

Environmental Education Programming

2019-2020



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goHunterdon's free Environmental Education Program explores the connection between transportation choice and impact on the environment.



The program is designed to educate students in grades K-12 on issues of sustainable transportation options in their community.

All lessons meet NJ Core Curriculum standards.

We invite you to browse through our offerings on the pages that follow.

For more information and to schedule programming for your students, contact:

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Environmental Education Coordinator

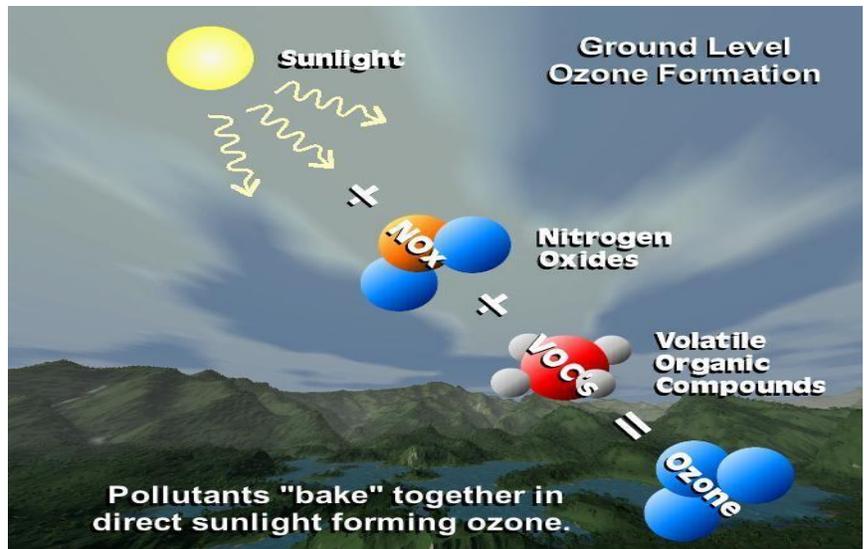
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Air Quality

Progress has been made in achieving national air quality standards, which EPA originally established in 1971 and updates periodically based on the latest science.

However, air pollution can be harmful even when it is not visible. Newer scientific studies have shown that some pollutants can harm public health and welfare even at very low levels.



Today, pollution levels in many areas of the United States exceed national air quality standards for at least one of the six common pollutants: *particle pollution*, *ground level ozone*, *sulfur dioxide*, *nitrogen oxide*, *lead*, and *carbon monoxide*.

Although levels of particle pollution and ground-level ozone pollution are substantially lower than in the past, levels are unhealthy in numerous areas of the country. Both pollutants are the result of emissions from diverse sources, and travel long distances and across state lines.

Long and short-term exposures to fine *particle pollution*, also known as fine particulate matter (PM_{2.5}), can cause premature death and harmful effects on the cardiovascular system. Scientific evidence also links PM to harmful respiratory effects, including asthma attacks.

Ozone can increase the frequency of asthma attacks, cause shortness of breath, aggravate lung diseases, and cause permanent damage to lungs through long-term exposure.

Both pollutants cause environmental damage, and fine particles impair visibility.

The United States meets carbon monoxide air quality standards, largely because of emissions standards for new motor vehicles under the Clean Air Act.

The Air Quality lessons on the pages that follow are all designed to provide students with age appropriate information, an interactive activity and a "call to action" related to understanding and improving air quality.

Reading Series – “AIR”

Grade(s): 1-3

Learning Objectives

Students will be able to:

- Describe what AIR is and why it is important
- Identify common air pollutants

Overview

Students are read this short book, describing what air is, the importance of clean air, and actions that can be taken in our daily lives to improve air quality.

Following the reading of the book aloud, students will participate in a “Clean Air Bingo” game. Students will be asked questions that pertain to the book and must find the answer on a bingo card.

Students will be provided with clean air activity packets to take home that will help to reinforce the message of keeping our air clean.

This lesson can be used as the first in a series, followed by “[What's Air Got To Do With It](#)” and “[Air Quality Experiment](#)” Lessons. This lesson can be designed to incorporate these other activities.

Curriculum Standards

Literacy

- CCSS.ELALiteracy.CCRA.R.[2&3]
- CCSS.ELALiteracy.CCRA.R.8
- CCSS.ELALiteracy.CCRA.RL.1.1
- CCSS.ELALiteracy.CCRA.RL.1.3
- CCSS.ELALiteracy.CCRA.RL.1.7
- CCSS.ELALiteracy.CCRA.RL.2. [1 & 3]
- CCSS.ELALiteracy.CCRA.RL.3.3

Science

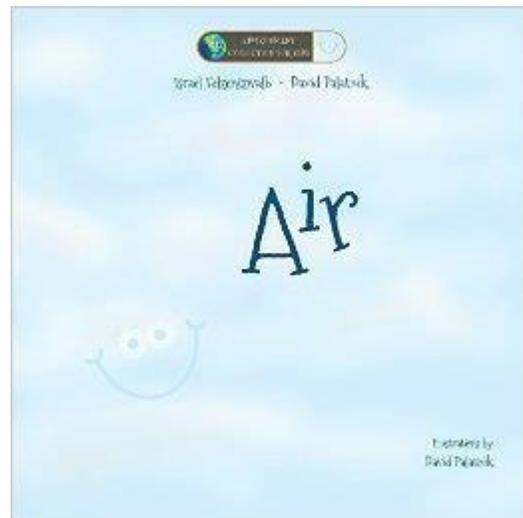
- CCSS.ELALiteracy.CCRA.RL.4. [2 & 4]
- CCSS.ELALiteracy.CCRA.SL.1. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.2. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.3.1
- 5.1.4.A.1
- 5.1.4.D.1
- 5.2.2.C.1
- 5.2.4.C.1

Social Studies

- 6.3.4.A.3
- 6.3.4.B.1

Health/PE

- 2.1.2.C.2
- 2.1.2.D.[1 & 3]
- 2.1.4.C.[1 & 2]
- 2.1.4.D.[1 & 3]
- 2.2.2.B.2
- 2.2.4.A.1
- 2.2.4.B.[1 & 2]
- 2.5.2.C.[1 & 2]



Reading Series – “Air Pollution!”

