



Fairchild Challenge at Phipps

2019 – 2020 High School Challenges In-Depth

Challenge I: Art and Writing

“Wish You Were Here”

For individuals or groups | Maximum points: 200 (100 points/submission)

Due at Phipps: Friday, October 4 by 5 p.m.

Your Challenge:

“If one truly loves nature one finds beauty everywhere.”
- Vincent van Gogh in a letter to Theo van Gogh, 1847

Vincent van Gogh often used nature as inspiration for his artwork. Some of his famous nature scenes include *Wheat Field with Cypresses*, *Olive Trees*, and *Irises*. Along with painting these breathtaking natural scenes, he also wrote many letters to his brother, Theo van Gogh describing them in vivid detail. For this challenge, choose a favorite nature spot or scene from your own life and write a one-page letter to a friend describing it. Use imagery and descriptive language to “paint a picture” with your words. Pair the letter with an original painting or drawing of the scene, using van Gogh’s style of bold brushstrokes and contrasting colors if you wish.

The art piece can be created using any medium, but must be two-dimensional. The finished art work should be no larger than 12”x16”. Letters should be typed or neatly hand-written in first-person and should be no longer than one page, single-spaced with 1-inch margins.

Resources: The following list of online resources may be used when preparing your entry:

- *The Letters of Vincent van Gogh* by Vincent van Gogh and Mark W. Roskill
- [Van Gogh in Bloom, Phipps 2019 Summer Flower Show](#)

Entry Requirements: Deliver to high school program coordinator at Phipps in person or via certified mail (electronic submission is not accepted):

- Challenge Entry Form
- Create a two-dimensional artwork of a natural scene, no larger than 12”x16”
- Write a one-page first-person letter to a friend describing your natural scene. Letter may be typed or neatly hand-written and should be single spaced with 1-inch margins.
- Please include the school name and a list of the students involved in the project.

- Maximum Entry: Two letters, each with an accompanying artwork

School Submits: Two letters with two accompanying art pieces, Challenge Entry Form

Select student artwork will be displayed in the Center for Sustainable Landscapes Gallery.

State Standards:

9th and 10th Grades

- CC.1.4.9-10.A Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
- CC.1.4.9-10.B Write with a sharp distinct focus identifying topic, task, and audience.
- CC.1.4.9-10.D Organize ideas, concepts, and information to make important connections and distinctions; use appropriate and varied transitions to link the major sections of the text; include formatting when useful to aiding comprehension; provide a concluding statement or section.
- CC.1.4.9-10.E Write with an awareness of the stylistic aspects of composition. • Use precise language and domain-specific vocabulary to manage the complexity of the topic. • Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.
- CC.1.4.9-10.F Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.

11th and 12th Grades

- CC.1.4.11-12.A Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
- CC.1.4.11-12.B Write with a sharp distinct focus identifying topic, task, and audience.
- CC.1.4.11-12.E Write with an awareness of the stylistic aspects of composition. • Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic. • Establish and maintain a formal style and objective tone while attending to the norms of the discipline in which they are writing.
- CC.1.4.11-12.F Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.
- 9.1.12.E Delineate a unifying theme through the production of a work of art that reflects skills in media processes and techniques.
- 9.1.12.F Analyze works of arts influenced by experiences or historical and cultural events through production, performance or exhibition.
- 9.2.12.A Explain the historical, cultural and social context of an individual work in the arts.

Keystone Final Assessments:

- C.IE.1.1 Write informative and explanatory pieces that describe, explain, or summarize information or ideas.
- C.IE.2.1 Revise writing to improve style, meaning, word choice, and sentence variety.
- C.IE.3.1 Use conventions of standard written language.

Challenge 2: Global Challenge – Field Data Collection

“Shade our Schools – Leaves Are Cool!”

For groups | Maximum Points: 200

Due at Phipps: Friday, November 15 by 5 p.m.

Fairchild Global Challenge: The Fairchild Global Challenge is distributed to the many Fairchild Partner Sites (such as Phipps) by the Fairchild Tropical Botanic Garden (FTBG) in Miami, Florida. Because this challenge is posed to Fairchild Partner Sites around the world, it provides the opportunity for students to have a wider and stronger impact. In this year’s Global Challenge, students from around the world will collect data that will be used by a scientist at the University of Miami.

