Content: Ecology, specifically carbon footprint, grade 10

Knows:

- Land fragmentation (breaking up large areas of land by roads or other vices causes natural organisms living in that area to suffer and likely have to relocate)
- Carbon (binds to 4 elements, thus making it a versatile element)
- Carbon footprint (the total sets of greenhouse gas emissions caused by an organization, event, product or individual)
- Emission (the production and discharge of something, especially gas or radiation)
- Emission standards (are legal requirements governing air pollutants released into the atmosphere. Emission standards set quantitative limits on the permissible amount of specific air pollutants that may be released from specific sources over specific timeframes. They are generally designed to achieve air quality standards and to protect human health.)
- Roads (Places designated for driving, often macadam or concrete)
- Ozone (O_3) (an inorganic molecule with the chemical formula O3, It is an allotrope of oxygen that is much less stable than the diatomic allotrope O2, breaking down in the lower atmosphere to normal dioxygen, and is present in low concentrations throughout the Earth's atmosphere(stratosphere). In total, ozone makes up only 0.6 ppm of the atmosphere.)
- Global warming (gradual increase in the average temperature of the Earth's atmosphere and its oceans, a change that is believed to be permanently changing the Earth's climate.)
- Trees (a woody perennial plant, typically having a single stem or trunk growing to a considerable height and bearing lateral branches at some distance from the ground.)

- Photosynthesis (process of converting light energy to chemical energy and storing it in the bonds of sugar. This process occurs in plants and some algae (Kingdom Protista). Plants need only light energy, CO_2, and H_2O to make sugar.)
- Ecology (the branch of biology that deals with the relations of organisms to one another and to their physical surroundings.)
- Renewable resource (A renewable resource is a resource which is replaced naturally and can be used again. Examples are: oxygen, fresh water, solar energy, timber, and biomass. Renewable resources may also include goods commodities such as wood, paper and leather.)
- Nonrenewable resource (A resource of economic value that cannot be readily replaced by natural means on a level equal to its consumption. Most fossil fuels, such as oil, natural gas and coal are considered nonrenewable resources in that their use is not sustainable because their formation takes billions of years.)

Dos:

- Recall information
- Define key content and vocabulary
- Deconstruct emissions and byproducts
- Categorize vehicles
- Research
- Reading and Writing
- Discuss findings utilizing vocabulary
- Demonstrate how car emissions contribute to global warming and carbon footprint
- Debate
- Present information

- Create ways of conveying newly learned information
- Calculate total emissions and gas costs

Standards:

BIO.B.4.1 – Describe ecological levels of organization in the biosphere

BIO.B.4.1.2 – Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.

BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.3 – Describe how matter recycles through an ecosystem (carbon cycle)

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change)

BIO.A.3.2 – ID and describe how energy is captured and transformed in organisms to drive their life processes

BIO.A.3.2.1. – Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration.

http://auto.howstuffworks.com/catalytic-converter1.htm

- control amount of fuel they burn
- keep air:fuel ratio close to stoichiometric point – ideal ratio
    - gasoline 14.7:1 (each lb of gas 14.7 lbs of air will be burned)
    - sometime be **lean**, means higher than 14.7
    - **rich** lower than 14.7
- main emissions are
    - N2 – most pass through car engine
    - CO2 – product of combustion, C in fuel bonds with O2 in air
    - H2Ov – product of combustion, H2 in fuel bonds with O2 in air
- emissions are mostly benign
    - CO2 believed to contribute to global warming
    - Not perfect, some small bad things are produced (Catalytic converters reduce)
        - CO – poisonous, colorless and odorless
        - volatile organic compounds – component of smog, evaporated unburned fuel
        - NOx – smog and acid rain

Benchmark #1 (day 3-4) - formative

Debate: Students will be split into 4 groups representing “sides” of an argument; the “sides” of the argument will be the city council, townspeople, ecologist/biologist, and the company looking to make the new road for cars to drive on. The debate will start with the road company proposing their plan, which will cut through a large plot of natural land, in order to reduce the time and gas it takes to get from one side of a state to another.

