Problem 1.5.9 Playground Design

Introduction

Your school's Board of Education has contacted your class and asked if you will design a new playground for the elementary school. Your class will work as a team to sketch and design a solution for the playground using the design process. You will present your solution to a representative from the committee.

Teamwork is essential in order to finish in time and present your solution. A team is a group of individuals, each with an expertise, who are brought together to benefit a common goal. The benefits of working in a team are that
1. More ideas can be pursued.
2. The workload is shared.
3. More work can be accomplished.

Make sure your group completes all stages of the design process. One of your biggest constraints is time; you must be prepared to present your design solution by _____. (Record the date that your teacher provides.)

Equipment

- PLTW Gateway notebook
- Pencil
- Graph paper
- Metric rulers
- Computer with 3D modeling program, Internet access, word processing software, and presentation program
- Printer
- Digital camera (optional)
- Tech Cards kit
- Paper glue
- Paper fasteners
- Paper clips
- Hot glue gun and glue
- Pencil sharpener
- Tape
- String
- Scissors
- Easy cutter
- Craft knife
- Dowel rods
- Hole punch

Procedure

In this activity your class will work as an engineering design team. You will use your knowledge of the design process, engineering tools, the Internet, and teamwork to communicate and work with your partners to solve the playground problem. Make at least one entry in your Gateway notebook for every class period. Identify all of your research sources, and sketch all of your ideas in your Gateway notebook.

1. **Define the problem** by completing the Playground Design Brief as a class. List the criteria and constraints presented by your teacher, the playground committee representative, and the constraints your team decides to include. For example, your team (class) may decide the playground should have a safari theme or should be color-coded for age-appropriate play areas.

2. As you complete each step in the Design Process, describe the steps that you took on the Playground Design Process Solution chart.

3. **Generate Concepts** by brainstorming with your classmates as to how you can complete this problem given your resources and constraints.

    - Research by taking a tour of an existing playground, online, or by asking elementary-aged students what types of playground equipment they like.

    - Break into smaller groups. Each group will design and complete a specific part of the playground. Each student will sketch 3 thumbnail sketches that follow the criteria established by the class and follow the guidelines presented in the Engineering Notebook Sketching Example Document.

    - Use a decision matrix to decide on the best solution for your team's playground equipment.

4. **Develop a Solution** based on the criteria and constraints for the design and the results of your decision matrix.

    - Use 3D modeling software to create computer **models**. Print a working drawing.

    - Include files of each assembly with balloons and a parts list.

5. **Construct** a scaled **prototype** of the playground equipment using the supplies provided by your teacher.

6. Continually **test and evaluate** your design solutions as you model your solution. Have elementary-aged students look at your designs and give you feedback on how they may want that piece of equipment to look, act, or work.

7. **Present your Solution** to the playground committee representatives who come and listen to your presentation. All students should be involved in the presentation, some speaking, some helping with technology, and some helping with room organization. All students should be available during a question and answer time following the presentation. The following items should be included in your presentation:

- Explain the problem.
- Review the constraints.
- Explain the research that was conducted.
- Show and explain initial design sketches.
- Explain why an idea was chosen to pursue or why it wasn't pursued.
- Show and explain working drawings of 3D computer model.

- Show and explain your prototype.
- Explain the method of testing and evaluating the models.
- Explain changes made to initial CAD drawings and why these changes were made.
- Questions?

Presenters should:
- Present in a logical order.
- Maintain good eye contact with the audience.
- Use good voice projection.
- Practice and be well prepared to present.

| Client:	
Designer:	
Problem Statement:	
Design Statement:	
Constraints:	
Deliverables:	

1. In the criteria boxes, list the criteria from your design brief.

2. Under the ideas boxes, put your 3 ideas and your partner's 3 ideas – label the sketches A, B, C, D, E, and F.

3. Evaluate the design idea for each criteria, giving it a value between 1 and 4. A value of 1 means it doesn't meet this criteria, while a value of 4 means this is the best possible solution to the problem for this specific need.

4. If your criteria is a question, use 1 if the answer is no, 2 if the answer is yes.

5. When you finish evaluating your sketches, add the numbers across and put your answer in the Total column.

6. The design with the highest total is your Best Solution.

	Criteria						
Ideas							**Totals**
A Designed by:							
B Designed by:							
C Designed by:							
D Designed by:							

E Designed by:							
F Designed by:							

My Design Process Solution
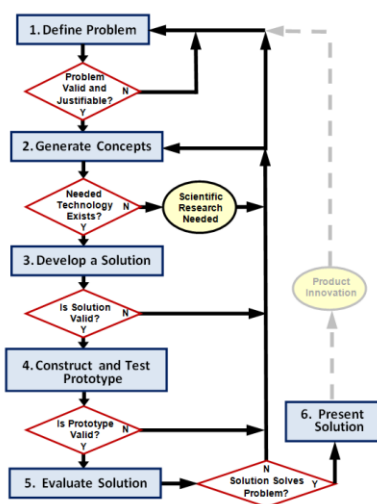
Design Process Step	Definition	Student Work at This Step
Define Problem		
Generate Concepts		
Develop a Solution		
Construct and Test Prototype		
Evaluate Solution		
Present Solution		

Conclusion

1. What specific tasks were you responsible for?

2. What was the most challenging part of this design experience?

3. Which stage of the design process was most difficult for you and why?

4. The seven resources of technology are listed below. Give an example of how you used each resource to solve the playground design problem.

   - Capital (Money or Value)
   - Time
   - Information
   - Materials
   - People
   - Energy
   - Tools and Machines