Your Challenge: In order to understand and predict how plant species are affected by global warming, we need to understand how temperature impacts a plant’s ability to carry out its basic functions. Despite rising ambient temperatures, plants are able to use different characteristics and mechanisms to regulate their leaf temperature. This year, students will help a scientist from the University of Miami conduct a series of experiments to understand how leaf size, shape and color affect leaf temperature. Students will collect data and create an illustrated field journal documenting their observations.

Resources: The following list of online resources may be used when preparing your entry:

- [Types of plants \(video\)](#)
- [Basic Leaf ID Information](#)
- [How to conduct a biodiversity survey](#)
- [ETEKCITY Non-Contact Thermometer](#) (Phipps will have some thermometers available to borrow.)
- [Shade Our Schools Protocol](#), [Shade Our Schools Data Sheets](#)

Entry Requirements: Deliver to high school program coordinator at Phipps in person or via certified mail (electronic submission is not accepted):

- Challenge Entry Form
- Data Requirements:
 - Collect temperature data for leaves of different colors*, different shapes and different sizes as per Shade Our Schools protocol
 - Students must collect temperature measurements for **at least** three leaves per variable (color, shape and size)
 - Data sheets must be filled out completely (including the “notes” section)
 - Data sheets must include the temperature measurements for the reference
 - Complete data set must be submitted with Field Journal

- On-time entry submission (late entries may not receive points)
- Field Journal Requirements:
 - Title page of field journal must clearly indicate school name, teacher name(s), and how many students or classes were involved in the collection of data and the creation of the journal
 - Field journal must include a combination of text, labeled drawings, photos and graphs summarizing the results
 - Field journal must include an analysis of the results and conclusions
 - Field journal must be 8.5" x 11" or less, and 12 double sided pages or less, excluding the front and back cover pages. Pages cannot include additional attachments or be used as pockets
 - On time entry submission (late entries may not receive points)
- Maximum Entry: One Field Journal with data sheet

** Leaves that have stopped photosynthesizing and have changed color due to the season change **should not be used** for color comparison. Students can compare leaves that are light and dark green, or other colors as long as they are photosynthesizing and otherwise healthy.*

School submits: Challenge Entry Form, One Field Journal, Data Sheet (Google Sheet provided by FTBG or hardcopy)

State Standards:

9th and 10th Grades

- CC.3.5.9-10.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- CC.3.5.9-10.D Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
- CC.3.6.9-10.F Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

11th and 12th Grades

- 3.1.12.A1 Relate changes in the environment to various organisms' ability to compensate using homeostatic mechanisms.
- 3.1.12.C2 Analyze how genotypic and phenotypic variation can result in adaptations that influence an organism's success in an environment.
- 3.1.12.C4
 - Examine the status of existing theories.
 - Evaluate experimental information for relevance and adherence to science processes.
 - Judge that conclusions are consistent and logical with experimental conditions.
 - Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.

- Communicate and defend a scientific argument.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- CC.3.5.11-12.D Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
- CC.3.6.11-12.F Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Keystone Final Assessment:

- BIO.A.4.2 Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.
 - BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
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Optional Challenge: Video

“Set the Stage for Air Quality”

For individuals or groups

Note: Entries in this challenge will not receive points, but instead will be considered for the Patti Burns Prize in Excellence in Communication and Media.

Due at Phipps: Friday, January 10 by 5 p.m.

Your Challenge:

The air that surrounds us is a vital component of the ecosystem and has a direct impact on our health. In humans, poor air quality can lead to respiratory, cardiovascular and nervous system complications as well as other chronic diseases. While the Pittsburgh region has come a long way from the notorious smog of the industrial revolution, Pittsburgh still struggles with air quality issues today. In fact, according to the American Lung Association’s 2019 State of the Air report, our area’s air quality has worsened in the categories of ozone and short- and long-term particulate matter over the last year (https://www.lung.org/local-content/_content-items/about-us/media/press-releases/air-quality-in-pittsburgh.html). Air quality is affected by many different sources, some of which are more obvious than others.

In this challenge, create a video skit that draws attention to an air quality issue that is often overlooked. Choose one of the following topics and research the issue to learn more about

it. Then, using characters and a plot, create a short skit that draws attention to the topic and concludes with an action or lesson that viewers can use to take action.

