Children's Environmental Literacy Foundation

# *How Can we attract Butterflies to Pierson's Walk?*

*Hannah Pang, Sepulveda Middle School, LAUSD*

| **Cover Page** |
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| **Unit Title:** Butterfly Garden<br>**Grade Level:** 8th Grade<br>**Subject Area:** Math<br>**Unit Duration:** One Month |
| **Lead Design Team Members:** Hannah Pang - 8th Grade Math, Robin Dickerson - 6th Grade Science, Lee Bodner - Self Contained Day Class<br>**School District:** Los Angeles Unified School District<br>**School:** Sepulveda Middle School<br>**Courses:** 8th Grade Math, 6th Grade Science |
| **Topic:** Students will design a garden that will attract butterflies, specifying plants, dimensions and layout.<br>**Keywords or Tags:** Garden, ecosystem, action plan, Estimation, ecology, area, perimeter, volume, measurement and scale |
| **Unit/Project Summary:**<br>Ms. Pang's 8th grade math classes will design and plan a butterfly garden that will be for Pierson's Walk. They will come up with a design for the garden incorporating geometric transformations in the pattern. Ms. Dickerson and Ms. Bodner's classes will analyze the biodiversity of the area and specify plants that will attract butterflies. They will study the efficacy of the efforts of Ms. Pang's and Ms. Bodner's classes to attract butterflies to Pierson's walk. |

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| **Open-Ended Driving Question:** How can we create an environment that will attract butterflies to Pierson's walk while providing a great place for students to spend their lunch and nutrition break? |

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| Desired Student Outcomes |
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| **Learning Standards**:<br><br>Math Part 1<br>• CCSS.MATH.CONTENT.8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.<br>• CCSS.MATH.CONTENT.8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.<br>• CCSS.MATH.CONTENT.8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.<br><br>Math Part 2<br>• CCSS.MATH.CONTENT.8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.<br>• CCSS.MATH.CONTENT.8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.<br>• CCSS.MATH.CONTENT.8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.<br>• CCSS.MATH.CONTENT.8.SP.A.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. |
| **EfS Standards (USPESD):**<br>• *EfS Standard 2*: Students recognize the concept of sustainability as a dynamic condition characterized by the interdependency among ecological, economic, and social systems and how these interconnected systems affect individual and societal well-being. They develop an understanding of the human connection to and interdependence with the natural world.<br>• Biodiversity: Students explain how the range of species and their habitats within an ecosystem interact and identify the physical environment and processes necessary for that interaction. Example: Students identify plant and animal species in the region through a graphic depiction linking each to at least one other by drawing connecting lines. |

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| Big Ideas of Sustainability | Essential Questions of Sustainability |
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| • Diversity<br>• Interdependence<br>• Place<br>• Cycle | • How does the diversity of a system affect its health?<br>• How are human and natural systems interrelated?<br>• How do humans and the natural world interact?<br>• What cycles can we find in our community? |

**Learning Objectives**

***Students will understand that . . . (concepts)***

- Geometry can help students design a space that will be a place for students to "hang out" and also provide areas that will attract butterfly populations.
- Geometric transformations are used in the design of a garden.
- We are part of an interconnected system of living organisms, plant life, butterflies and humans.
- Butterflies are important indicators of a healthy environment and ecosystem.

| ***Students will know that . . . (facts)*** | ***Students will be able to . . . (skills)*** |
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| • Scaling provides a means of representing the garden as we design it through measured drawings<br>• Translations and rotations are repeated patterns that provide interest in the design that define space for humans and butterflies<br>• Certain plants such as lantana and milkweed attract butterflies<br>• That butterflies are pollinators<br>• A butterfly's life cycle often depends on the availability of certain pollinator plants.<br>• The Pythagorean Theorem can be used to find the distance between two points. | • Draw scaled drawings of a garden including translations and rotations as part of the defined spaces<br>• Analyze plant to butterfly counts<br>• Plot relationships between number of plants and number of butterflies in different parts of the garden and create a line of best fit that they can analyze<br>• Problem Solve: Students identify an issue in their community and and analyze it from the perspective of environmental, social/cultural, and economic concerns, brainstorm root causes, identify stakeholders, and design a solution.<br>• Project Plan: Students create a flowchart and a timeline to identify project components and a course of action. |

| Place, Problem, and Project *(P3)* Community Connections | | |
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| **Place** | **Problem** | **Project** |
| We will be focusing our efforts in the design of a garden on the Northwest corner of Pierson's Walk which is a tree lined open space between the main office<br>and a row of classrooms where students often like to spend their Nutrition and Lunch breaks. | How can we attract butterflies to Pierson's Walk? | Students will design and plant a garden that will attract butterflies and analyze the effectiveness of their efforts. |
| **P3 Possibilities** | | |
| Parks | Community resources | City Workers |
| Natural Resources | Local Businesses | Parents |
| Community Garden | Nature Centers | Teachers |
| School Garden | Neighborhood Organizations | Facilities Staff |
| Outdoor Schoolyard | Professional Experts | Local Leaders |
| Local Architecture | | Elected Officials |

| Assessment Plan | |
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| **Learning Objectives** | **Evidence and Criteria (Assessment)** |
| Geometry can help students design a space that will be a place for students to "hang out" and also provide areas that will attract butterfly populations. | A butterfly garden will be created by students, staff and school community. |
| Geometric transformations are used in the design of a garden. | Students will create scaled drawings of their garden designs. |
| We are part of an interconnected system of living organisms, specifically plant life, butterflies and humans. | Students will analyze the relationship between plants and butterflies numerically. |
| **Learning Plan** | |

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**Unit Timing and Duration:** 2 weeks

**Local and Real World Context:** Pierson's Walk

**Open-Ended Driving Question:** How can we attract butterflies to Pierson's Walk?

**Learning Events**

**Beginning: Engage**

- Students will walk around Pierson's Walk with their teacher and take measurements, make sketches of the space.
- Students will research the work of a landscape designer.
- Students will talk about places where they have seen butterflies.

**Middle: Inform**

Teacher will teach lessons on:

- Geometric Transformations
- Scatterplots
- Lines of Best Fit
- Two-Way Tables

**End: Apply**

Students will create their designs of the gardens. Ms. Pang, Ms. Bodner and Ms. Dickerson will judge a competition and decide which design will be carried out by the classes and staff. After the garden has been established, students will count butterfly populations at different locations in the garden and graph their numerical findings.

**Epilogue: (Next Steps)**

Students will write a reflection on the design of the garden answering the questions: Were they able to attract butterflies to Pierson's Walk? Where were there more or less butterflies and what affected their butterfly counts?

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| Addendum | |
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| **Unit Materials** | |
| Field trip idea to LA Natural History Museum Butterfly Pavilion in the spring: https://www.nhm.org/site/explore-exhibits/special-exhibits/butterfly-pavilion | What is a landscape designer? http://www.apldca.org/what-is-landscape-design/ |
| Invertebrate Conservation: http://www.xerces.org/monarchs/ | How to welcome wildlife into your garden: http://www.nhm.org/nature/visit/your-garden |
| **Resources:**<br>• Glencoe Math 8 Textbook<br>Chapter 5: Triangles and the Pythagorean Theorem<br>• Chapter 6: Transformations | **Equipment:**<br>• Shovels<br>• Topsoil<br>• Roto-Rooter<br>• Lantana and Milkweed seedlings<br>• Caterpillars<br>• Graph paper<br>• Rulers |
| **Notes:**<br><br>Need to discuss with Science Teachers about how we can continue upkeep of the garden once it has been planted. | |