Grade(s): 1-3

Learning Objectives

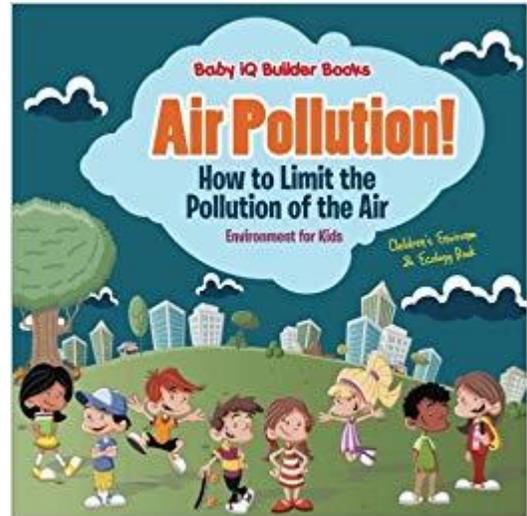
Students will be able to:

- Identify types of air pollutants
- Identify causes of air pollution
- Provide ways to reduce air pollution

Overview

Through this story students will learn about the types of air pollutants, their sources, and how they impact the environment and health.

Following the reading of the book aloud, students will participate in a “Q & A style” game designed to reinforce the information offered in the book and engage students in a discussion on ways that they can limit air pollution.



Curriculum Standards

Literacy

- CCSS.ELALiteracy.CCRA.RL.4. [2 & 4]
- CCSS.ELALiteracy.CCRA.SL.1. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.2. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.3.1
- CCSS.ELALiteracy.CCRA.RL.1.3
- CCSS.ELALiteracy.CCRA.RL.1.7
- CCSS.ELALiteracy.CCRA.RL.2. [1 & 3]
- CCSS.ELALiteracy.CCRA.RL.3.3

Science

- 5.1.4.A.1
- 5.1.4.D.1
- 5.2.2.C.1
- 5.2.4.C.1

Social Studies

- 6.3.4.A.3
- 6.3.4.B.1

Health/PE

- 2.1.2.C.2
- 2.1.2.D.[1 & 3]
- 2.1.4.C.[1 & 2]
- 2.1.4.D.[1 & 3]
- 2.2.2.B.2
- 2.2.4.A.1
- 2.2.4.B.[1 & 2]
- 2.5.2.C.[1 & 2]

Reading Series – “Owls for the Environment”

Grade(s): 1-4

Learning Objectives

Students will be able to:

- Understand how transportation and energy choices can impact the environment and health.

Overview

This lesson uses a three part book series to focus on the impact of transportation choice and energy on the environment. The lesson also provides an opportunity for students to discuss strategies to improve air quality.

Following the reading of a book to students aloud, students participate in an interactive game designed to reinforce the key concepts introduced in the books.

Working in teams, students will answer questions from the book and earn points.



BOOKS:

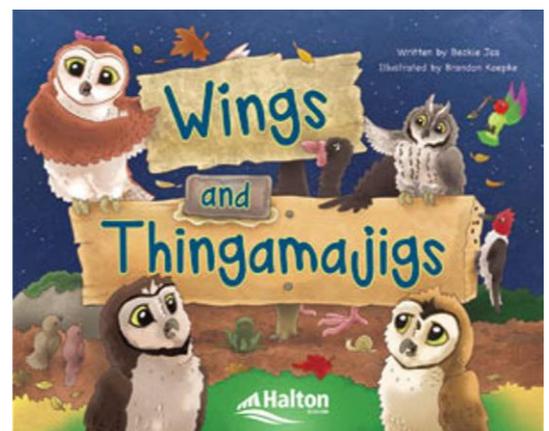
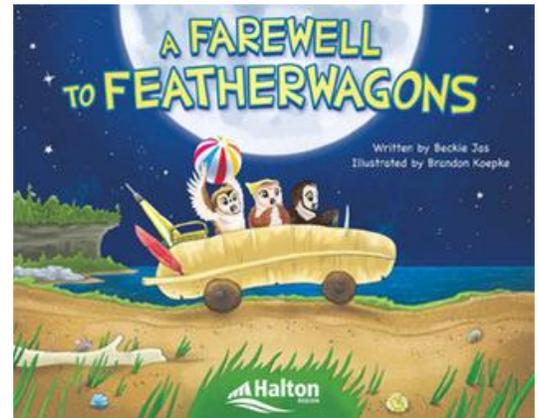
A Farewell to Featherwagons

In the first book of the series, students are introduced to a group of fictional owls who take a trip to the lake. Along the way, they realize that their current mode of transportation, the “featherwagon”, is having an impact on the environment and their health. Eventually the owls realize that it would be better to use their wings rather than their vehicle to get places that they want to go.

Wings and Thing-a-majigs

In the second book, the owls go to school.

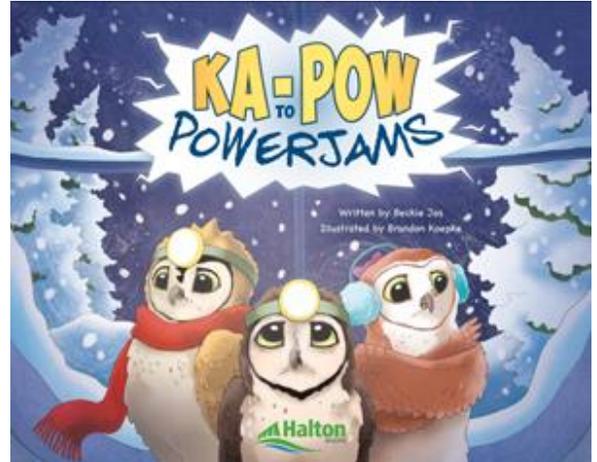
When the owls arrive on the first day, all of the featherwagons are idling in front of the school. Teacher, Mrs. Hootz, gives her students an assignment to design and build a “thing-a-majig” as an alternative to the polluting feather wagons. The owls come up with many fun ways to get to school without their featherwagons.



Ka-Pow to Powerjams

In the final story of the series, the owls learn about energy conservation and emergency preparedness.

When the owls have to survive a blackout they learn about how they can have an impact on the environment by conserving energy.



Curriculum Standards

Literacy

- CCSS.ELALiteracy.CCRA.R.[2&3]
- CCSS.ELALiteracy.CCRA.R.8
- CCSS.ELALiteracy.CCRA.RL.1.1
- CCSS.ELALiteracy.CCRA.RL.1.3
- CCSS.ELALiteracy.CCRA.RL.1.7
- CCSS.ELALiteracy.CCRA.RL.2. [1 & 3]
- CCSS.ELALiteracy.CCRA.RL.3.3
- CCSS.ELALiteracy.CCRA.RL.4. [2 & 4]
- CCSS.ELALiteracy.CCRA.SL.1. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.2. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.3.1

Science

- 5.1.4.A.1
- 5.1.4.D.1
- 5.2.2.C.1
- 5.2.4.C.1

Social Studies

- 6.3.4.A.3
- 6.3.4.B.1

Health/PE

- 2.1.2.C.2
- 2.1.2.D.[1 & 3]
- 2.1.4.C.[1 & 2]
- 2.1.4.D.[1 & 3]
- 2.2.2.B.2
- 2.2.4.A.1
- 2.2.4.B.[1 & 2]
- 2.5.2.C.[1 & 2]

What's Air Got to Do With It?

