

Pumpkin Safety Device

Objective(s)

- Students will work in teams or with partners to design and build a device that can safely carry a "giant" pumpkin.

Activity that involves problem-solving and strategic thinking:

- Students will be able to explain how to distribute weight evenly across their device to ensure stability when carrying the pumpkin.
- Students will accurately measure the dimensions of their pumpkin and their device using rulers or measuring tapes to ensure proper fit and balance.
- Students will design a device that demonstrates basic engineering principles, such as balance, support, and structural integrity, to safely carry the pumpkin.
- Students will test their devices by carrying the pumpkin and evaluate the effectiveness of their designs based on how well they can transport the pumpkin without dropping it.

Standards/Objectives addressed:

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or directions of pushes and pulls on the motion of an object.

1-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional detail.

SL.1.5: Add drawings or other visual displays to descriptions to provide additional detail.

SL.2.5: Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; include visual displays in presentations when appropriate to enhance the development of main ideas or themes.

K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

2.MD.A.1 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

Background knowledge needed:

- Basic Understanding of Balance
- Simple Engineering Concepts
- Measurement Skills
- Properties of Materials
- Forces and Motion
- Teamwork and Collaboration
- Problem-Solving Skills

Materials:

- Pumpkin (large foam or inflatable)
- Cardboard
- Plastic containers
- Straws
- Wooden craft sticks (popsicle sticks)
- Paper plates
- Tape (masking, duct, or clear tape)
- Glue (white or hot glue)
- Rubber bands
- Toy vehicle wheels (optional)
- Bottle caps (optional)
- Rulers
- Small weights (like washers or bags of sand) (optional)
- Markers
- Crayons
- Paint
- Stickers
- Safety scissors
- Fabric scraps (optional)
- String or yarn (optional)
- Foam sheets (optional)

Prompts – questions or statements to elicit engagement:

- What materials do you think will work best for your design? Why?
- What do you think makes a structure strong enough to carry a pumpkin?
- How can we make our device balanced? Can you show me what that looks like?
- How can we work together to combine our ideas into one great design?
- Can you explain your idea to your partner? How can they help improve it?
- What challenges are you facing while building? How can we solve them together?
- If your device isn't working, what could you change to make it better?
- How will you measure the size of your pumpkin? What tools can you use?
- Can you think of ways to ensure the pumpkin fits securely on your device?
- Can you think of a time when you saw something being carried? How did they do it?
- How do you think engineers design vehicles to carry heavy loads? What materials do they use?
- When you present your device, what key points do you want to share with the class?
- How will you demonstrate that your device can safely carry the pumpkin?

Vocabulary:

- Structure, balance, design, weight, measurement, stability, forces, engineering, support, device, construction, plan, collaborate, secure, adjust

Reflection prompts:

- What did you learn about balance and weight distribution as you built your device?
- How do you feel about the challenges you faced today? What are you most proud of?
- What was the most enjoyable part of building your device?
- What did you find challenging during the building process?
- What new skills or concepts did you learn while working on this project?
- How did your group work together to create your device?
- What role did you play in your team, and how did it contribute to your project?
- What problems did you encounter while building your device, and how did you solve them?
- Can you describe a moment when you had to rethink your design? What did you change?
- How did you come up with your design ideas? What inspired you?
- What unique features did you include in your device, and why?
- If you could redesign your device, what changes would you make?
- What materials would you like to use next time, and why?
- How do you think this activity relates to real-world engineering and design?
- Can you think of a real-life example where balance is important? How does it apply?
- What are you most proud of in your final product?

- How did this project help you understand the importance of teamwork and collaboration?

Extensions:

- **Design a Transportation Vehicle:** Students can design and build a model vehicle (e.g., a truck or cart) that can transport their pumpkin over a specific distance or obstacle course.
- **Create a Pumpkin Art Project:** Students can decorate their pumpkins using various art materials (paint, fabric, etc.) and present their designs, explaining their artistic choices.
- **Science Exploration:** Conduct a science experiment to observe how different weights affect balance. Students can use small weights to test how their device holds up under varying loads.
- **Engineering Journal:** Students can keep an engineering journal throughout the project, documenting their design process, challenges faced, and solutions found, culminating in a final reflection.
- **Guest Speaker:** Invite a local engineer or designer to speak about their work. Students can prepare questions based on their experiences in the project.
- **Pumpkin Science:** Explore the life cycle of a pumpkin, including planting seeds and observing growth. Students can start a small garden or plant seeds in pots.
- **Team Challenges:** Organize relay races or challenges where students must transport their pumpkin using their device, encouraging teamwork and collaboration.