Once students are split into a “side” of an argument they will be given one entire class period to research and define key vocabulary terms that may be used during the debate, they should also research key points/arguments related to their “side” of the debate. Each member of each group will also be responsible for writing a short essay explaining their “side” of the argument as well as persuading an uninvolved member of the town to favor their “side”.

Benchmark #2 (day 2) – formative

Explore the AACA website (http://www.aacamuseum.org/), then hover over the ‘Exhibits’ tab, in the drop down menu select ‘permanent’, students will then select 2 cars from two different decades, from this webpage and research those cars in regards to their emission output. Students will also need to research the emission standards/law in place during the time period of the cars they have chosen, and emission laws in place today. Utilizing vocabulary students will then write a one paragraph write-up discussing if their cars would pass inspection or not according to past laws, and current laws. Students will pick one car they have researched and give a brief presentation to the class discussing their findings.

Performance Task – summative (several days after everything else is completed)

If possible, a member of the AACA Car Museum will be invited to watch students present their final summative assignment. Students will work in small teams (1-3 students each – assigned by the teacher) to complete a menu project. Only one part of the project will be presented to the board member. Options and explanations are below:

Breakfast: 3 options / choose 1

- Create a short movie discussing global warming and the effect someone's carbon footprint plays into that. Choose two cars to talk about during your movie that your parents or grandparents drove when he/she was young; hint, the AACA website might be helpful for research. The movie must be 4-6 minutes, factual information must be stated in a creative way and must be correct, and one interview of an outside party must be included.
- Create a children's book explaining global warming and a carbon footprint to young children. The book should be factual, creative, 8-10 pages (at least), and include pictures to go along with the text. The Ford Model T should be used, along with one other car of the student's choice from the AACA museum.
- Write an essay / poem / or song about global warming and a carbon footprint. The information should be factual. The essay must be 2-3 pages, the poem should be a full sheet of paper long, or several small poems would be acceptable as long as all put together it totals one page, and the song on paper should be one page long, or sung over a minute long. Reference two special exhibit cars from the AACA museum for this project.

Lunch: 4 options / choose 2

- Research how gasoline that is put into a car at a gas station is broken down/used in a car; essentially, explain the path gasoline takes, from fuel pump to exhaust. Presentation of

information can be in any form of the students choosing. Examples: presentation, movie, animation, slideshow, essay, etc (just be sure to get it approved if you're unsure if it is "good enough" or not). Two cars from the AACA museum must be used for this assignment.

- Pretend to be two people: a hauling company, and an ecologist/biologist, and write two persuasive essay arguing to raise and to lower the emission standards, respectively. The truck driver likely wants the standards raised so he can drive more with cheaper gasoline, and the scientists want it lowered because of the looming effects and worries about global warming. Essays should be 2-3 pages each. Use a truck or large vehicle (Hearse) from the AACA museum when discussing the hauling company's perspective, and use a eco-friendly car when talking about the ecologist/biologist perspective.
- Draft and design the 'ideal' emission laws for the state of Pennsylvania. Research may need to be done to find the current laws in order to complete this project. Research safe levels of emissions – from a biological perspective, not a government perspective. Write a formal bill/law that could be drafted to actually be implemented one day. Use 2 cars from the AACA museum that failed their emission standards to support your argument for further refinement of the laws. Also, use a car from "today" that fits your criteria for your bill/law. Bill/law should be a minimum of 2 pages.
- Write a formal letter to the governor explaining to them how cars are affecting the carbon footprint and increasing global warming, and encourage them to give a presentation on this subject in order to increase awareness of the issues the world is facing if changes are not made. Be sure to reference several cars from the AACA museum in your letter that contributed significantly to the carbon footprint and global warming. The letter should be concise, compelling, and informative. Be sure to explain who you are and why you care

about this subject, and why they should too. Students will revise the letter as needed with peers and the teacher and send it to the person being written to.