Grade(s): 2-4

Learning Objectives

Students will be able to:

- Identify the main causes, effects, and sources of air pollution
- Understand and explain the different properties of air

Overview



What is air? Why is it important? Students will participate in a series of activities and demonstrations that will be used to teach about the scientific properties of air.

Demonstration #1 – Air Takes up Space

If we cannot see the air, how do we know that it is even there? This two part demonstration will show students that air is not only all around us but is interacting with every surface that it touches.

Demonstration #2 – Air has Mass

How can we tell that air has mass? It doesn't feel like it does. Through this demonstration the students will see how we can tell that air does indeed have mass.

Demonstration #3 – Air exerts Pressure

How do we know that air is interacting with objects that it surrounds? Through this set of demonstrations the students can see firsthand that air is exerting pressure on the objects that it touches

Curriculum Standards

Science

- 5.1.4.B.1
- 5.1.4.D.1
- 5.4.4.E.1
- 5.4.6.F.1

Physical Education, Health & Safety

- 2.1.4.A.1
- 2.1.4.C.[1-2]
- 2.1.4.D.[1 & 3]
- 2.1.6.C.2
- 2.1.6.D.3
- 2.2.4.B.[2 & 3]
- 2.2.6.B.1
- 2.2.6.D.2
- 2.2.6.E.2

Air Quality Experiment

Grade(s): 2-6

Learning Objectives

Students will be able to:

- Define air pollution
- Describe what makes up air pollution
- Explain the scientific method

Overview

How clean is the air you are breathing right now? How about the air at home? That is what students will find out in this lesson!

Students will create air quality testers that they can hang at home or at school. The air testers are hung and monitored for a week. Students will look for air pollution residue on the cards. Students will chart and graph their findings.

**All supplies needed to conduct this experiment are provided.*

Curriculum Standards

Science

- 5.1.4.B.1
- 5.1.4.D.1
- 5.4.4.E.1
- 5.4.6.F.1

Physical Education, Health & Safety

- 2.1.4.A.1
- 2.1.4.C.[1-2]
- 2.1.4.D.[1 & 3]
- 2.1.6.C.2
- 2.1.6.D.3
- 2.2.4.B.[2 & 3]
- 2.2.6.B.1
- 2.2.6.D.2
- 2.2.6.E.2



Outdoor Air Quality Awareness Program

Grade(s): ALL

[*Sustainable Jersey for Schools Action](#)

Learning Objectives

Students will be able to:

- Explain levels of Air Quality and what they mean

Overview

Students will learn all about the Air Quality “Flag Program”, designed and implemented by the US Environmental Protection Agency, which indicates the air pollution levels around the school to let students, faculty and parents know what to expect in the way of air quality for the day.

This lesson can also be a stepping stone to implementing a flag program at your school. Staff will assist you in the implementation and set-up of the program, assist with the information outreach to students, staff, and parents.

Setting up a program to inform vulnerable populations within your school community will also make your school eligible for points in the Sustainable Jersey for Schools Program. For more information about this program please feel free to follow the link at the top of this page.

Curriculum Standards

Life & Career Skills

Elementary

- 9.1.4.A.1
- 9.1.4.A.5
- 9.1.4.B.1

Middle School

- 6.3.8.C.1
- 9.1.8.A.2
- 9.1.8.A.4
- 9.1.8.C.3
- 9.1.8.D.3

High School

- 9.1.12.B.1
- 9.1.12.B.3
- 9.1.12.C.1
- 9.1.12.C.[4&5]

 green	Green means air quality is good.
 yellow	Yellow means air quality is acceptable.
 orange	Orange means air quality is unhealthy for sensitive groups -- people with lung disease such as asthma, children, and older adults.
 red	Red means air quality is unhealthy.
 purple	Purple means air quality is very unhealthy.

Clean Air Week Challenge

Grade(s): ALL

*Sustainable Jersey for Schools Action

Learning Objectives

- Describe the importance of keeping the air clean at school
- Define and use alternative forms of transportation such as carpooling, walking, bicycling



Overview

Clean Air Week challenges students, parents and faculty to reduce this impact by pledging to carpool, walk, ride the bus to school, and reduce idling every day for a week.

It can also be a way to improve air quality around the school, raise awareness of the harmful impacts of idling and "single occupancy vehicle" use (excess CO2 emissions).

A "Clean Air Week Challenge" creates a friendly competition at the school, by classrooms, or grade level, school bus, or the school as a whole to see who is a "Clean Air Champion".

Sample activities include:

- Alternative Transportation Pledges
- Anti-Idling Education/Awareness Efforts
- Public Service Announcements
- Poster and Lawn Awareness Signs
- Fill the Bus Campaign
- School Bus Driver Appreciation
- Walk/Bike to School Events (walking districts)
- Bicycle and Pedestrian Safety Presentations

Curriculum Standards

Life & Career Skills

Elementary

- 9.1.4.A.1
- 9.1.4.A.5
- 9.1.4.B.1

Middle School

- 6.3.8.C.1
- 9.1.8.A.2
- 9.1.8.A.4
- 9.1.8.C.3
- 9.1.8.D.3

High School

- 9.1.12.B.1
- 9.1.12.B.3
- 9.1.12.C.1
- 9.1.12.C.[4&5]

**Note: Extra lessons and presentations performed during this event will impact the Curriculum Standards*

Anti-Idling Education Program

Grade(s): ALL

Learning Objectives

Students will be able to:

- Define vehicle idling
- Explain how vehicle idling can impact them and their community
- Develop strategies to improve air quality at the school



Overview

Vehicle idling happens everywhere- at school, home, and the store. Idling cars, trucks, school buses, public and private transportation buses, and off-road construction vehicles/equipment all contribute to the degradation of local air quality. Current regulations limit engine idling for both diesel and gasoline vehicles to three minutes with limited exceptions.



The Anti-Idling Education Program begins with a “Jeopardy” style game for students to learn about idling, its impacts, and alternatives.

This initial lesson may be followed up with the activities outlined on the next page.

