

Overview

Students will explore skills used in carpentry and manufacturing including design thinking, measurement, planning, teamwork, and literacy skills to design and build a pet house prototype using cardboard and recycled materials.

NB Curricular Connections

6-8 Learning Areas

English Language Arts:

- *Strand: Interactions - Big Idea: Exchanges – Skill Descriptor: Ask and respond to questions to clarify information, explore possibilities, and identify solutions to a problem*
- *Strand: Interactions - Big Idea: Exchanges – Skill Descriptor: Give and respond to a variety of directions and instructions*
- *Strand: Reading - Big Idea: Reading Comprehension – Skill Descriptor: Construct meaning from a variety of text considering the source, intended audience, and purpose*

Mathematics:

- *Strand: Shape and Space - Big Idea: Measurement*
- *Strand: Shape and Space – Big Idea: 2-D Shapes and 3-D Objects*

Technology:

- *Strand: Design Thinking Skills - Big Idea: Problem Solving – Skill Descriptors: Construct, execute and present a project within given parameters and with assistance*

Personal Wellness:

- *Strand: Career Connected Learning - Big Idea: Experiencing Potential Career Pathways – Skill Descriptors: Engage in frequent and ongoing career connected experiential learning about preferred career pathways and develop personal competencies*

What You'll Need

- Makedo construction kits (or similar building components)
- Cardboard sheets/boxes (various sizes)
- Rulers, measuring tapes, protractors
- Paper & pencils, markers, tape, scissors
- Design worksheets / planning templates
- Digital tools (optional): tablet/computer for research

Instructions

- 1. Career Connection:** Introduction to Carpentry and Designing for a Purpose
 - **Discuss:** What do carpenters do? What skills are important in their work?
 - **Activity:** Students brainstorm a list of carpentry skills
 - **Discuss:** How do carpenters use measurement, planning, and tools in their work?
 - **Activity:** Students watch video ([Carpenters](#)) from NBJobs and record 3 key take aways (using sentence starts provided on the graphic organizer).
 - **Discuss:** Connect to manufacturing by discussing how precision, quality, and design thinking are critical to a carpenter's craft. Explain that it is important for carpenters to consider whether or not a design can be replicated without being too complex or expensive, and how the product would be marketed to the intended audience.
 - **Activity:** Reach the following article with the class - '[The sky's the limit' for new class of female carpentry students, says would-be mentor | CBC News](#) and discuss:
 - Why do you think there are fewer women than men working in carpentry and other skilled trades? What challenges or barriers might women face when entering these careers?
 - How can programs that support women in trades help create more fairness and opportunity?
 - Why is it important to have role models or mentors in these fields?
- 2. Client Scenarios:** Introducing empathy as a key part of the design thinking process (understanding the user)
 - **Discuss:** What does it mean to design something for someone else? Why is it important to understand the needs of both the pet (user) and the owner (client)?
 - **Explain:** Carpenters and designers must think about comfort, safety, function and environment when building structures
 - **Share** the slide that includes the exemplar of a "Client Scenarios"
 - **Activity:** Complete the "Client Scenarios" part of graphic organizer
 - Students will work in groups to either choose (examples provided) or create a "client scenario". See examples in the appendix
 - Students will complete the research and empathy chart in groups. Some research will be required to determine pet size, needs, behavior, etc. Utilize technology, school libraries, or additional research methods based on classroom context.
 - Lastly, students will complete the design statement on the graphic organizer provided. Example: "We are designing a pet house for a cat that needs sunlight because cats love the heat and the house will be outside."

3. **Planning and Measurement:** Students will explore measurement concepts including perimeter, area, volume and angles, to design a functional 3D structure.
 - **Activity:** Students will create a front view, side view, and top view on the graphic organizer provided. They will label all dimensions, carefully considering the size of the pet and the space provided. Students will identify 2-D shapes and 3-D objects used in their structure and consider angles as they plan for the build. Finally, students will complete the following tasks:
 - Calculate the perimeter of the base of your pet house. Explain why perimeter matters.
 - Calculate the floor area (space available for the pet) and ensure the area is large enough to accommodate the objects they plan to include in the pet house (food and water bowl, toys, etc)
 - Estimate or calculate interior volume. Connect to pet size and comfort, as well as air circulation.
 - Prompt students to consider how increasing the area affects the volume of the structure. What happens if height changes but the base stays the same?
 - **Extend your learning:** Identify and label at least 2 angles in the design (roof pitch, wall intersections) and classify angles as acute, right, obtuse.

4. **Design Justification:** Communicating design choices to the client
 - Students will write a short paragraph explaining:
 - How the design meets the pet's needs
 - How the design meets the owner's needs
 - How math (measurement, shapes, angles) is used to strengthen the design and ensure functionality.

5. **Time to Build:** Students will translate plans into a physical model and adapt as needed. Carpentry skills, numeracy and literacy will be applied through experience.
 - **Learn:** Use the link provided to watch instructional videos about the Makedo tools.
 - **Explore:** Discuss how these tools are both similar and different from the everyday tools that carpenters use.
 - **Build:** Students will work in groups to build the models based on the plan. Emphasize measurement and proportion as they work. Ensure that students document any changes made during the building process and why they were necessary (stability issues, measurement errors, better solution discovered).

6. **Success Criteria:** Learners will reflect on the client scenario, design features, how empathy influenced design choices, and how mathematics was used (perimeter, area, volume, angles, 3D shapes)
- **Activity:** Students will respond to the following questions (Pair and Share Brainstorm)
 - How did understanding the pet change your design?
 - What math concept was most useful?
 - What would you improve in a real build?
 - What did you find most challenging?
 - What did you enjoy about this project?

IMPORTANT NOTE: Following builds and display it is important to dismantle the projects and preserve the Makedo screws and tools for future learning opportunities within your school community.

Make Meaning Activity

Please see the attached Make Meaning document (and slide) for several choices on how you and your learners can reflect upon today's activity. This is an important step in the experiential learning cycle.

Extension Ideas

- Create a marketing campaign for the pet house design.
- Write a short story about the intended user (pet) and client (owner) that features design elements from your pet house.
- What are some additional features and components to add to your pet house to make it more energy efficient and comfortable for your pet.
- Explore the outdoor/natural world to examine how animals in nature build their own habitats to live in.