Dinner: 3 options / choose 1

- Write a proposal on how to change the effects of carbon footprints for three "people": a 'normal', everyday human person, and a company that emits smoke and pollutants into the air daily, and a car manufacturer – pretend this car company only makes 1970's style cars, specifically cars (pick 2) from the AACA museum made before 1980. Proposals (3 of them) should be 1-2 pages in length, they should include facts about the carbon footprint, why the group/individual needs to change their behaviors/actions, and how the effects of their change would impact the environment and global warming.
- Create an exam, (that will not be given) testing their understanding and knowledge of the carbon footprint / AACA Museum unit. The test should be worth 100 points, and it should take a student about 30-40 minutes to complete it. No more than 5 multiple choice and/or true false questions can be used, full in the blank questions should be limited to 5, 2-3 short answer questions should be asked, as well as one essay type question. An 'answer key' must be turned in along with a blank exam.
- Calculate their total emissions and total gas cost from a car of their choosing from the AACA museum, simulating that they are driving from New York City to Austin Texas, then to Seattle Washington. They should use the gas prices from that car's time period. They should find out 1) how much gas that car can hold, 2) the mpg value, 3) how far the journey is in miles, 4) the cost to fill the tank the appropriate number of times, 5) the total emissions produced from your journey (if the emission value for your car cannot be found, use the emission standards for that time period and assume you emit that quantity). A map of the

route should be drawn, and some type of symbol should be placed at each location that it is necessary to refill the tank.

Lesson 1

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ:

How do cars contribute to a greater carbon footprint?

Why is carbon an important element?

How does a rise in the concentration [ ] of CO_2 affect the environment?

Objectives: SWBAT explain the importance of carbon, draw the carbon cycle

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.3 – Describe how matter recycles through an ecosystem (carbon cycle)

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change)

Prior Knowledge: Carbon (being reviewed), pollution, ecosystem

Activating Strategy: An index card will start at the front of each row of students (or at a random student within a group if the desks are arranged that way), each student will write a fact about carbon on that index card. They will then pass the index card to the person behind them, where the next student must write something about carbon on the card. This pattern continues until everyone has written something. If a student honestly doesn't know a fact, then the student can pass the card to the next person without writing anything. Once everyone has written or attempted to write something, 5 students will be called on by the teacher to share what they wrote or what was written on the card. The purpose of this activity is for the teacher to quickly assess the base knowledge the students have.

DIFFERENTIATED Activating Strategy:

Deafness: There should be no differentiation needed for the first part of this activity for a student who is deaf. During the discussion part of the activity an interpreter can be present to communicate with a student who is deaf. Or instead all students can be called on to come up to the board to write their answer on the white/chalkboard. This allows students who are deaf to read the "discussed" answers on the board, and they themselves tell their answer to the class.

Physical Disability: If a student is in a wheel chair or has a lower extremity disability this should not be an issue. If there are physical disabilities, a nearby classmate in the student's row can be asked to pass the notecard on for the student, or the teacher can be waiting near the student to act as the notecard passer. If a student with severe physical disability is present that student can have their own notecard and they are simply responsible for writing one answer down before the end of the activity. If the student is physically disabled to the point that they cannot write the student could tell their answer to the teacher during the activity and/or they could be called on during the discussion part of the activity.

Autism: For a student with autism this activity could be accommodated to slow it down, instead of having the rows "race" to fill out their notecard each student could have 20 seconds to fill out an answer, then the students would be told to pass the card onto the next student. Or the student with autism could be given their own card and they can just write as many answers as they can in the same time as it takes the rest of the class to finish the activity.

Enhancement: None available.

