Home Tweet Home Engineering Portfolio

This portfolio belongs to:

Endangered Animals Graphic Organizer

Complete the graphic organizer by recording answers to the questions below. You may add other interesting facts that help to answer the essential questions.

Endangered Animals

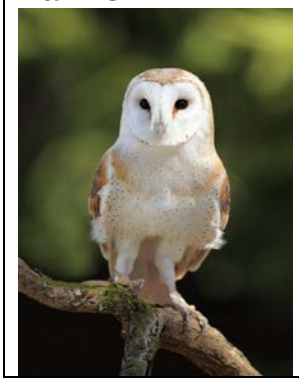
Questions	**Answers**
What causes animals to become endangered?	
Why should we care about endangered animals?	
What kinds of animals are endangered?	
What can be done to help endangered animals?	

Endangered Bird Graphic Organizer

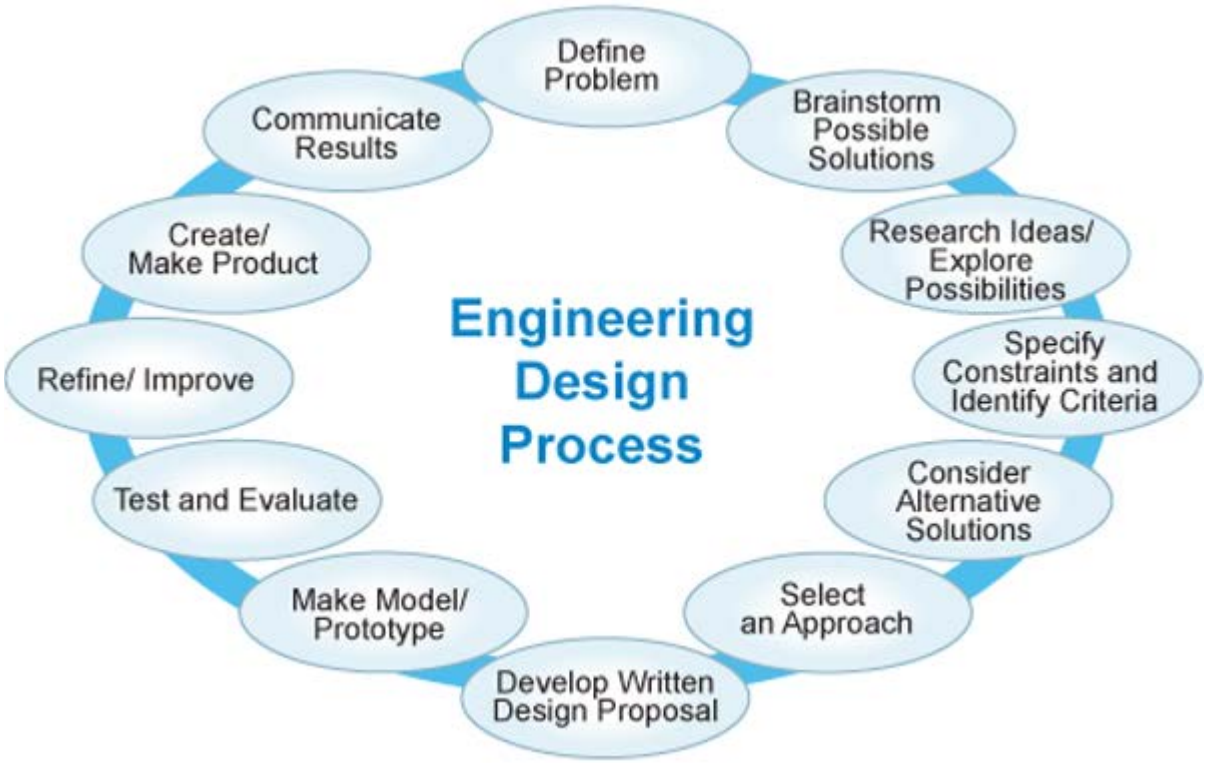
As you read about the Bewick's wren, barn owl and red-cockaded woodpecker, take notes by answering the questions below.

Bewick's Wren 	How does this bird choose its nesting spot? What are some reasons for this bird's decline in population? What, if any, solutions are offered to save the bird populations?

Red-cockaded Woodpecker 	How does this bird choose its nesting spot? What are some reasons for this bird's decline in population? What, if any, solutions are offered to save the bird populations?

Barn Owl 	How does this bird choose its nesting spot? What are some reasons for this bird's decline in population? What, if any, solutions are offered to save the bird populations?

