Lesson: Action in my community

Grades	4–5	**Duration**	60-90 min. initially *Possibly with implementation of action plan over several days/weeks*
Subjects	Science, social studies		
Essential question	How can I solve a problem in my community?		
Content and language objectives	• Students will be able to define a problem in their community. • Students will be able to brainstorm possible solutions for the problem. • Students will be able to test and implement a solution.		
Summary	In this lesson, students engage with the NGSS Engineering and Design Standards to understand the process of solving a problem in their community and make an action plan.		
Standards	***Next Generation Science Standards:*** ***All NGSS Standards are Focus Standards in this lesson.*** 3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.		
	C3: College, Career and Civic Life Framework *(National Council for the Social Studies)* D4.6.3-5. Draw on disciplinary concepts to explain the challenges people have faced and opportunities they have created, in addressing local, regional, and global problems at various times and places. **D4.7.3-5. Explain different strategies and approaches students and others could take in working alone and together to address local, regional, and global problems, and predict possible results of their actions.** D4.8.3-5. Use a range of deliberative and democratic procedures to make decisions about and act on civic problems in their classrooms and schools.		

Language frames	The problem is ... A possible solution is ...	I (dis)agree because ... I think ...	
Vocabulary	to define to develop to optimize to engineer to design	habitat ecosystem species	dependent guardian impact
Materials	Growing food for giants video (Viewing guide optional) Growing food for giants comic (or low resolution version) Handout: Solution brainstorming Engineering and design process image and cards chart paper (see Example class chart)		

Engage and prepare

1. Partner or group students. Distribute the "Engineering and design cards" (word cards only) to each group. There are three cards, one with each step in the process written on it.
2. Ask students, "How should the cards be ordered?" Students read the cards and decide which one comes first, next, and last. Rotate and ask students for reasoning for their decisions.
    a. Pause, if needed, to define unknown words as a class.
    b. Do not confirm students' predictions yet.
    c. Students may decide to put them in a circle, even before step 3.
3. Distribute the "Engineering and design cards (arrow cards)" to each group. Tell students these arrows help explain the process, ask them to place them between or around the cards in their model. Students may adapt their previous thinking with the addition of new cards.
4. Discuss students' organization of the cards and how it may have changed. Project the NGSS "Engineering and design process image" *(page 2 of teacher resource)* to confirm their predictions.
5. Ask students, "Why are the arrows important?" Focus on the idea that scientists and engineers can move back and forth between steps before finding the best solution.

Modeled and shared instruction

1. Watch the "Growing food for giants video." Use the video guide, if desired for stopping points, or if your class has already watched the video, from "Growing food for giants lesson 1: Giraffes in Tanzania," just rewatch and summarize key points.
2. Review the "Engineering and design process image" *(page 2 of teacher resource)* and reference

the first step, “define the problem.” Ask students, “What was the problem the students in the video wanted to solve?”

   a. *Teacher note: The Wild Nature Institute (WNI), referenced in the video, partnered with the school to create the school nursery. It is part of a broader giraffe conservation education program. For the purposes of this lesson, we are focusing on the student action in order to show how kids can be wild guardians in their community. Oftentimes, however, it is a partnership between groups or individuals. The action plan your class develops can reference stakeholders (often leaders or organizations) that can support their ideas.*

3. Review the next step, “develop solutions.” Tell students we don’t know what other solutions the students may have tried first to help the giraffes, but we can infer. The giraffes used to have enough food to eat, but now there aren’t enough trees. Ask students, “Why are trees in our community cut down?” Students use background knowledge to reference construction of new communities, farms, or to use the wood for building.
4. *Optional step:* Students consider, “What other solutions ***may*** the students have thought about?” Ideas may include sharing ideas, encouraging farmers to plant around trees, etc.

   Teacher note: In northern Tanzania trees are cut down by local people to build houses and sheds, for fuel for cooking, etc. The tree planting project helps regenerate woodland and educate the community about the ecosystem, particularly how animals rely on the trees.