- **Idling:** Pennsylvania has laws against idling diesel vehicles, especially school buses. Research these laws as well as the dangers associated with diesel pollution. You can continue your research by making observations at school. Are there signs posted that prohibit idling? Do buses and other diesel vehicles obey the signage? What can viewers of your video do to make a difference when it comes to idling?
- **Outdoor Activity:** Outdoor athletes are particularly sensitive to air pollution. Research why this is, and how their exposure/risk are increased. What are some ways that athletes can protect themselves? You can continue your research by learning more from teams and coaches at your school. Are there procedures that they follow on “bad air days?” What can viewers of your video do or learn when it comes to outdoor activity and air quality?
- **Indoor Air Quality:** Although humans spend an increasing amount of time indoors, we don’t often think about the quality of the air inside our buildings. Research indoor air quality and some sources of indoor air pollution. Continue your research by looking for potential sources of air pollution inside your school. Are there actions you, your fellow classmates and school staff members can take to improve indoor air quality? What can viewers of your video learn or do?

This challenge was created in collaboration with Pittsburgh’s Group Against Smog and Pollution (GASP).

Select entries may be featured during the [2020 One Health One Planet™ Symposium, “One Health and the Air We Breathe.”](#) which will be held in April. This two-day conference will bring together experts and leaders from across the country to discuss the critical issue of air quality.

Resources: The following list of online resources may be used when preparing your entry:

- [Group Against Smog and Pollution \(GASP\)](#)
- [EPA Air Topics](#)
- [AirNow](#)
- [Clean Air Council](#)
- [Southwestern Pennsylvania Air Quality Partnership, Inc.](#)

Entry Requirements: Deliver to high school program coordinator at Phipps in person or via mail or email:

- Challenge Entry Form
- Maximum of two videos, each no longer than 4 minutes
- Include a works cited page (in either MLA or APA format), citing at least two sources. Works cited can be included in video or submitted in a separate document.
- Include the school name and the participating students’ names in the credits of the video

School Submits: Maximum of two videos, Challenge Entry Form

State Standards:

- 10.2.9.E Explain the interrelationship between the environment and personal health.
- 10.4.9.C Analyze factors that affect the responses of body systems during moderate to vigorous physical activities.
- 4.5.10.C Analyze real-world data and explain how point and non-point source pollution can be detected and eliminated.
- 4.5.10.E Describe the impact of occupational exposure to pollutants.
- 4.1.12.E Research solutions addressing human impacts on ecosystems over time.
- 4.5.12.C Analyze the costs and benefits of means to control pollution.
- 4.5.12.E Analyze how consumer demands promote the production of pollutants that affect human health.
- 10.2.12.E Analyze the interrelationship between environmental factors and community health.

Keystone Final Assessment:

- BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).
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Challenge 3: Sustainable Design

“Green Grub on the Go”

For individuals or groups | Maximum points: 200

Due at Phipps: Friday, February 14 by 5 p.m.

Your Challenge:

Have you ever thought about starting your own food stand or truck? It’s time for you to make your mark on the Pittsburgh food scene - sustainability style! When something is sustainable, it considers people, the planet and economic feasibility. Your task is to consider these elements and design your very own food stand or truck. Create a visual design of your business, either digitally or neatly by hand. Along with this visual representation, please include a 1-2 page written description of your truck, stand or cart. You must address what details make your business sustainable and why. Some food-related environmental issues include greenhouse gas emissions (from livestock, food transport, processing, packaging and refrigerating), sustainable land management, nutrient runoff, food waste, and packaging. Social food issues include food security and availability, affordability, culture and health/nutrition.

Include the following in your design:

1. Specify whether it will be a truck, cart or stand (keep in mind energy usage and source, type of food served and travel distance).
2. Create a menu, considering the nutrition, sourcing, and type of food.
3. Calculate a budget for your business (some expenses may include transportation, upkeep, food, labor and equipment.)
4. Coin a catchy and creative name for your truck or stand!

The design can be organized into a report or presented as a poster, no larger than 18" x 22".