Teaching Strategy: A brief lecture will be given to the students covering the element carbon – placement on periodic table, prevalence, and importance to humans and trees. Instructor and students will be given ball and stick models in order to reinforce the structure of carbon; students will build several molecules that are harmful (CO2, CO, CH4). Next, the term carbon footprint will be introduced also with a lecture (continuation from first lecture). A video will be shown about the topic (https://www.youtube.com/watch?v=8q7_aV8eLUE & https://www.youtube.com/watch?v=2Jp1D1dzxj8).

DIFFERENTIATED Teaching Strategy:

Deafness: For the lecture, an interpreter should be present during the class in order to get the content of the class to the student; if that is not possible images can be used heavily, or a modified PowerPoint can be given to that student that includes everything that will be said orally or as "side notes". The ball and stick part of the lesson should be fine. During the video the closed captions can be turned on, or a script of the videos can be typed and printed and given to the student.

Physical Disability: For the lecture, unless the student has severe disabilities and is unable to write, the guided notes that are given to the students can be filled in with the correct

words/answers. During the activity part of the lesson if students choose to move around to work on the activities the teacher could choose groups/pairs and assign where they are supposed to sit – this could prevent the student with disabilities from having to move around a lot. If the student wants to move or is insistent on being able to move like typical students the classroom should just be modified to accommodate for movement regardless of wheelchair size/crutches/etc.
Autism: For the lecture there should not be any issues. Maybe the student with autism may need guided notes (if not already given to all students), or the guided notes can be filled in.
Enhancement: Enhancement can be provided in the form of guided notes, but they can be 'less guided'. For example, there can still be key words and points written out so the student doesn't miss important material, but there can be more blanks so the student can practice listening and writing simultaneously.

Summarizing Strategy: Class will end after the video and students will write a one paragraph essay summarizing the information from the video, and they must also draw the structure of CO_2, this activity will be handed in on the way out for the teacher to review.
DIFFERENTIATED Summarizing Strategy:
Deafness: A student who is deaf should have no issues with this activity, as long as they were able to read the videos or read the script. If that was an issue then the assignment should be collected the next day for the student – this gives them more time to watch the video again and process the information.
Physical Disability: There is no movement involved in this activity, so there should be no issues here. If the student has a severe disability and is unable to write, the information could be spoken to the teacher, or the student could be pulled out of the class and an aid (or someone else) could write what is verbally said.
Autism: For a student with autism, extended time could be given, this could be similar to a student who is deaf; the assignment can be collected the next day or at the end of the school day.
Enhancement: All models we learned yesterday could be drawn rather than just CO_2.

Assessment: The one paragraph essay at the end of the period will be an easy quick informal assessment that the teacher can quickly glance at to see how much the students learned. There will be no formal assessment today or homework.

Key Vocabulary: Carbon, carbon footprint, ozone, global warming

Materials:

- Index cards
- Note packet/sheet for students
- Video (https://www.youtube.com/watch?v=8q7_aV8eLUE & https://www.youtube.com/watch?v=2Jp1D1dzxj8)
- Half sheet of paper for each student

Carbon

- Symbol: _____
- % by mass in the human body: 18.5%
- 4 electrons available for _____ in the outer energy level
- Must form 4 _____ bonds to be stable

Draw the ball and stick model of CO2 below:

- Carbon atoms bond to each other, they can form _____, branched chains, or _____.

Carbon Cycle

- All life on Earth is based on _____ molecules
- Carbon forms the framework of _____, carbohydrates, fats, and other important molecules of life
- Starts with an _____
- _____, energy from the sun is used by autotrophs to convert carbon dioxide gas into energy-rich carbon molecules

Carbon Footprint

- A carbon footprint is defined as:
    - The total amount of _____ produced to directly and indirectly support human activities, usually expressed in equivalent _____ of carbon dioxide (CO2).
- In other words: When you drive a car, the engine burns fuel which creates a certain amount of CO2. When you heat your house with oil, gas or coal, then you also generate CO2.
- Even if you heat your house with electricity, the generation of the electrical power may also have emitted a certain amount of CO2. When you buy food and goods, the production of the food and goods also emitted some quantities of CO2.
- Your carbon footprint is the _____ of all emissions of CO2 (carbon dioxide), which were induced by your _____ in a given time frame. Usually a carbon footprint is calculated for the time period of a _____.