Curriculum Standards

Life & Career Skills

Elementary

- 9.1.4.A.1
- 9.1.4.A.5
- 9.1.4.B.1

Middle School

- 6.3.8.C.1
- 9.1.8.A.2
- 9.1.8.A.4
- 9.1.8.C.3
- 9.1.8.D.3

High School

- 9.1.12.B.1
- 9.1.12.B.3
- 9.1.12.C.1
- 9.1.12.C.[4&5]

Anti-Idling Education Activities

Idling Audit

Using stopwatches and tally sheets, students conduct a week long observation and data collection of the number of vehicles idling beyond NJ's 3 minute idling law outside of their school.

The data collected in the school pick-up and drop off zones establishes a baseline of information that can be used to prior to beginning a school or community wide education/awareness program.



Following education/awareness efforts, students will conduct a follow up audit to see if idling behavior has changed.

Student can present this information to the school board, PTO, or municipal body.

Anti-Idling Design-a-Sign

Students are engaged to design a custom sign, to communicate New Jersey's "No Idle" law.

The custom sign will be produced by goHunterdon, free of charge, for installation at your school.

**Schools may request an official New Jersey anti-idling sign, at no cost, as well.*



Greenhouse Gases

A greenhouse gas is a gas that absorbs and traps heat. The primary greenhouse gases that make up the Earth's atmosphere are; water vapor, carbon dioxide, methane, nitrous oxide and ozone.

Without greenhouse gases in the atmosphere the average temperature on the Earth's surface would be 0 °F. However, too high a concentration of these chemicals in the atmosphere causes the planet to become warmer.

Many scientists in the field of meteorology and weather science predict that due to increases in greenhouse gases in our atmosphere, the Earth's surface temperature could exceed historical limits by 2047.

In the lessons that follow students will learn about greenhouse gases, how they work, how they impact the temperature of our planet, and what can be done to reduce greenhouse gas emissions.



Reading Series – “Why are the Ice Caps Melting?”

Grade(s): 1-3

Learning Objectives

Students will be able to:

- Discuss greenhouse gases and how they impact our planet.

Overview

This book looks at changes to the planet and what this means for life on Earth. The planet is getting warmer, but what is causing it? Is it a natural fluctuation of the planet? Do humans have something to do with it?

Following the reading of the book aloud, students will participate in a “Memory Game” that will require them to remember and employ information from the book.

Curriculum Standards

Literacy

- CCSS.ELALiteracy.CCRA.R.[2&3]
- CCSS.ELALiteracy.CCRA.R.8
- CCSS.ELALiteracy.CCRA.RL.1.1
- CCSS.ELALiteracy.CCRA.RL.1.3
- CCSS.ELALiteracy.CCRA.RL.1.7
- CCSS.ELALiteracy.CCRA.RL.2. [1 & 3]
- CCSS.ELALiteracy.CCRA.RL.3.3

Science

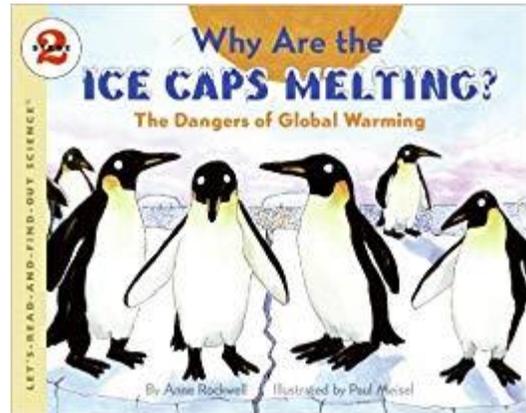
- CCSS.ELALiteracy.CCRA.RL.4. [2 & 4]
- CCSS.ELALiteracy.CCRA.SL.1. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.2. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.3.1
- 5.1.4.A.1
- 5.1.4.D.1
- 5.2.2.C.1
- 5.2.4.C.1

Social Studies

- 6.3.4.A.3
- 6.3.4.B.1

Health/PE

- 2.1.2.C.2
- 2.1.2.D.[1 & 3]
- 2.1.4.C.[1 & 2]
- 2.1.4.D.[1 & 3]
- 2.2.2.B.2
- 2.2.4.A.1
- 2.2.4.B.[1 & 2]
- 2.5.2.C.[1 & 2]



The Greenhouse Effect

Grade(s): 4-6

Learning Objectives

Students will be able to:

- Explain how a greenhouse works
- Explain what the greenhouse effect is and how it impacts our planet
- Name greenhouse gases and what we can do to limit their impact on our planet



Overview

How do greenhouse gases impact our climate? Students will create their own ecosystem by putting dirt, water and decorations into 2 jars. One jar will be covered. The other jar will be left uncovered. Using thermometers attached to the inside of the jar, participants will monitor the ecosystems for 10 minutes; recording the temperature inside each jar at 1 minute intervals.

Participants will learn about how a greenhouse works to trap heat and, by extension, will learn about how greenhouse gases work within our atmosphere to make the planet warmer.

Students will then brainstorm ideas on how to decrease the greenhouse effect inside their bottles as well as how we can decrease greenhouse gases in our environment.

**All supplies needed to participate in the experiment are provided.*

Curriculum Standards

Social Studies

- 6.1.4.A.15
- 6.1.4.B.5
- 6.1.4.B.9
- 6.1.4.C.12
- 6.1.4.C.15
- 6.1.4.C.16

Science

- 5.1.4.D.1
- 5.1.4.D.2
- 5.2.4.C.1
- 5.2.4.E.3

Life & Career Skills

- 9.1.4.A.[2 - 5]
- 9.1.4.C.1
- 9.1.4.D.1

Technology

- 8.2.4.A.1
- 8.2.4.B.2
- 8.2.4.B.3
- 8.2.4.G.3

Carbon Footprint

Grade(s): ALL

[*Sustainable Jersey for Schools Action](#)

Learning Objectives

Students will be able to:

- Explain a Carbon Footprint
- Why Carbon Footprints are important
- Understand how to identify/measure their own carbon footprint
- Start the process of estimating the school's carbon footprint



Overview

What is a Carbon Footprint? Why is it important to understand your impact on our planet? Students will learn the behaviors that contribute to own their Carbon Footprint by participating in an interactive activity. Following their calculation of their individual Carbon Footprint, students will calculate the Carbon Footprint for the class as a whole.

Optional Follow Up: the students can help conduct a school wide Carbon Footprint assessment to see where improvements could be made to make the school more sustainable. Data collected can be used to not only see the footprint the school has but also to help make small changes that can lead to big strides in helping to protect our planet. This data can also be used to see where the school can make changes to potentially save money and have an immediate impact on their students and staff.