Resources: The following list of online resources may be used when preparing your entry:

- [Johns Hopkins Center for a Livable Future's FoodSpan](#)
- [Sustainable Agriculture Research and Education \(SARE\)](#)

Entry Requirements: Deliver to high school program coordinator at Phipps in person or via certified mail (electronic submission is not accepted):

- Challenge Entry Form
- Create a visual design (either digitally or by hand) of your food truck, cart or stand.
- Write a short description of your business that is no longer than 1-2 pages with 1-inch margins.
- Clearly state the specific details that make your truck or stand sustainable. Include a menu, budget and name.
- Include the school name and the participating students' names in the credits of the video

School Submits: Either 1 report or 1 poster no larger than 18" x 22", Challenge Entry Form

State Standards:

- 6.1.12.C Analyze the opportunity cost of decisions made by individuals, businesses, communities, and nations.
- 6.2.12.D Predict how changes in supply and demand affect equilibrium price and quantity sold.
- 11.3.9.A Explain how scientific and technological developments enhance our food supply (e.g., food preservation techniques, packaging, nutrient fortification).
- 11.3.12.A Analyze how food engineering and technology trends will influence the food supply.
- 11.3.12.C Evaluate sources of food and nutrition information.
- 11.3.12.E Analyze the breakdown of foods, absorption of nutrients and their conversion to energy by the body.
- 11.3.12.F Evaluate the application of nutrition and meal planning principles in the selection, planning, preparation and serving of meals that meet the specific nutritional needs of individuals across their lifespan.
- 11.3.12.G Analyze the relevance of scientific principles to food processing, preparation and packaging.
- 13.4.11.A Analyze entrepreneurship as it relates to personal career goals and corporate opportunities.

- 13.4.11.B Analyze entrepreneurship as it relates to personal character traits.
 - 13.4.11.C Develop a business plan for an entrepreneurial concept of personal interest and identify available resources, such as, but not limited to:
 - Community based organizations (that is chambers of commerce, trade/technical associations, Industrial Resource Centers)
 - Financial institutions
 - School-based career centers Small Business Administration services (that is SCORE, Small Business Development Centers, Entrepreneurial Development Centers)
 - Venture capital
 - 15.5.12.A Analyze personal choices in preparation for entrepreneurship.
 - 15.5.12.D Create a business plan using appropriate data to support the business concept.
 - 15.5.12.L Analyze an innovation/ business concept and develop a comprehensive business plan. Reference Career Education and Work 13.4.12 A – B
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Challenge 4: Game Design

“Saving the Planet...Are You Game?”

For individuals or groups | Maximum points: 200

Due at Phipps: Friday, March 20 by 5 p.m.

Your Challenge:

Playing games is fun, but it’s also a great way to practice creative problem solving, learn about something new, or share something you’re passionate about with others.

Design and create a game that teaches someone about an environmental issue that is interesting and important to you. Examples of themes may be: exploring biodiversity, comparing renewable and nonrenewable energy sources, or explaining the idea of a “foodprint.” Get creative about a topic that interests you! You may also choose to format your game however you’d like. It can be collaborative or competitive; and it can be a board game, card game, active game, or any other style you wish! Be sure to include clear instructions that provide details on set-up, player objectives, game play, and ending the game. Don’t forget to cite any sources you use. Your game should be built of only repurposed or found materials. All game pieces should fit into a container no larger than 20x12x5”, and the game should be labeled with the school and participating students’ names. Games (with entry forms) should be submitted to Phipps either by mail or in person.

Resources: The following list of online resources may be used when preparing your entry:

- [Board Game Design Lab](#)
- Board Games to Create and Play by Kevan Davis

- [BoardGameGeek](#)
- Designing Board Games by Kristin Fontichiaro
- Eurogames: The Design, Culture and Play of Modern European Board Games by Stewart Woods
- [Open Educational Resources, The University of Edinburgh – Theme, Setting and Game Mechanics](#)
- [Pittsburgh Center for Creative Reuse](#)

Entry Requirements: Deliver to high school program coordinator at Phipps in person or via certified mail (electronic submission is not accepted):

- Challenge Entry Form
- Game, with the exception of the instructions, should be built of found or repurposed materials.
- Entire game should fit within a container no larger than 20x12x5”.
- Clear instructions for how to set up, play, and end the game should be included.
- Game should be labeled with the school and the participating students’ names.

School Submits: 1 Game, Game Instructions, Challenge Entry Form

State Standards:

- CC.1.4.9-10.A Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
- CC.1.4.9-10.B Write with a sharp distinct focus identifying topic, task, and audience.
- CC.1.4.9-10.F Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.
- CC.1.4.9-10.T Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- CC.1.4.11-12.A Write informative/ explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
- CC.1.4.11-12.B Write with a sharp distinct focus identifying topic, task, and audience.
- CC.1.4.11-12.F Demonstrate a grade-appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.
- CC.1.4.11-12.T Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- 3.4.10.A2 Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.