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| **Lesson Title: Fantastic Feeders** |  |
| **Grade Level:** 4th  | **Quarter:**4th  |
| **Standards:** Science:S4L1. Students will describe the roles of organisms and the flow of energy within an ecosystem. c. Predict how changes in the environment would affect a community (ecosystem) of organisms. d. Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many. Math:MGSE4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.MGSE4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec.a. Understand the relationship between gallons, cups, quarts, and pints.b. Express larger units in terms of smaller units within the same measurement system.c. Record measurement equivalents in a two column table. |
| **Lesson Essential Question:** **EQ: How can I can create and design my own bird feeder?**  | **Vocabulary:**organisms, energy, ecosystem, predict, population, environment, animals |
| * student journal
* Cardboard building materials (tubes, boxes, etc.)
* Tape and/or glue (hot glue may be useful)
* Scissors
* Popsicle sticks and/or skewers
* Various types of bird food/seed
* Rulers
* String or yarn
 | * Plastic building materials
* Scales
* Decorative materials (markers, construction paper, colored pencils, etc.)
* Research materials for birds
 | **Lesson Assessment:** * Teacher observation
* Student journal
* Student created bird feeder
* Rubric
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| **STEM Challenge Overview:**Students should be using their knowledge of ecosystems and the role of birds in a community to shape their design for this project. They will need to have a thorough knowledge of food chains/webs and how the energy flows in an ecosystem.  |
| **Teacher Background:**Teacher background knowledge builder:<http://seagrant.uaf.edu/marine-ed/curriculum/grade-4/teacher-background.html> <http://www.muhlenberg.edu/cultural/graver/K-12Outreach/TheBirdsAroundUsModule.pdf>Student Research Resources:<http://www.osweb.com/kidzkorner/feeder.htm><http://www.birdfeeding.org/> (LOTS of information, very few ads) |
| **INSTRUCTION** |
| 1. **Ask/Engage (Day 1, 30-40 minutes)**
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| * Go bird watching around your schools grounds. Have students bring iPads to take pictures of where the birds live and any other observations about the bird’s ecosystem.
* After taking a bird walk have students discuss in small groups their observations or share pictures they took with one another.
* Show students this video about birdhouses: <https://www.youtube.com/watch?v=k3W1yL2OLt4>
* Introduce the challenge:

Your principal LOVES to have a beautiful school! One of the things that makes the community and ecosystem around a school lovely is the presence of birds. Birds are very important and helpful! They eat insects, pollinate plants, disperse seeds, and much more! Your principal would like to attract many different types of birds to the school community. He/She has asked the talented 4th grade class to design and construct new bird feeders. This will require research and planning, but you can do it! |
| 1. **Imagine/Brainstorm (Day 2, 30-45 minutes)**
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| Introduce the constraints of the design plan. Define the criteria for success. Criteria: Bird Feeder* Your birdfeeder must be designed with a specific type of bird in mind
* Your birdfeeder must be refillable
* Your birdfeeder should be able to withstand rain and wind
* Your birdfeeder should protect the bird food from other animals
* Your birdfeeder construction should incorporate at least 4 different 2D shapes

Bird Feeder Guide* A detailed description of your birdfeeder- Which 2D shapes are represented? What is the weight of your birdhouse in grams and ounces?
* Instructions for where your birdfeeder should be placed (In a tree? On the ground? On a post? Where on the school grounds?) and why you chose that place
* Instructions for the type of food that should be in your birdfeeder and how to refill it
* Describe why you think birds will eat from your feeder
* Describe how you will keep other animals from getting to your birdfeeder’s food

Ask each student to work independently to come up with 1-2 possible design solutions. Students should draw/label their designs. Have students create groups of 3-4. Be sure to have student building materials available while they plan.  |
| 1. **Plan/Design (Day 2 continued)**
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| * Show students the bird feeding websites. Take them to a computer lab/media center or have them use devices in the classroom to research about bird feeders prior to discussing their designs.
* After researching in groups have each student presents their ideas to their team.
* Student teams collaborate to come up with final design plan.
* Students draw final design plan and make a list of needed supplies.
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| 1. **Create / Test (Day 3-5, this challenge may take more time than most challenges since they are creating a bird house and an informational guide about their bird house)**
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| * Student teams build their design according to their design plan. Students test their design plan and record data.
* Have a designated testing area that students can test their feeders at. Students could test their design while they are a recess.
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| 1. **Evaluate/Improve –** and repeat Steps 1-5
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| * Students evaluate their design for success. Did it meet the established criteria? Did their final design match their planned design? How would students improve their design?
* Invite your principal to a grade level bird show display outside the school grounds. You could also invite another grade level to observe what you created.
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Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fantastic Feeders

**** 4th Grade

**Challenge**: Your principal LOVES to have a beautiful school! One of the things that make the community and ecosystem around a school lovely is the presence of birds. Birds are very important and helpful! They eat insects, pollinate plants, disperse seeds, and much more! Your principal would like to attract many different types of birds to the school community. He/She has asked the talented 4th grade class to design and construct new bird feeders. This will require research and planning, but you can do it!

**Criteria:**

Bird Feeder

* Your birdfeeder must be designed with a specific type of bird in mind
* Your birdfeeder must be refillable
* Your birdfeeder should be able to withstand rain and wind
* Your birdfeeder should protect the bird food from other animals
* Your birdfeeder construction should incorporate at least 4 different 2D shapes

Bird Feeder Guide

* A detailed description of your birdfeeder- Which 2D shapes are represented? What is the weight of your birdhouse in grams and ounces?
* Instructions for where your birdfeeder should be placed (In a tree? On the ground? On a post? Where on the school grounds?) and why you chose that place
* Instructions for the type of food that should be in your birdfeeder and how to refill it
* Describe why you think birds will eat from your feeder
* Describe how you will keep other animals from getting to your birdfeeder’s food

**Constraints:**

1. You may only use the materials provided by your teacher.

2. You only have 3-5 days to complete this during your STEM time.

**Materials:**

1. **ASK / ENGAGE:** What is the problem you are being asked to solve?

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1. **IMAGINE/BRAINSTORM:** What are some possible solutions to the problem that you are trying to solve? After you brainstorm, draw and label your ideas below.

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| **Idea #1** | **Idea #2** |

1. **PLAN/DESIGN:** Share your ideas with your group and collaborate to decide on a final design plan. Draw your team’s design below and make a list of the materials that you will need to complete your design.

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| **Team Design Plan** | **Materials List** |

1. **CREATE/TEST**: Use your Final Design Plan to create and build your solution. Test your design. Did it work? Why or Why not?

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1. **EVAULATE/IMPROVE:**  How well did your design work? Did your solution solve the problem within the given constraints?

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How can you improve your design? How can you make it better? Draw and label your improved design below.

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| **Improved Design Plan** |