Curriculum Standards

Social Studies

- 6.1.4.A.15
- 6.1.4.B.5
- 6.1.4.B.9
- 6.1.4.C.12
- 6.1.4.C.15
- 6.1.4.C.16

Science

- 5.1.4.D.1
- 5.1.4.D.2
- 5.2.4.C.1
- 5.2.4.E.3

Life & Career Skills

- 9.1.4.A.[2 - 5]
- 9.1.4.C.1
- 9.1.4.D.1

Technology

- 8.2.4.A.1
- 8.2.4.B.2
- 8.2.4.B.3
- 8.2.4.G.3

Sustainability

Sustainability is defined by the United Nations as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

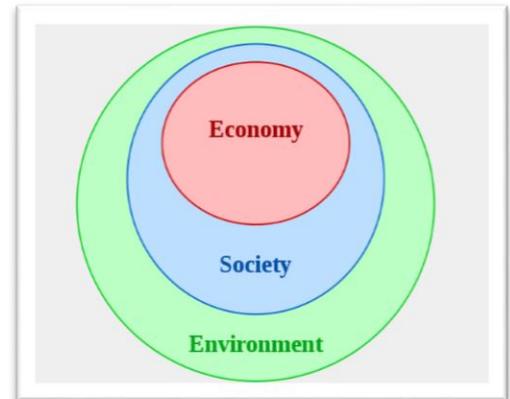
There are three (3) main pillars of sustainability that are interconnected and impact the success of one another:

- Environment
- Economy
- Social

Sustainability means reducing our harm on the environment and ultimately reversing the harm we have already caused.

A sustainable community is one that resembles a living system where all of the resources (human, natural, and economic) are renewed and in balance.

The lesson that follows explores these concepts and what it means to be a sustainable community.



Three “pillars of sustainability” in which both the economy and society are constrained by environmental limits.



Solving the Puzzle of Sustainability

Grade(s): 4-8

Learning Objectives

Students will learn:

- What sustainability means
- Why we need to work towards sustainability and how
- How different aspects of sustainability function



Overview

This classroom activity is designed to be highly engaging and interactive with students working in groups. Students will engage in a series of puzzles in which they will learn about the three pillars sustainability; Economic, Social, and Environmental. Within each of these categories students will work together to solve an issue or set of issues.

The activity will be set up in stations. Students will have a set amount of time at each station to work within their groups to attempt to solve the issue at each station. Following their work, we will have a larger group discussion about how they solved each problem and if/how that would lead to a more sustainable future.

Curriculum Standards

Social Studies

- 6.1.4.A.15
- 6.1.4.B.5
- 6.1.4.B.9
- 6.1.4.C.12
- 6.1.4.C.15
- 6.1.4.C.16

Science

- 5.1.4.D.1
- 5.1.4.D.2
- 5.2.4.C.1
- 5.2.4.E.3

Life & Career Skills

- 9.1.4.A.[2 - 5]
- 9.1.4.C.1
- 9.1.4.D.1

Technology

- 8.2.4.A.1
- 8.2.4.B.2
- 8.2.4.B.3
- 8.2.4.G.3

Alternative Fuels

Known as “non-conventional” and “advanced fuels”, alternative fuels are materials and substances that can be used as fuel that are other than traditional fossil fuels such as petroleum, coal, and natural gas.

Over the past several decades, there have been enormous strides in the development and implementation of alternative fuel sources to power motor vehicles. There are currently a number of vehicles that utilize these fuels and technologies.

These fuels include electric, biodiesel, hydrogen, compressed natural gas and propane.

Through the following lessons, students will be introduced to these alternative energy sources, specifically as they pertain to transportation.



Reading Series – Alternative Fuels

Grade(s): 1-3

Learning Objectives

Students will be able to:

- Explain how the burning of fossil fuels impacts our planet
- Describe an electric vehicle and how it works
- Identify a solar panel and explain how it works

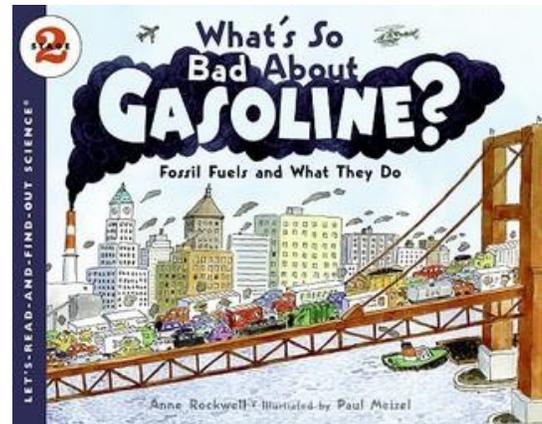
Overview

The reading series begins with students being introduced to a traditional fossil fuel, gasoline, and the impact that burning it has on our planet.

As the series continues, students are introduced to alternative forms of power, how they are currently used, and how they may be used for transportation in the future.

What's So Bad About Gasoline?

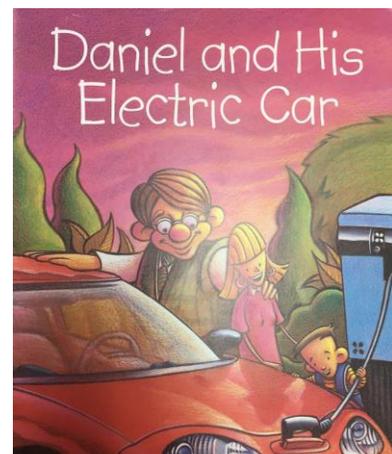
This first book in the series provides students with a basic understanding of the history of petroleum, its use around the world, and impacts to the environment.



Daniel and His Electric Car

Daniel and his family are trying to decide which type of vehicle to buy.

Following the reading of the book aloud, students will discuss electric vehicles as an alternative to traditional fossil fuel powered engines. Discussion will also include information on hybrid technology.

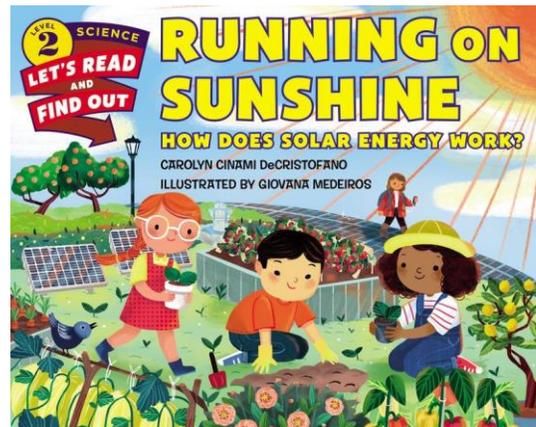


Running on Sunshine

Students will learn how solar energy and solar panels work and how solar technology is being integrated into our daily lives.