Greenhouse Gas

- Carbon dioxide is a so called _____ causing global warming. Other greenhouse gases which might be emitted as a result of your activities are e.g. methane and _____. These greenhouse gases are normally also taken into account for the carbon footprint. They are converted into the amount of CO2 that would cause the same effects on global warming (this is called equivalent CO2 amount).
- Highway vehicles release about _____ tons of greenhouse gases (GHGs) into the atmosphere each year—mostly in the form of carbon dioxide (CO2)—

contributing to _____ climate change. Each _____ of gasoline you burn creates 20 pounds of GHG. That's roughly 7 to 10 tons of GHG each year a _____ vehicle.

Car Emissions

- Car emissions are byproducts of the _____ combustion engine of a car, which is released into the _____ via the car’s exhaust system.
- These _____ are significant contributors to air pollution and also form the main ingredients required to create _____ in many of the larger cities around the world. In this respect, emissions are of importance as they have been found to have many detrimental effects on both public health and the environment.
- Generally the emission of Carbon dioxide from a car is considered a “_____” (it means that fuel is being burned effectively), it is still a greenhouse gas.

Lesson 2

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ:

How do cars contribute to a greater carbon footprint?

What is an emission?

What is the carbon cycle? How do car emissions and other pollutants affect the environment?

Objectives: SWBAT draw the carbon cycle, and describe an emission and how they affect the environment.

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.3 – Describe how matter recycles through an ecosystem (carbon cycle)

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change)

Prior Knowledge: Previous day's PKs + vocabulary

Activating Strategy: This will begin with a review from yesterday. Ask the students to draw the structure of CO2 and CO. After they have drawn it they will compare their drawing to the drawing from a neighbor so that they will hopefully, see similarities.

DIFFERENTIATED Activating Strategy:

Deafness: The prompt will be projected on the board so any students who are deaf can look up and read it and complete the assignment.

Physical Disability: There should be no issues here, unless the student has a physical disability that affects the student's ability to write/draw. In that case they could verbally describe the structures to the teacher quietly while the rest of the class is working.

Autism: A student with autism should not have problems with this activity.

Enhancement: A student who needs enhancements could be asked to draw the structures on the board and to explain the different parts of it to the class.

Teaching Strategy: The majority of the class will be notes via a PowerPoint in a note packet on carbon (finishing anything not covered yesterday), emissions, global warming, and the carbon footprint. These topics will be connected to cars – but not explained how a car produces emissions, this is just discussing how car emissions are harmful. With any remaining time a video can be played talking about the carbon cycle or how emissions are harming the environment.

DIFFERENTIATED Teaching Strategy:

Deafness: The teacher could wear a voice-to-text device, and the student could have a laptop on their desk or on a nearby table and the student could follow the lesson by reading what the teacher says. Or an interpreter could be present during the class in order to get the content of the class to the student; if that is not possible images can be used heavily, or a modified PowerPoint can be given to that student that includes everything that will be said orally or as "side notes".

Physical Disability: For the lecture, the guided notes that are given to the students can be filled in with the correct words/answers.

Autism: For the lecture there should not be any issues. Perhaps the student with autism needs guided notes (if not already given to all students), or the guided notes can be filled in.

Enhancement: Enhancement can be provided in the form of guided notes, but they can be 'less guided'. For example, there can still be key words and points written out so the student doesn't miss important material, but there can be more blanks so the student can practice listening and writing simultaneously.

Summarizing Strategy: This will be a simple exit ticket. Project four short answer questions on the board regarding the material from the day's lesson, and the students will have to choose two of the questions to answer and turn in when they walk out the door.

DIFFERENTIATED Summarizing Strategy:

Deafness: This should not require differentiation.

