MAINE MUSEUM OF INNOVATION LEARNING + LABOR

Shoe Design STEAM Challenge

Teacher's Guide and Worksheets

Shoe Design STEAM Challenge

Grades 4 - Adult

Time: 2-3, 50-60 min. class period(s)

Learning Objectives:
Students will be able to:

1. Understand the principles of shoe design, including function, durability, and aesthetics.
2. Use the engineering design process to create and improve a product.
3. Apply creative thinking and artistic expression to product development.
4. Practice sustainable design using recycled materials.

Materials Needed

- Recycled Materials: Old cardboard, paper, fabric remnants, envelopes, construction paper, used magazines/newspapers.
- Crafting Tools: Scissors, glue, tape, string, ribbon, markers, colored pencils, crayons, rulers.
- Other Optional Materials: Velcro, rubber bands, old shoes for additional parts (laces, buckles, etc.), markers for designing.
- Any additional safe, recycled materials students bring in
- Optional: Shoe boxes for packaging and final presentation

Lesson Instructions
Day 1: Introduction & Planning (45–60 minutes)

1. **E**ngage:
    - Show a brief slideshow or images of different shoe types and designs.
    - Share the history of Lewiston and Auburn's shoe-making legacy (2–3 minutes overview).
2. Challenge Introduction:
    - Present the Shoe Design Challenge.
    - Explain the design constraints: must stay on, removable, made of recycled materials, and reflect personal style.
3. Brainstorming & Planning:
    - Students answer the following in a design journal or worksheet:
        - What kind of shoe will you design?
        - Who is it for (you, a hiker, a dancer, etc.)?
        - What recycled materials will you use?
        - How will it be worn and removed?
        - What makes it durable and comfortable?
    - Sketch the shoe design and label materials and construction details.
    - Write a step-by-step plan for assembly.

Lesson Instructions Cont.

Day 2: Building the Prototype (45–60 minutes)

1. Prototype Construction:
   - Trace foot on cardboard and cut out the sole.
   - Use materials to build the upper part of the shoe, connecting it securely to the sole.
   - Encourage students to follow their plan but adjust as needed during construction.
2. Peer Collaboration:
   - Students can share tips, troubleshoot challenges, and support each other.

Day 3: Testing, Improving, and Presenting (45–60 minutes)

1. Testing:
   - Students test their shoes by wearing them and walking around the room.
   - Reflect and record: What worked? What didn't? What will you change?
2. Redesign (if time allows):
   - Make necessary adjustments or redesign the prototype to improve function or appearance.
3. Optional Extensions (for fun or early finishers):
   - Name your shoe brand and model.
   - Design an advertisement (poster, slogan, jingle).
   - Decorate a shoe box for your design.
   - Present your shoe in a "Shark Tank" or fashion show-style pitch.

Differentiation:

- **Support:** Provide shoe templates or offer help with cutting and attaching materials.
- **Challenge:** Ask advanced students to design for a specific market or special need (e.g., sports, elderly, children).

Maine State Learning Standards

Subject Area	Standard Code / Area	Connection to Lesson
Science/Engineering	ETS1.A–C	Engineering design process
Visual Arts	A1, A2, B1	Artistic expression, use of media, cultural relevance
Career Education	A1, B2	Personal interest exploration and planning
ELA (optional)	SL.4–8.4, SL.4–8.5	Presentations and advertisements

Assessment

Criteria	Excellent (4)	Good (3)	Developing (2)	Needs Improvement (1)
Creativity & Personal Style	Shoe shows unique design	Some original design choices	Limited creativity	Minimal effort shown
Functionality	Shoe stays on foot and can be	Minor issues staying on	Falls off or hard to remove	Doesn’t function
Use of Recycled Materials	Only recycled/sustaina	Mostly recycled	Some recycled, some new	Mostly new materials
Planning & Reflection	Detailed sketch and plan;	Clear plan and basic reflection	Minimal planning or testing	No plan or reflection
Effort & Participation	Fully engaged in all steps	Participated actively	Inconsistent engagement	Rarely participated