Discussion will include how solar energy can power electricity and electric vehicles.

This lesson provides a good base for understanding the technology employed in the Junior Solar Sprints program.



Curriculum Standards

Literacy

- CCSS.ELALiteracy.CCRA.R.[2&3]
- CCSS.ELALiteracy.CCRA.R.8
- CCSS.ELALiteracy.CCRA.RL.1.1
- CCSS.ELALiteracy.CCRA.RL.1.3
- CCSS.ELALiteracy.CCRA.RL.1.7
- CCSS.ELALiteracy.CCRA.RL.2. [1 & 3]
- CCSS.ELALiteracy.CCRA.RL.3.3

Science

- CCSS.ELALiteracy.CCRA.RL.4. [2 & 4]
- CCSS.ELALiteracy.CCRA.SL.1. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.2. [1 & 2]
- CCSS.ELALiteracy.CCRA.SL.3.1
- 5.1.4.A.1
- 5.1.4.D.1
- 5.2.2.C.1
- 5.2.4.C.1

Social Studies

- 6.3.4.A.3
- 6.3.4.B.1

Health/PE

- 2.1.2.C.2
- 2.1.2.D.[1 & 3]
- 2.1.4.C.[1 & 2]
- 2.1.4.D.[1 & 3]
- 2.2.2.B.2
- 2.2.4.A.1
- 2.2.4.B.[1 & 2]
- 2.5.2.C.[1 & 2]

Moving with STEM

As a precursor to the popular Junior Solar Sprints program students in grades K-5 can learn about transportation choice through the lens of STEM (Science, Technology, Engineering, and Mathematics) Education. Through these program students will work together to solve problems dealing with transportation and will work through the design and build process to develop solutions to the issues posed.



Transportation Structure Engineering

Grades: K-2

Learning Goals and Activities

- Develop and build a structure that can hold weight.
- Learn how different types of surfaces interact with objects moving over them
- Define friction

Overview

Exploring Ramps and Friction – Cars and ramps. Throughout this lesson students will play with different cars and a series of ramps that are coated in a different material. Students will be investigating the impact that these different surfaces have on their cars.

Bridge Building – Utilizing provided building materials students will construct a bridge that spans a 12" gap. Each bridge will be tested using weight to see how much the bridge can hold.



Curriculum Standards

Science

- 5.1.4.B.1
- 5.1.4.D.1
- 5.4.4.E.1
- 5.4.6.F.1

Physical Education, Health & Safety

- 2.1.4.A.1
- 2.1.4.C.[1-2]
- 2.1.4.D.[1 & 3]
- 2.1.6.C.2
- 2.1.6.D.3
- 2.2.4.B.[2 & 3]
- 2.2.6.B.1
- 2.2.6.D.2
- 2.2.6.E.2

Transportation Method Engineering

Grades: 2-5

Learning Goals and Activities

- Utilize the design process to create a working boat, airplane, or wind.
- Develop a solution to a posed problem

Overview

Will your boat float? - The goal of this activity is to have the boat that can carry the most cargo. Students will be provided with different materials to build their boat. Once built the boat will be placed in water and allowed to float. Weight will be added to see which boat is the best.

Airplane Cargo - Sure, everyone can make a paper airplane that will fly, but can that airplane transport cargo? Students will be provided with different types of paper and will need to build an airplane that holds \$0.10 in pennies. In this competition students will be judged on distance traveled.

Wind powered cars – Students will build a car that utilizes wind as its power source. Using provided materials students must create a vehicle that can travel the farthest using only the wind.

Curriculum Standards

Science

- 5.1.8.A.[1&2]
- 5.1.8.B.2
- 5.1.8.C.[2&3]
- 5.1.8.D.[2&3]
- 5.2.8.C.2
- 5.2.8.D.1
- 5.2.8.E.[1&2]

Life and Career Skills

- 9.1.8.A.[1&2]
- 9.1.8.C.[1-3]

Visual & Performing Arts

- 1.1.5.D.1
- 1.3.8.D.[1&2]
- 1.3.8.D.6

Technology

- 8.1.8.A.1
- 8.1.8.B.1
- 8.2.8.B.[1&3]
- 8.2.8.F.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3
- CCSS.Math.Content.6.G.A.4



Junior Solar Sprints

Grade(s) 6-8

Junior Solar Sprints is a competition based program in which students design, build and race a solar powered model car.

Junior Solar Sprints is a terrific S.T.E.M. (Science, Technology, Engineering, and Math) activity for your students and can be incorporated into the curriculum as an in class or after school project.

Students are provided with the basic materials required to build their race cars including the wheels, axels, gears, motors, and solar panels.

Beyond these materials, students can use anything they like to build their vehicle. The only two required materials that must be used are the solar panel and motor, everything else is fair game.

The culmination of the work done by the students throughout the year is the district race day that is held in May at a local Hunterdon County school.

Students from around the county who are participating in their local schools come together to compete and race their vehicles against one another. Student's cars are judged in five different categories: speed, craftsmanship, engineering, best use of recycled materials, and documentation portfolio. Winners in each of these categories are invited to the JSS regional competition between the winners from the other five (5) regional races.



Curriculum Standards

Science

- 5.1.8.A.[1&2]
- 5.1.8.B.2
- 5.1.8.C.[2&3]
- 5.1.8.D.[2&3]
- 5.2.8.C.2
- 5.2.8.D.1
- 5.2.8.E.[1&2]

Life and Career Skills

- 9.1.8.A.[1&2]
- 9.1.8.C.[1-3]

Visual & Performing Arts

- 1.1.5.D.1
- 1.3.8.D.[1&2]
- 1.3.8.D.6

Technology

- 8.1.8.A.1
- 8.1.8.B.1
- 8.2.8.B.[1&3]
- 8.2.8.F.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3
- CCSS.Math.Content.6.G.A.4

Teacher Workshops

Workshops are designed to provide teachers with practical information to allow them to help student teams to participate in the Junior Solar Sprints Program (JSS).

The workshop offers an overview of the JSS program, timelines for preparing student teams, and details/benefits of the lesson offerings.



The workshops will include a hands on opportunity for teachers to design and build a race car to familiarize themselves with the vehicle components, as well as the design and build process.

Other topics will include Judging Criteria, Progress Journal, Vehicle Requirements, Testing, Race Day Rules and Regulations. There will be plenty of time for Q & A, and a discussion of Best practices/Lessons Learned.