Physical Disability: If the student is physically disabled to the point that they cannot write the student could tell their answer to the teacher during the activity. One prompt could be required to answer rather than two to allow for more time to answer.

Autism: One prompt could be required to answer rather than two to allow for more time to answer.

Enhancement: A fifth question could be given to students that require enhancement, this question could require a longer or more detailed answer.

Assessment: No formal assessment is going to be given, only the exit ticket.

Key Vocabulary: Carbon, carbon footprint, emission, emission standards, ozone, global warming, and ecology

Materials:

- Guided note packet
- PowerPoint/flipchart of material
- Scrap paper for exit ticket

Lesson 3

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ:

How do cars contribute to a greater carbon footprint?

How does human interference on land affect the environment?

Objectives: SWBAT research topics related to the previous 2 days lessons and complete benchmark #1.

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change)

Prior Knowledge: Previous two day's PKs + vocabulary

Activating Strategy: The lesson will begin by reviewing the four questions from yesterday's exit ticket – all four will be discussed as a class.

DIFFERENTIATED Activating Strategy:

Deafness: Questions will be projected so a student who is deaf can read them, and perhaps an interpreter can be present to translate answers.

Physical Disability: No differentiation will be needed.

Autism: No differentiation should be needed.

Enhancement: The answer to the fifth question can be typed and handout out to the students that answered this question so they can compare their answer to the correct answer.

Teaching Strategy: Class will start by finishing all the notes the students will need to know in this AACA unit. After this is completed, benchmark #1 will be introduced and completed during class – this benchmark is a debate, see other document for a full description.

DIFFERENTIATED Teaching Strategy:

Deafness: The teacher could wear a voice-to-text device, and/or the student could have a laptop on their desk or on a nearby table and the student could follow the lesson by reading what the teacher says. Or an interpreter could be present during the class in order to get the content of the class to the student; if that is not possible images can be used heavily, or a modified PowerPoint can be given to that student that includes everything that will be said orally or as "side notes". An interpreter can be present to assist with communication within the groups.

Physical Disability: For the lecture, the guided notes that are given to the students can be filled in with the correct words/answers. I don't foresee problems here, the student with a disability should be able to help research or discuss the concepts.

Autism: For the lecture there should not be any issues. Perhaps the student with autism will need guided notes (if not already given to all students), or the guided notes can be filled in. A student with autism could be assigned a "side" of the argument, and they could 'debate' their side in a short essay, maybe 2-3 pages.

Enhancement: Enhancement can be provided in the form of guided notes, but they can be 'less guided'. For example, there can still be key words and points written out so the student doesn't miss important material, but there can be more blanks so the student can practice listening and writing simultaneously. *Benchmark 1* could be enhanced by asking students to research the normal part of this assignment, plus to research global warming from another country's perspective; for example, India. India is very urbanized country and they're view on global warming may be very different than in the United States.

Summarizing Strategy: Students will work up till the end of the period, but if students desire they can have a mini-meeting with the teacher to discuss questions or concerns they are having. At the very end of the period each group could share their progress on the project for one minute.

DIFFERENTIATED Summarizing Strategy:

Deafness: See above. Interpreter can be present for the mini-meeting and presentation.

Physical Disability: See above. Presentation can be given from the student's desk rather than the front of the classroom,

Autism: See above. Mini-meeting can be held at a time of their convenience – within school hours.
Enhancement: None needed.

Assessment: The benchmark will be assigned and worked on today. See above.

Key Vocabulary: Land fragmentation, ozone, roads, global warming, trees, photosynthesis, ecology, renewable and nonrenewable resources

Materials:

- PowerPoint/flipchart
- Guided note packet, & benchmark #1 handout
- Laptops

Lesson 4

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ:

How do cars contribute to a greater carbon footprint?

How do trees remove harmful substances from the atmosphere?

How does pollution affect breathing?