5. Review the next step, “optimize.” Tell students the school in the video shared a few ideas of how they optimized their solution.
   a. The video said the trees were planted in a certain season. It said, “Then, they wait for the rains to come. This is the best time to plant the seedlings, which need water to survive and grow.” Ask students, “What may have happened before students optimized their solution, if they planted the seeds at a different time?” Students infer that the seedlings may not have grown as well or at all in a different season.
   b. The video also said that students planted them in a certain place and watered and fertilized them. These are also ways they have optimized their solution. Ask students, “Do you think students tested different ways to take care of the seeds before they found the best way?”

      To practice making decisions like the students may have, to optimize their solution, (re)read Growing food for giants comic pages 3–7 (low resolution version) together. Students choose their own way to take care of an acacia or mango seed, and may not survive, based on their choices. You may choose to use the teacher edition for additional discussion and stopping points.

6. Read Growing food for giants comic page 8: “Be a Habitat Guardian.” Ask students, “What is a problem in our community?” Review how to *define the problem*, working together to discuss what being successful in solving the chosen problem would look like.

Collaborative and Independent Practice
1. Review how to *develop solutions*. Remind students we want to think about multiple ways to solve the chosen problem to find the best solution. 2. Students complete the handout: "Solution brainstorming." They may choose to "borrow" a solution from the video or the comic suggestions. 3. Groups share their solution ideas. As students share, record their ideas on chart paper to compare and contrast. If two groups have the same solution, add to the row on the chart and/or star parts that are the same in a different color to honor their contribution.
Evaluate and close **Call to action**
1. Review the "Engineering and design process image," refer to the last step, *optimize*. 2. Review the class' ideas and vote on a solution to test. 3. Reference the arrows in the image and remind students that in the testing, there may be a need to return to the definition of the problem or to refer back to our group's ideas for solutions. 4. Make a plan for next steps to test the solution. For more support in planning, refer to this Climate action planning guide. 5. Go try it! Remember, the class may need to refer back to the problem or other solutions in the process!

Written by Emily Townsend in collaboration with Mongabay Kids.

About Wild Guardians

Mongabay Kids is the Kids Desk of Mongabay, a nonprofit environmental science and conservation news platform.

Wild Guardians is a multimedia educational series that uses videos, comics, and hands-on activities to engage grade 4–5 students in community-based interdisciplinary learning about how to be stewards of wild things and wild places in their community.

Website: kids.mongabay.com

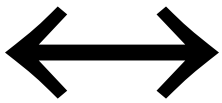
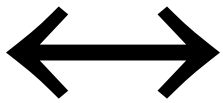
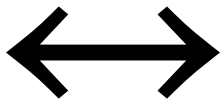
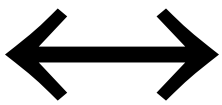
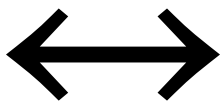
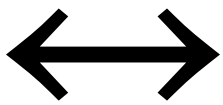
Special thanks

This project was supported by a grant from The CEK Foundation Earth Focus Initiative.

Teacher resource: Engineering and design cards

Print as many sets of cards as you need for partners or small groups in your class.
Distribute the word cards to each group in the Engage and prepare section: Step 1.

Then, distribute the arrow cards to each group in Step 3.
A diagram of the engineering and design process is on page 2.

Define the problem: Think about the problem and what it looks like to be successful if you solved it.	**Develop solutions:** Research and explore multiple possible solutions.	**Optimize:** Test and improve a solution, if needed, based on the results.
		
