**Technology Education
Career & Technical Education
Desert Hills Middle School**

**Punkin’ Chunkin’ Design Challenge**

**Objectives:**

* Formulate a design process that can be used to solve a technological problem
* Recognize important design considerations
* Identify a design problem
* Brainstorm solutions
* Create a prototype
* Test the prototype
* Redesign/optimize the solution
* Create and utilize an engineering notebook per established conventions

**Criteria:**

You have entered a “punkin’ chunkin’” contest at a local fall harvest festival. The object of the contest is to launch a 10 lb. pumpkin farther than the other contestants. You must design and build a launching mechanism to accomplish this. Before building the full-size machine, you must first create a prototype. Your prototype must be able to throw a small wiffle-ball at least 10 feet, counting any rolling which takes place after the ball impacts the ground. You must also thoroughly document your design in your design notebook so that the full-scale machine could be built based on your prototype.

**Constraints:**
You may only use the materials provided in your kit, including:

* Large red cup
* Small paper cup
* Steel rod
* Spool of string
* Small wiffle ball
* Plastic rectangle
* Large balloon
* 2 pipe cleaners
* 3 Large rubber bands
* 3 Small rubber bands
* 15 craft sticks

You may also use as much hot glue as you need.

You may modify any of the materials as needed, using available tools.

**Directions:**

1. Begin with a date entry at the top of the first open page of your design notebook. Title this entry “Punkin’ Chunkin’ Design Challenge.” If you use multiple pages, be sure to date each page. At the end of each day’s work, you will also need to summarize that day’s activity in your design notebook.
2. Identify the problem:
	1. In your design notebook, list the criteria and constraints for your design.
	2. Investigate any existing solutions, and summarize them in your design notebook.
3. Brainstorm solutions:
	1. With your design team, list at least 5 possible solutions in your design notebook
	2. For each potential solution, make a list of pros and cons in your design notebook
	3. Narrow the list to the top two solutions, and write these in your design notebook.
	4. With your design team, discuss which of the two solutions to choose. Select one solution to pursue, and write in your design notebook which solution you chose and why.
4. Build a Prototype
	1. Use sketches and mathematical models to plan your prototype in your design notebook
	2. From your plans, use the materials provided and the available tools to create your prototype
5. Test the prototype
	1. In your design notebook, record failures and successes of your prototype
	2. Write in your design notebook how your design did or did not meet the criteria you listed at the beginning
6. Redesign
	1. In your design notebook, write and/or draw how you will address failure points
	2. Use your plans to improve your prototype and retest it
7. Turn in your Design Notebook for evaluation.

**Punkin’ Chunkin’ Design Challenge Rubric**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **3 Points****Full Marks** | **2 Points** | **1 Point** | **0 Points****No Marks** | **Multiplier** | **Score** |
| **Meets Criteria** | The prototype throws a small wiffle-ball at least 10 feet | The prototype throws a small wiffle ball at least 7.5 feet | The prototype throws a small wiffle ball at least 5 feet | The prototype throws a small wiffle ball less than 5 feet | **1X** |  |
| **Adheres to Constraints** | The prototype falls within all of the specified constraints | The prototype exceeds 1 specified constraint | The prototype exceeds 2 or 3 specified constraints | The prototype exceeds more than 3 constraints | **1X** |  |
| **Design Process** | All steps of the design process were clearly followed | 4 of the five steps of the design process were clearly followed | 3 of the five steps of the design process were clearly followed | Less than 3 of the five steps of the design process were clearly followed | **1X** |  |
| **Design Notebook** | Design notebook follows all conventions and is complete, neat, and legible | Design notebook mostly follows conventions or is mostly complete, neat, and legible | Design notebook partially follows conventions or is partially complete, neat, and legible | Design notebook does not follow conventions or is incomplete, messy, and illegible | **2X** |  |
|  |  |  |  |  | **Total Score** |  |