Objectives: SWBAT explain photosynthesis, and how pollutants affect breathing.

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.A.3.2 – ID and describe how energy is captured and transformed in organisms to drive their life processes. BIO.A.3.2.1. – Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration.

Prior Knowledge: Same PKs as the past 5 days, + new vocabulary.

Activating Strategy: Class will start with a video about respiration and an article about how lungs breathe less efficiently with greater air pollution (https://www.youtube.com/watch?v=4oKL33ZAs9Q – only a clip of the video should be shown) & (http://www3.epa.gov/airquality/peg_caa/concern.html)

DIFFERENTIATED Activating Strategy:

Deafness: No differentiation should be needed for the reading. An interpreter might be present for the discussion.

Physical Disability: No differentiation should be needed for the reading or the discussion.

Autism: A student with autism could be given a copy of the article with the appropriate accommodations needed for that student; such as extra white space. Rather than discussing the article with the class the student with autism could be asked to write a few sentences summarizing the article and giving me their opinion on it.

Enhancement: No enhancement needed. The article is short and discussion will be brief.

Teaching Strategy: There will be a focus on biology and will learn how plants, specifically trees, remove CO2 and pollution from the atmosphere via photosynthesis. This information will be given to students via a PowerPoint presentation, and they will follow along with guided notes. This should take approximately 30 minutes to cover all the material. An introduction to the Performance Task (PT) will be given at this time.

DIFFERENTIATED Teaching Strategy:

Deafness: For the lecture, an interpreter could be present during the class in order to get the content of the class to the student; if that is not possible images can be used heavily, or a modified PowerPoint can be given to that student that includes everything that will be said orally or as "side notes". PT Differentiation described in LP 6.

Physical Disability: The guided notes that are given to the students can be filled in with the correct words/answers. PT Differentiation described in LP 6.

Autism: Perhaps the student with autism might need guided notes (if not already given to all students), or the guided notes can be filled in. PT Differentiation described in LP 6.

Enhancement: Enhancement can be provided in the form of guided notes, but they can be 'less guided'. For example, there can still be key words and points written out so the student doesn't miss important material, but there can be more blanks so the student can practice listening and writing simultaneously. PT Differentiation described in LP 6.

Summarizing Strategy: The students will make origami organelles! Facebook page that has patterns for each organelle (https://www.facebook.com/origamiorganelles/?fref=ts)

DIFFERENTIATED Summarizing Strategy:

Deafness: No differentiation should be needed, directions can be given visually with pictures and demonstrated folds by the teacher.

Physical Disability: A premade origami organelle can be made, and the student with a physical disability can still have a model to study with and label, they just wouldn't have to actually make the model.

Autism: No differentiation should be needed. Maybe a folding instruction book can be given to the student; it can be like the Lego kit instruction books that move step by step and have a ton of pictures.

Enhancement: No enhancement.

Assessment: Performance Task

Key Vocabulary: Photosynthesis, electron transport chain, energy, sugar, glucose, chloroplasts, plant cells, and photosystem 1 and 2

Materials:

- Photosynthesis PPT
- Guided note packet
- PT instruction sheet
- Video and article for activator
- Origami organelles materials and patterns

Lesson 5

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ:

How do cars contribute to a greater carbon footprint?

How the environment is affected by increasing emissions from cars and how does this compare to the past?

Objectives: SWBAT demonstrate their knowledge about cars impact on the environment.

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change). BIO.A.3.2.1. – Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration.

Prior Knowledge: Previous 4 days information.

Activating Strategy: Student example pieces of this project will be shown at the beginning of class, and displayed for the duration of this assignment for students to reference. I hope that fun examples will hook students' interest in the project and spark some creative ideas!

DIFFERENTIATED Activating Strategy:

Deafness: No differentiation needed to view examples.

Physical Disability: No differentiation needed to view examples.

Autism: No differentiation needed to view examples.

Enhancement: No differentiation needed to view examples.