Workshops are offered in October and January. Participation is strongly recommended. Workshop invitations with specific dates will be sent via email.

The teacher workshops are informative and fun! Please plan to participate.



NOTE: If you are not available to attend one of the scheduled workshops or would like some more personalized service we can also arrange for a workshop to be conducted with you individually.

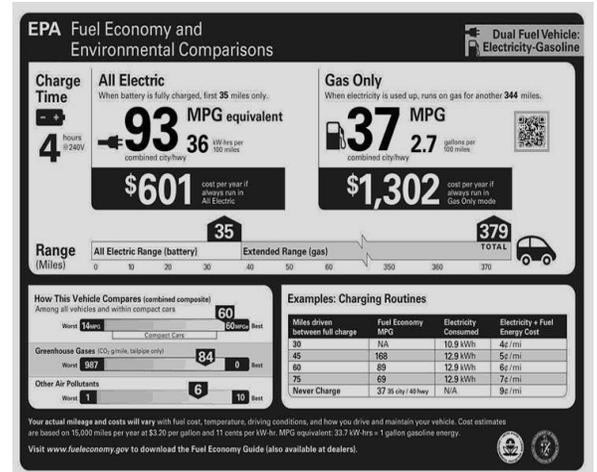
Drive it Green

Grade(s): 5-8

Learning & Activity Goals/Objectives

Students will be able to:

- Discuss fuel efficiency and what it means for the environment
- Understand how transportation choices impact the environment
- Understand the types of fuel that can power motor vehicles



Overview

Students start out the lesson by looking at a list of seven (7) reasons that a person might consider when purchasing a vehicle (color, style, brand name, etc.)

Students are then broken out into teams and directed to select a vehicle (sports car, sedan, pick-up truck, etc) that they will utilize for the remainder of the class period. Students select their vehicle prior to being given any further information about the activity.

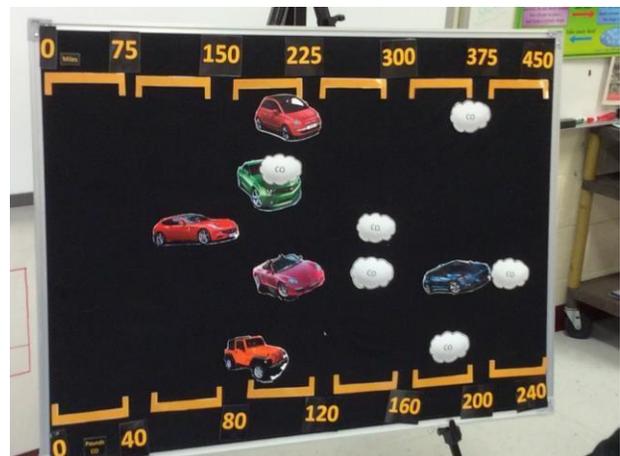


Only after the student teams have selected their vehicles are they provided with a “window sticker” which will give them additional information, such as gas mileage, EPA ratings, etc.

Students are then given a “mock allowance” of \$30 to spend on fuel for their vehicle. Then are then asked to calculate how far they will be able to travel using the \$30 worth of fuel. Students will also calculate how much pollution their vehicle will generate using \$30 worth of fuel.

Finally, the teams compete against each other on a “race board”, placing their vehicles along a chart to how far their vehicle traveled on \$30 worth of gas and also how much CO2 their car emitted.

Students will discuss alternative fuels and more sustainable forms of transportation.



Curriculum Standards

Health & Physical

Education

Grade 6

- 2.1.6.A.2
- 2.1.6.D.1
- 2.2.6.A.1
- 2.2.6.B.1
- 2.2.6.D.2

Grade 8

- 2.1.8.A.2-3
- 2.1.8.C.2
- 2.2.8.D.1-2

Science

- 5.1.8.A.1
- 5.1.8.A.2
- 5.1.8.C.1
- 5.1.8.C.2
- 5.1.8.D.1
- 5.2.8.C.2

Technology

- 8.2.4.B.3

Life & Career Skills

- 9.1.8.A.2
- 9.1.8.B.[1 & 2]
- 9.1.8.D.3

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3

Social Studies

- 6.3.8.A.1

Basics of Designing & Building Your Model Car

Grade(s): 6-8

Learning & Activity Goals/Objectives

- What are the basic design strategies
- What are the best materials for strength vs. weight
- How does the structure of my vehicle impact its durability



Overview

Using a continuous feedback loop of:

Ask -> Imagine -> Plan -> Build -> Test and Evaluate, students will learn the steps necessary to successfully build a working model solar vehicle. This process will be important as they move through the stages of building their Solar Sprint cars and developing not only a working vehicle but be competitive on race day.

Students will participate in a building exercise that will engage them in the building and design of shapes that could help them improve the overall strength of their vehicles without adding weight.

Curriculum Standards

Health & Physical Education

- 2.1.8.A.3
- 2.2.8.A.2
- 2.2.8.B.2
- 2.2.8.C.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3
- CCSS.Math.Content.6.G.A.4

- CCSS.Math.Content.7.G.B.[1&6]
- CCSS.Math.Content.8.G.B.7

Science

- 5.2.6.E.3
- 5.1.8.A.2
- 5.1.8.B.[1&2]
- 5.1.8.D.[1-3]

Technology

- 8.2.8.B.[1-3]
- 8.2.8.E.1
- 8.2.8.F.1

Life & Career Skills

- 9.1.8.A.1
- 9.1.8.A.4
- 9.1.8.B.1
- 9.1.8.C.[1-3]

Visual Arts

- 1.3.8.D.1

Introduction to Gears & Gear Ratios

Grade(s): 6-8

Learning & Activity Goals/Objectives

- What is a gear and how does it work
- How do you determine a gear ratio
- What is torque vs. speed and how do they impact the way gears operate

Overview

What is a gear? How does it work? How does the size of the gear and different gear arrangements impact the overall performance of the gears?

In this lesson we answer all of these questions and more.

Students will be introduced to gears, and gear ratios.

Students will also learn about torque and speed and how to determine if the gear ratio that they are using is utilizing either of these.

The second part of the lesson, after the students are familiarized with gear ratios, focuses on how to incorporate these concepts into their race car. We will discuss how wheel size directly impacts the gear ratio needed to move the vehicle and how to best find the proper ratio to use.