Engineering Design Process



Your Challenge: Design a Nest Box

How can we protect endangered birds? Use the engineering design process outlined below to help your STEM team come up with a way to help.

1. **Problem:** Endangered birds need places to build nests and raise young.

Choose the type of bird you would like to help. Write the name of the bird below.

2. **Brainstorm:** Work with your STEM team to brainstorm answers to the following questions:

- Where does this bird usually choose to nest?

- How can we create an alternative place to nest?

- What materials can we use?

3. **Research and Generate Ideas:** Explore the links provided in the activity and write down notes and ideas below.

Your Challenge: Design a Nest Box

4./5. **Identify Constraints and Criteria/ Consider Alternate Solutions**
You have several constraints on this challenge: budget, materials, dimensions of nest box and location. Answer the following questions as you investigate specific constraints and criteria:

a. What materials do you have available to you? How much do they cost?

b. What size and shape nest box is appropriate for your bird? What features are important in building a nest box for your bird?

c. What is an appropriate location for your bird? The seashore? An open field? The forest? Think about your bird's natural habitat and where it finds food, and write down a location for your nest box that will work for your bird.

Your Challenge: Design a Nest Box

6./7. **Select an Approach and Develop a Design Proposal.**
How will you design your nest box? Record answers to the following questions.

- What kind of nest box is appropriate for your bird? **Check one:** Nest Box A ☐, B ☐ or C ☐
- What are some reasonable dimensions, given the research you have done? Think about width, depth and height. width ☐ depth ☐ height ☐
- What materials will you use to build your nest box?

- What size entry hole should your nest box have?
- How far off the ground should your nest box be placed?
- In what sort of habitat should your nest box be placed?
- How will you ensure that air will circulate and rainwater will drain from the nest box?

- Are there any other features that will ensure your nest box will be appropriate for your bird?

Now that you have selected an approach, your team will need to write up a design proposal that explains your choice. Include each of the following components in your proposal. Write your proposal on the following pages.

Introduction: Briefly state the problem at hand—the decline in numbers and possible future extinction of your chosen bird—and explain how your nest box will help solve this issue.
Objective: Outline the goals and general activities involved in building your proposed nest box, including constraints and limitations.
Design Strategy: Describe how your proposed nest box will achieve the objectives that you have listed. Explain the science behind the design of your nest box, and provide detail on why your design is the best one.
Plan of Action: Describe the steps you will take to create and install your nest box.
Verification Plan: Create a plan for ensuring that your nest box is feasible to produce and acceptable to your intended bird.
Predicted Cost and Schedule: Estimate the cost of creating your nest box and include an estimate of how long it would take to create.
Technical Drawing: Include a scale drawing of your nest box. Add detail to indicate where it will be installed.
Statement of Contribution of Each Team Member: Describe how each team member contributed to the development of your nest box and the creation of the design proposal.

Your Challenge: Design a Nest Box

Design Proposal

Introduction:

Objective:

Design Strategy:

Your Challenge: Design a Nest Box

Design Proposal (continued)

Plan of Action:

Verification Plan:

Your Challenge: Design a Next Box

Design Proposal (continued)

Technical Drawing:

As a team, come to a consensus and create a technical drawing of your design. A technical drawing must be drawn to scale and is based on research. It must identify all components of the nest box.

Your Challenge: Design a Nest Box

Design Proposal (continued)

Predicted Cost and Schedule:

Statement of Contribution of Each Team Member:

Your Challenge: Design a Nest Box

You will complete steps 8-11 of the engineering design process using the Nest Box Builder Tool in the Design a Model section of the website.

8. **Make a Prototype** – Using the orthographic drawing you made in the tool, print, cut out the pieces, and use tape to assemble the parts to build a paper model of your nest box.

9. **Test and Evaluate** – After following instructions to assemble your nest box in the tool, click the “Test” button to see if you have designed an appropriate design within your constraints. Remember to keep track of the amount and cost of materials used.

10. **Refine and Improve** – Return to the tool to refine or make improvements to your design, if necessary.

11. **Create/Make Product** – Create your final nest box design using the tool.

Your Challenge: Design a Nest Box

12. **Communicate Results** – Now communicate your results to others. Scientists often describe their work in trade journals and magazines read by their peers. You will do the same, by writing a feature article suitable for publication in your school or local newspaper.

In the article, you will:

- Introduce your topic (building nest boxes for endangered birds) with an interesting lead sentence.
- Describe the research you conducted and the information you found using relevant facts, pertinent details and appropriate quotes.
- End your feature with a closing paragraph.

Use a separate sheet of paper to compose your article or use the notes pages that follow.

Notes

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