

Protect the Pollinators

student guide

CHALLENGE RATIONALE

Pollinator populations are shrinking, and several factors are contributing to this disturbing global trend. There are growing concerns as to what the impact will be on food production. Through this challenge, students will become more aware of the important role pollinators play in our daily lives and how to help protect the various populations. After thoughtful research, students will design, test and demonstrate a solution that will sustain or improve pollinator well-being.

ESTABLISHING THE CHALLENGE

Identify the Challenge

More than 90 species of U.S. specialty crops require pollination, and various animals, including bees, butterflies, moths, bats, and birds, are a critical part of the pollinator-plant ecosystem.ⁱ Pollinators affect 35 percent of the world's crop production.ⁱⁱ There have been concerns regarding pollinator populations for decades. According to the United Nations, it's estimated there will be nearly 10 billion people on Earth by 2050.ⁱⁱⁱ Pollinators play an important role in food production that's essential to feeding the human population.

Challenge Question

What can we do to sustain or improve pollinator well-being?

The solution must address the following needs:

- Determine what might be causing the decline in the number of pollinators.
- Provide a solution to maintain or sustain the population of a chosen species of pollinators.

Success will be determined by

- Constructing a plan that incorporates methods to maintain or increase the population of a chosen pollinator population.
- Estimating how sustaining or increasing the pollinator population will help feed a growing human population.
- Sharing progress and results on social media by tagging @ThePurplePlow.



1. IDENTIFY

PURPOSE OF STEP

Define the problem and how it is affecting life globally, nationally, and locally. Research and consider how others have approached solving the problem including how people have addressed this problem historically. Describe why this problem needs a solution. Determine constraints (e.g., time, space, resources, etc.).

STUDENT PROMPTS AND GUIDING QUESTIONS

- What is pollination?
- Which species pollinate?
- How are pollinators beneficial?
- What are the requirements for a healthy pollinator population?
- What are the factors impacting pollinator health?
- What is the importance of maintaining a diverse food supply?
- What is the government or other institutions doing to protect pollinators?
- What type of habitat do pollinators live in?

SIGNS OF STEP COMPLETION

Students will present a description of the Challenge to the facilitator. Be sure to include how this problem affects communities globally, nationally, and locally. The description should also include ways in which others have addressed finding a solution and constraints to be considered (e.g., time, space, resources, etc.).

At the completion of this step, direct students to the reflection questions in the “Protect the Pollinators Student Guide.”



1. IDENTIFY REFLECTION

Important discoveries during this step:

Define the problem as it relates to you locally:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



2: IMAGINE

PURPOSE OF STEP

Brainstorm solutions to the challenge. List all of your ideas – don't hold back! Discuss the possible solutions. Select the best possible solution from your brainstormed list.

STUDENT PROMPTS AND GUIDING QUESTIONS

- What do plants need to grow?
- What space is available to grow plants?
- What materials can be used to build a pollinator habitat?
- What types of materials are unique to the local community?
- What plants are native to our community?
- Which pollinators are common in our community?

SIGNS OF STEP COMPLETION

Students will present a list of possible solutions to the identified challenge to the facilitator.

At the completion of this step, direct students to the reflection questions in the "Protect the Pollinators Student Guide."



2: IMAGINE REFLECTION

Important discoveries during this step:

List your possible solutions:

Identify the solution that you think will be achievable:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



3: DESIGN

PURPOSE OF STEP

Diagram the prototype and identify the materials needed to build your solution. Write out the steps to take and describe the expected outcomes.

STUDENT PROMPTS AND GUIDING QUESTIONS

- What pollinator species do I want to help protect?
- Design a structure that meets the Challenge requirements.
- Determine what specific materials would be used in the construction.
- Create a supply list and budget.
 - What specific materials will be used to build the growing structure?
 - How will materials be obtained?
 - What is the cost of these materials?
- In what ways will my solution be measured?
 - What will need to be observed (qualitative data)?
 - What information can be put into a chart or graph (quantitative data)?

SIGNS OF STEP COMPLETION

Present a detailed diagram of the solution as well as a written plan of how it will be built. Be sure to include a materials list with budget, detailed directions, and expected outcomes.

At the completion of this step, direct students to the reflection questions in the “Protect the Pollinators Student Guide.”



3: DESIGN REFLECTION

Important discoveries during this step:

Justify your model design and the materials you will need:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



4: CREATE

PURPOSE OF STEP

Follow the design plan and build your solution.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Use all research, knowledge gained and the design plan to create the solution.
- Repeat any of the previous steps should issues arise during the building process.
- Consider the parameters of the Challenge and what needs to be accomplished for a successful Challenge.

SIGNS OF STEP COMPLETION

Build out your design and share with the facilitator.

At the completion of this step, direct students to the reflection questions in the “Protect the Pollinators Student Guide.”



4: CREATE REFLECTION

Important discoveries during this step:

Describe any barriers you overcame in creating your model.

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



5: TEST + IMPROVE

PURPOSE OF STEP

Test the design and collect quantitative and qualitative data. Discuss results and compare with the expected outcomes. Seek areas of improvement and make changes where needed.

STUDENT PROMPTS AND GUIDING QUESTIONS

- How successful is your solution in addressing the well-being of pollinators?
- What suggestions did you receive for improvements on your solution?
- What changes will you make to your design, based on feedback from your peer reviewers?
- How does your design address budgetary constraints, timeline issues or other challenges?

SIGNS OF STEP COMPLETION

The students will keep records of all test trials and share data with the facilitator. Entries should include both qualitative and quantitative data. Record any improvements made to your solution and the effect they had on outcomes.

At the completion of this step, direct students to the reflection questions in the “Protect the Pollinators Student Guide.”



5. TEST & IMPROVE REFLECTION

Important discoveries during this step:

Impacts to the global, national, and local community:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



6: SHARE

PURPOSE OF STEP

Communicate what was learned throughout the challenge. Share the design, data, and conclusions. Present results.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Develop a presentation including knowledge gained, design plans, materials used to create the structure, testing completed during challenge, and data analysis.
- How is your design approach an appropriate, innovative solution that realistically responds to the precise design competition problem?
- How does your design address budgetary constraints, timeline issues or other challenges?
- How successful was your solution in addressing the well-being of pollinators?
- Describe and/or demonstrate what you learned from this challenge.

SIGNS OF STEP COMPLETION

The students present what was learned through the design process, including sharing how the prototype addresses the problem, key aspects of design, data from test trials, and end results.

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ⁱⁱⁱUniversity of California, Berkley. (2006, October 25). *Pollinators help one-third of world's crop production, says new study*. Retrieved from https://www.berkeley.edu/news/media/releases/2006/10/25_pollinator.shtml