Teaching Strategy: Work day – students will be working on their PT for the duration of the period. Meetings will be held with each individual student for 1 minute each for the last 20 minutes of class. During the last 20 minutes students will share their beginning ideas with 2 classmates in order to expand their thinking and make sure they're all on the same page.

DIFFERENTIATED Teaching Strategy:

Deafness: No differentiation should be needed to complete the assignments.

Physical Disability: No differentiation should be needed to complete the assignments. If physical impairments present themselves at the completion of an assignment accommodations will be made at that time.
Autism: A student with autism could be asked to only complete 3 assignments overall, one from each category. Extended time can also be given if needed.
Enhancement: Enhancement can be provided to individual students that require it.

Summarizing Strategy: A different set of 4 questions will be projected on the board and answered as a summarizer for the unit. These questions will be a good representation of the questions that will be found on the test tomorrow. Questions will be answered and discussed in the last 10 minutes of class.
DIFFERENTIATED Summarizing Strategy:
Deafness: Questions will be projected so a student who is deaf can read them, and an interpreter can be present to translate answers.
Physical Disability: No differentiation will be needed.
Autism: No differentiation will be needed.
Enhancement: No enhancement will be provided on the test.

Assessment: PT is in progress. Meeting is an informal assessment.

Key Vocabulary: All vocabulary from this unit is key and will be needed for the PT.
Materials:

- Laptops
- PT instruction handout
- Paper for the summarizer

Lesson 6

Topic: Carbon Footprint – information from AACA Museum

Related Big Idea: Ecology

*Note: for differentiation Deafness, physical disability, and autism in mind.

EQ: How do cars contribute to a greater carbon footprint?

How the environment is affected by increasing emissions from cars and how does this compare to the past?

Objectives: SWBAT demonstrate their knowledge about cars impact on the environment.

Standards: BIO.B.4.2 – Describe interactions and relationships in an ecosystem

BIO.4.2.5 – Describe how the ecosystems change in response to natural and human disturbances (climate change). BIO.A.3.2.1. – Compare and contrast the basic transformation of energy during photosynthesis and cellular respiration.

Prior Knowledge: Previous 7 days vocabulary.

Activating Strategy: Conduct a brief 10 question review activity. This could be completed with Kahoot – an online program. Students can access this program by using a laptop or a smart phone/device. This is an extremely quick activity and it will get their brains focused on the upcoming test.

DIFFERENTIATED Activating Strategy:

Deafness: Questions are projected on the board so the student could read the questions and answer options.

Physical Disability: If a student is immobile I would pair all students for this activity, and for the pair with the student with a disability I would be sure the other student would be the one controlling the device. This allows the student to still participate and express their knowledge, but their physical restriction does not limit them.

Autism: A student with autism could be given a print out of the questions and they could complete them on their own.

Enhancement: These students can work on a more in depth/harder worksheet as a warm up.

Teaching Strategy: Test day – students will be taking a test for the duration of the period.

DIFFERENTIATED Teaching Strategy:

Deafness: No differentiation is required.
Physical Disability: If the student has severe disabilities and is unable to write the test can be taken orally in a special education classroom, or with me orally before or after class. Student could be allowed time and half if needed.
Autism: Student could be allowed time and half if needed. Extra white space could be provided, or an accommodation could be provided to the student where one multiple choice option is eliminated.
Enhancement: Multiple choice and matching questions will be eliminated from the next and replaced with fill in the blank (no word bank), short answer, and essay style questions only.

Summarizing Strategy: No summarizing strategy today because of the test.
DIFFERENTIATED Summarizing Strategy:
Deafness: No summarizing strategy today because of the test.
Physical Disability: No summarizing strategy today because of the test.
Autism: No summarizing strategy today because of the test.
Enhancement: No summarizing strategy today because of the test.

Assessment: A formal test will be given today.

Key Vocabulary: All vocabulary from this unit is key and will be tested on the test.
Materials:

- Printed exam for each student