Curriculum Standards

Health & Physical

Education

Grade 6

- 2.1.6.A.2
- 2.1.6.D.1
- 2.2.6.A.1
- 2.2.6.B.1
- 2.2.6.D.2

Grade 8

- 2.1.8.A.2-3
- 2.1.8.C.2
- 2.2.8.D.1-2

Science

- 5.1.8.A.1
- 5.1.8.A.2
- 5.1.8.C.1
- 5.1.8.C.2
- 5.1.8.D.1
- 5.2.8.C.2

Technology

- 8.2.4.B.3

Life & Career Skills

- 9.1.8.A.2
- 9.1.8.B.[1 & 2]
- 9.1.8.D.3

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3

Social Studies

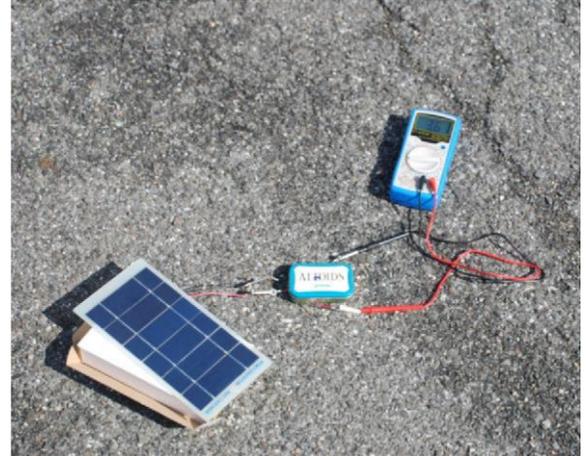
- 6.3.8.A.1

Powering your Car: Solar Power

Grade(s): 6-8

Learning & Activity Goals/Objectives

- How does the sun move across the sky
- How does a solar panel work
- Does the angle of the solar panel relative to the positioning of the sun impact the efficiency of the panel



Overview

Does the angle of the solar panel really impact the power output? This session will review the basics when it comes to solar energy generation; the distance from the earth to the sun, the path of the sun across the sky, how a solar panel works, and how to choose the best angle when looking to use solar power on a stationary object.

Utilizing a solar panel, a multimeter and a protractor students will investigate how the angle of the solar panel, relative to the sun's position, impacts the output of the solar panel.



Curriculum Standards

Health & Physical Education

- 2.1.8.A.3
- 2.2.8.A.2
- 2.2.8.B.2
- 2.2.8.C.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3

Science

- 5.1.8.A.2
- 5.1.8.B.[1&2]
- 5.1.8.D.[1-3]
- 5.2.8.C.2
- 5.2.8.D.2
- 5.2.8.E.1
- 5.4.8.C.3

Life & Career Skills

- 9.1.8.A.1
- 9.1.8.A.4
- 9.1.8.B.1
- 9.1.8.C.[1-3]

Aerodynamics

Grade(s): 6-8

Learning & Activity Goals/Objectives:

- What is Aerodynamics? How does it impact my vehicle?
- How can I make aerodynamics work for me



Overview

How does the aerodynamics, or shape, of an object moving through the air increase or decrease the friction (drag) on that object? This lesson explores the four (4) forces of aerodynamics: Lift, Weight, Thrust, and Drag and how each works with or against a vehicle.

For the experimental portion of this lesson students will be asked to design, using foam pieces, different shaped objects that will be put into a homemade wind tunnel to test how they interact with the air. Using a spring scale students will attach their shapes into the wind tunnel and record the amount of drag that is being placed on their shapes.



Curriculum Standards

Health & Physical Education

- 2.1.8.A.3
- 2.2.8.A.2
- 2.2.8.B.2
- 2.2.8.C.1

Technology

- 8.2.8.B.[1-3]

Science

- 5.2.6.E.3
- 5.1.8.A.2
- 5.1.8.B.[1&2]
- 5.1.8.D.[1-3]
- 5.2.8.E.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3
- CCSS.Math.Content.6.G.A.4
- CCSS.Math.Content.7.G.B.6
- CCSS.Math.Content.8.G.B.7

At the Race Line

Grade(s): 6-8

Learning Objectives

- Why do we attach our cars to a race line? What is the race line and what does it do?
- How do I attach and un-attach my vehicle easily from the race line.



Overview

Attaching race cars to the race line is a consistent challenge for students on race day. Student vehicles must attach (and remain attached or be disqualified) to a 60# fishing line (the guidewire) that stretches the length of the track. This lesson and practice session will help your students feel more confident and understand what they need to do prior to race day.

Utilizing simply designed balloon powered cars with different race line attachments students will have the opportunity to experiment with different set-ups to find one that would work well with the design of their vehicle.

Curriculum Standards

Health & Physical Education

- 2.1.8.A.3
- 2.2.8.A.2
- 2.2.8.B.2
- 2.2.8.C.1

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.NS.B.3
- CCSS.Math.Content.6.G.A.4
- CCSS.Math.Content.7.G.B.6
- CCSS.Math.Content.8.G.B.7

Science

- 5.2.6.E.3
- 5.1.8.A.2
- 5.1.8.B.[1&2]
- 5.1.8.D.[1-3]
- 5.2.8.E.1

Technology

- 8.2.8.B.[1-3]

Life & Career Skills

- 9.1.8.A.1
- 9.1.8.A.4
- 9.1.8.B.1
- 9.1.8.C.[1-3]

What to Expect on Race Day

Grade(s): 6-8

Lesson Objectives

- Making the students feel comfortable with what will be happening on Race Day
- Providing and last minute fixes, and tweaks to vehicles.



Overview

This workshop style session can be tailored to the specific needs of your students.

The lesson will provide your students' with specific information about what to expect on race day, what to do, where to go, and how the event works. The main goal of this lesson is to make sure your students and their vehicles are ready to race on race day.

Frequent requests at these sessions include soldering/wire connections, vehicle inspection to provide useful tips for students, test race line to test their vehicles, and a variety of last minute questions.



Curriculum Standards

Mathematics

- CCSS.Math.Practice.MP4
- CCSS.Math.Practice.MP7
- CCSS.Math.Content.6.G.A.4
- CCSS.Math.Content.7.G.B.[1&6]
- CCSS.Math.Content.8.G.B.7

Visual & Performing Arts

- 1.1.5.D.1
- 1.3.8.D.[1&2]

Science

- 5.1.8.A.[1&2]
- 5.1.8.B.2
- 5.1.8.C.[2&3]
- 5.1.8.D.[2&3]
- 5.2.8.C.2
- 5.2.8.D.1
- 5.2.8.E.[1&2]

Life & Career Skills

- 9.1.8.A.[1&2]
- 9.1.8.C.[1-3]

Technology

- 8.1.8.A.1
- 8.1.8.B.1
- 8.2.8.B.[1&3]
- 8.2.8.E.1
- 8.2.8.F.1