Robotics Engineering

DoDEA Career and Technical Education

First Semester Exam

Practicum

Objective:

Use the Engineering / Design Process to build a Rube Goldberg device that squeezes toothpaste onto a stationary toothbrush.

Discussion:

The machine must include at least seven steps in the process. It must incorporate at least four different simple machines. Machines may use the same simple machine more than once but its use only counts once. Your creation must incorporate at least four different simple machines for full credit. Potential energy can be stored in the machine including the use of electric components. However, the machine must be placed into motion using a trigger mechanism. The process must be fully documented using the ten-step Engineering / Design Process Worksheet where all the steps are clearly and completely annotated. The project, in its entirety must be presented and then demonstrated to the class. Only materials approved by the instructor may be used and it must comply with the specified size restrictions. The presentation must describe the rationale used in creating the design and list all safety procedures followed during its construction and use.

Scenario:

The Veterans' Administration (VA) has hired a team of engineers to support disabled veterans with simple tasks. One of these tasks is to put toothpaste on a stationary toothbrush for veterans so they may be more independent in life skills. You have been asked to contribute your design along with a prototype that may be mass-produced at a later date. The VA will ask for a detailed description of all the steps in the design process. Any research done should also be documented and submitted in the report.

Deliverables:

1. Complete Engineering / Design Process Worksheet used to solve this problem
2. Working prototype of the solution machine
3. Presentation depicting the Engineering / Design Process to include:
    - Define
    - Ideate
    - Create
    - Solve
    - List of safety guidelines required as part of this project
    - Explanation of the materials chosen to fabricate this product
    - Bibliography of resources utilized

Assessment Rubric: Rube Goldberg Toothpaste Machine

Name(s):	Period:	Date:

Sketch / Design Notes:

Item	Criteria	Assessment	
		Student	Instructor
A	**Engineering / Design Process**		
	Has the student completed an Engineering/Design Process Worksheet?	Yes/No	
B	**Working Prototype**		
	Does the solution include seven distinct but continuous steps?	Yes/No	
	Does the solution incorporate four different simple machines?	Yes/No	
	Does the solution comply with the announced constraints and criteria?	Yes/No	
	Does the solution operate as required?	Yes/No	
C	**Presentation**		
	Does the presentation represent the Engineering/Design Process?		
	• Define	Yes/No	
	• Ideate	Yes/No	
	• Create	Yes/No	
	• Solve	Yes/No	
	• List of safety guidelines required as part of this project	Yes/No	
	• Explanation of the materials chosen to fabricate this product	Yes/No	
	• Bibliography of resources utilized	Yes/No	
	Is the presentation free of spelling and grammatical errors?	Yes/No	