Engineering Design Challenge: Creating Playground Prototypes

Warm-Up

What is Engineering Design?

- A systematic approach to solving problems
- Key steps: Identify, Research, Plan, Create, Test, Improve
- Today's focus: Brainstorming and Prototyping
- Think about: What makes a playground both fun and safe?



Materials and Tools

Construction Materials:

- Cardboard
- Paper
- Scissors
- Glue and Tape

Design Tools:

- Pencils and Erasers
- Digital Design Software (optional)
- Canva or AI image generation tools (optional)



Brainstorming Guidelines

Form teams of 3-4 students

- **Consider these factors:**
  - Safety features
  - Environmental impact
  - Age-appropriate elements
  - Accessibility
    - Sketch initial designs
    - Document all ideas, even unusual ones

DESIGN Constraints

Safety Requirements:

- Appropriate heights
- Impact absorption
- Clear sight lines

Environmental Considerations:

- Sustainable materials
- Weather resistance
- Minimal environmental impact

Budget and Space limitations.

Reflection Questions

- **What scientific principles guided your group's choices?**
- **How did you ensure your design was safe and environmentally friendly?**
- **What potential challenges might arise in the implementation of your playground?**

Prototype Development

Select best design from brainstorming

- Create scaled model using provided materials
- Focus on:
    - Structural integrity
    - Key features
    - Proportions
    - Label all components



Ground Presentation Guidelines

Each team presents:

- Design concept
- Safety features
- Environmental considerations
- Unique elements
  - Prepare for peer feedback
  - Use presentation rubric



Reflection Question

Scientific Principles:

- What forces are at work?
- How does gravity affect your design?
  - Safety Considerations:
- How did you address potential risks?
  - Environmental Impact:
- What sustainable features did you include?



Assessment Criteria

- Innovation and Creativity (25%)
- Safety Features (25%)
- Environmental Considerations (20%)
- Presentation Quality (15%)
- Team Collaboration (15%)

Rubric: Student Rubric and Checklist

Engineering Design Playground Project – Student Rubric

Category	Extensive Evidence	Convincing Evidence	Limited Evidence	No Evidence
Key Concept	Your design is clearly guided by a specific scientific or engineering principle, with detailed explanation and strong justification.	Your design shows a clear connection to a scientific or engineering principle and some justification..	A principle is referenced but not clearly explained or connected to the design.	No principle is identified or applied.
Design Requirements	Requirements are clearly defined (e.g., safety, accessibility, age group, environment), with strong alignment to user needs	Most requirements are defined and somewhat aligned with user needs	Some requirements are mentioned, but connection to user needs is unclear.	Requirements are missing or unrelated to user needs.
Brainstorming & Sketch	Multiple well-thought-out sketches are provided with justifications for final design choice	More than one sketch is provided and a design is chosen with some reasoning..	One basic sketch is provided; little reasoning for the final design.	No sketches or unclear design process..
Sustainability & Safety	The design includes multiple eco-friendly materials/processes	The design includes at least one sustainability element and two	One safety or sustainability element is	No evidence of safety or sustainability.

Project Timeline and Next Steps

- Day 1: Brainstorming and Initial Designs
- Day 2: Prototype Creation
- Day 3: Testing and Modifications
- Day 4: Final Presentations
- Remember to document your process

- Take photos of your prototype stages

