.
Pre-Calculus/ Calculus			The Relationship between Population Growth and Emissions, p52-53, 344,	1,000-Year Climate Events, page 100, 680.	Food Price Spikes, page 122, 599	Eatble Insects, page 208, 104	
Economics			Exxon Letter p46-47, 374	Who Suffers Most?, page 104, 681.	Impact of Carbon Exports & Imports, page 152, 578.	Nuclear Energy by Fusion, page 186, 094	Where You Bank Makes A Difference, page 254, 133.
Statistics		The Diffusions of Innovation, page 35, 353	The History of Systematic Measurement of CO2, p54, 035	Ocean Acidity, page 105, 679.			
Algebra			What is the Carbon Cycle? p44, 012	Understanding the Five Scenarios, page 96, 039			
ENGINEERING:							
Robotics			Computing and Carbon, p88, 340.			The Drawdown Rankings, page 158, 245.	
Electronics						The Changing Cost of Power, page 170, 237.	
Computer programming							

Subject	1. Introduction	2. For Rookies	3. Here's What's True	4. Scenarios	5. Impacts	6. Solutions	7. Whose Job Is it?
Arts:							
Fine arts							Indigenous Youth Represent Their Culture to Demand Action, page 242, 120.
Music							
Dance							
Drama		What is Net Zero? page 30 & 31, 755.					
Crafts (weaving, metal smithing, etc.)						The Drawdown Rankings, page 158, 245.	Indigenous Youth Represent Their Culture to Demand Action, page 242, 120.
Media Arts		The Diffusions of Innovation, page 35, 353.					
LANGUAGES:							
Literature	A Brave and Startling Truth, page 16 & 17						
Creative Writing	A Brave and Startling Truth, page 16 & 17						
English	A Brave and Startling Truth, page 16 & 17						
Spanish							Indigenous Youth Represent Their Culture to Demand Action, page 242, 120.
History	The Tyranny of Convenience, page 6-9, 008	Temperature Change on Earth, p50, 366	Shifts in the Atlantic Ocean's Currents, page 102, 683.		Biodiversity Loss and Climate Change, page 135, 074	The Drawdown Rankings, page 158, 245.	
Sociology / Social Studies/Civics	Game Theory, page 15, 004	10 Myths About Climate Change, page 32 & 33, 342	Carbon Inequality, Climate Change, and Class, Effects of Carbon-Based Cooking Fuel, p85, 606,	Who Suffers Most?, page 104, 681	Desertification, page 130, 066	The Challenges of Critical Mineral Needs for Clean Energy, page 198, 264	10 Publishers Promoting Climate Change Denial Content Online, page 257, 345
Geography		How Much is a Metric Ton? page 25, 754.	The Dust Bowl: Lessons Learned for Farmers Everywhere, p80, 337	Who Suffers Most?, page 104, 681.	The Striking of Glaciers, page 143, 593	How Much Land Would It Take to Power the US through Solar?, page 176, 088	Indigenous Youth Represent Their Culture to Demand Action, page 242, 120.
Nutrition		What is Net Zero? page 30 & 31, 755.	The Relationship between Population Growth and Emissions, p52-53, 344.	Effects of CO2 on Crop Nutrition, page 124, 56	Developing Plant-Based Alternatives, page 203, 099		
Psychology		The Tyranny of Convenience, page 6-9, 008	Climate Change In Front of Your Eyes, page 28 & 29, 079	Exxon Letter p46--47, 374.	Bleaching and Loss of Coral Reefs, page 140, 592	Bioplastics, page 162, 256.	Talking About Climate Change, page 261, 127.
Physical Education			What Do I Get for 1kg CO2?, page 62, 338				

This matrix shows a sample of the articles for each subject. The full version is available on *The Carbon Almanac* website in the educators section.

EDUCATORS' RESOURCE LIST

The Carbon Almanac Education Team has compiled extensive resources for educators working in many different settings. Included are educators' guides, websites, videos, podcasts, books, and lesson plans.

Resources are organized by resource type.

Below is a sample of resources available.

See thecarbonalmanac.org/educational-resources-about-climate-and-sustainability for the full list.

EDUCATIONAL GUIDES/CURRICULA:

- [Guide - Talking to Kids about Climate Change: Top Tips to Explain Causes, Effects and Solutions](#) |
 - [OVO Energyfacts and Solutions](#) | [OVO Energy](#) - Explanations and a list of activities to help make the situation real to kids, without it being frightening.
 - [Howtosmile](#) - Science and Math Informal Learning Educators (SMILE): Free math and science activities for all ages. For anyone teaching and leading in informal learning environments.
 - [Climate Education For Everyone](#) - From the World's Largest Lesson: "There's a growing movement to formalize climate and environmental education for everyone and your learners can be part of making this change happen."
-

INSTITUTIONS & COURSES:

- [Top Climate Change Courses - Coursera](#) - This online learning platform has several courses about Climate Change for all levels (beginners to advanced), from institutions such as The World Bank Group, Yale University and the University of Copenhagen.
 - [Climate Change Online Courses, Classes, & Lessons - edX](#) - Founded by Harvard and MIT, this online platform has climate change courses for all levels from top international institutions.
 - [NASA Climate Change](#) - Facts, graphics, and multimedia for educators, and the public in general from a special arm of the National Aeronautics and Space Administration (US). Some content available in Spanish.
-

CHILDREN-FOCUSED EDUCATIONAL ACTIVITIES:

- [Children's Environment Quizzes](#) - Free downloadable PDF worksheets and quizzes about global warming and climate change for kids 8 - 12.
 - [Kids Science Quiz: How Much Do You Know About Global Warming?](#) - A compelling kids quiz from 8 Billion Trees, which carries out large-scale tree planting and tree conservation operations to fuel positive environmental change and defend habitats for animals.
-

BOOKS & VIDEOS:

- [Best Children's Books About Climate Change](#) - Listopia/Goodreads collection of top 15 books written for children about climate change and global warming.
 - [Crash Course Kids - Climate Change](#) - Online grade school science channel on YouTube. This episode explores how one small change in an ecosystem can affect everything.
-

GAMES:

- [Climate game](#) - From Games4Sustainability, an interactive online game that teaches about climate issues. Players settle on an uninhabited island covered by green trees and thick forests, harvest, use and plant trees, and manage income to develop island infrastructure. Players must be aware that actions have consequences!
 - [ClimateScience | Learn About Climate Solutions](#) - An app available on GooglePlay offering quizzes, courses, articles and infographics with simple explanations and illustrations. Rated E for Everyone.
-

VOLUNTEERING & ACTIVISM:

- [Earth Guardians](#) - Organization that trains and empowers youth to be effective leaders. Using art, music, storytelling, on the ground projects, civic engagement, and legal action, they advance solutions to the critical issues at the intersections of environmental and climate justice.
- [7 Climate and Environmental Volunteer Projects for Teens](#) - From We Are Teachers, ideas for clean-up, habitat restoration, planting food, and other simple yet impactful projects.