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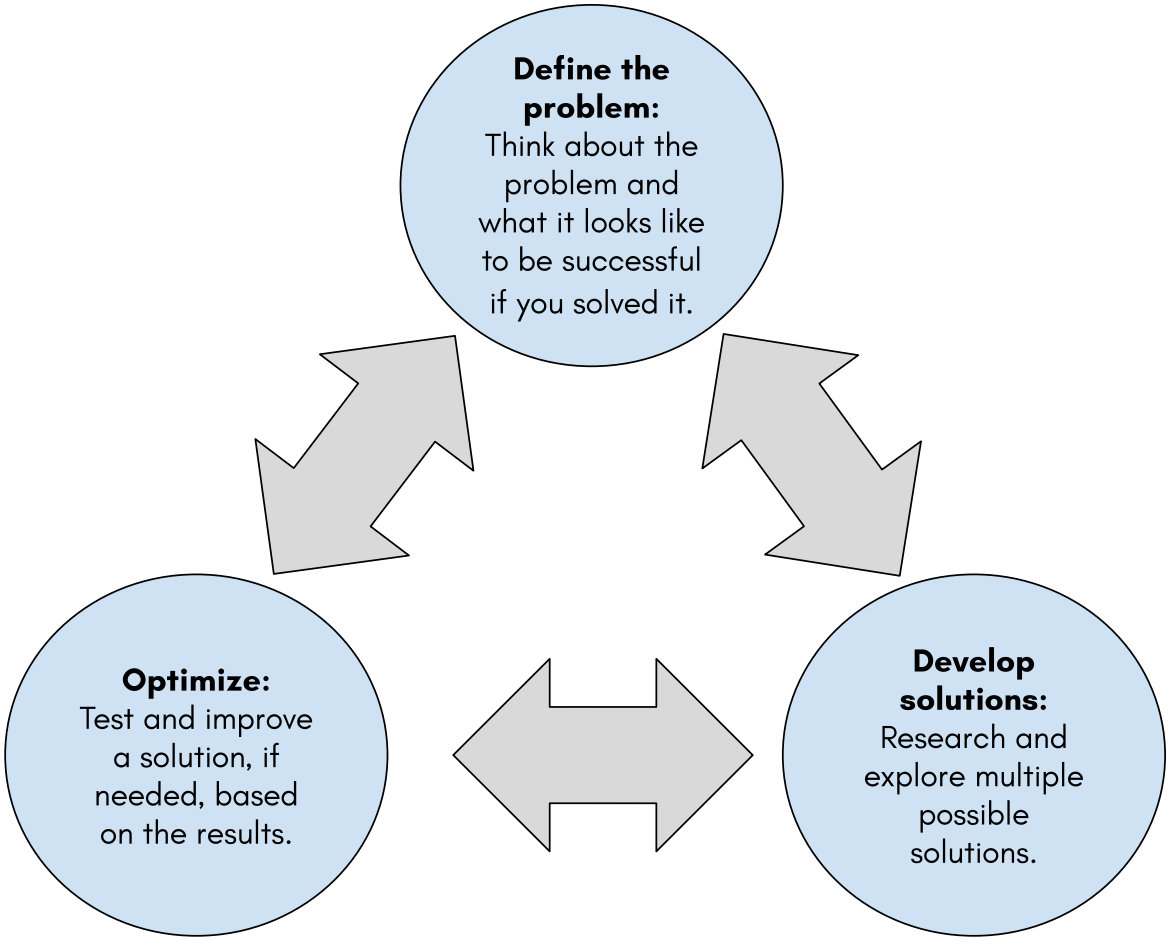


Image based on NGSS Engineering and Design Process Grades 3-5

Teacher resource: Example class chart

Problem: *The problem in our community is ...*

What is a possible solution?	How will the solution help our community?	Will the solution cost money?	How long will the solution take to implement?	Who are the stakeholders involved in the solution?	How will we know that the solution worked?	Votes	Reflection on Solution after test
One possible solution is ... *We think ...*	*It will be helpful because ...* *Since____, the solution will ...*	*Yes/No the solution will not cost money.* *We think ...*	*We think ... because ...*	*We will need to talk to/plan with/discuss ...*	*If the solution works, we will know because ...*		*____happened because ...* *I wonder ...*
Group 1:							
Group 2:							
Group 3:							
Group 4:							
Group 5:							
Group 6:							

Name _____ Date_____

Solution brainstorming

1. What is the class' chosen problem?

_____

_____

2. What is a possible solution to the problem?

_____

_____

3. How will the solution help our community?

_____

_____

4. Will the solution cost money?

_____

_____

5. How long will the solution take to implement?

_____

_____

6. Who are the stakeholders (people) involved in the solution?

_____

_____

7. How will we know if the solution works?

_____

_____