

Bobblehead Design Project

Lesson Plan for Grade 7-9, Introduction to Engineering Design

Time Needed: *Approximately 2 1/2 weeks - Dependent on length of time for 3D printing (45-55 minute class periods)*

OVERVIEW & PURPOSE

This project is used as an end of unit/end of quarter assessment of the students' ability to correctly work through and document the engineering design process as well as their skills in using CAD software to design a new product.

EDUCATION STANDARDS

1. Students perform the steps of the design process to develop and analyze products and systems.
2. Develop a working engineering notebook according to appropriate standards

OBJECTIVES

Students will be able to:

1. Apply and adapt the design loop as a guide in creating a solution
2. Demonstrate effective, proper documentation of an entire project in an engineering notebook.
3. Translate a pictorial sketch into a 3D model using a CAD software.

MATERIALS NEEDED

1. Bobblehead Project Packet
 - a. Bobblehead Project Overview
 - b. Bobblehead Project Design Brief
 - c. Mega Awesome Superdome Event Calendar
 - d. Bobblehead Project Rubric
2. Bobblehead (for students to reference) - ***optional***
3. Computers/Laptops with CAD software
4. 3D Printer
5. 3D printed springs - [Spring STL file](#)
6. Acrylic Paint - ***optional***

ACTIVITY OVERVIEW/SCHEDULE

Day 1

1. Hand out and go over the Bobblehead Project Packet with the class.
 - a. Overview
 - i. Read the introduction to the class
 - ii. Cover what the students will need to complete and submit
 - iii. Cover timetable/schedule for project
 - b. Design Brief
 - i. Discuss problem and design statements
 - ii. Be sure to explain the criteria and constraints
 - c. Event Calendar
 - i. Give examples of theme nights
 1. [Mike Smith Bobblehead Night Video](https://youtu.be/iIvmfBLvy3M) - <https://youtu.be/iIvmfBLvy3M>
 2. [Kevin Durant Bobblehead Night Video](https://youtu.be/Nm4UsGhG3DE) - <https://youtu.be/Nm4UsGhG3DE>
 3. [Game of Thrones Night King Bobblehead night video](https://www.youtube.com/watch?v=fgAlYeL3tVU) - <https://www.youtube.com/watch?v=fgAlYeL3tVU>
 4. [Hispanic Heritage Day Bobblehead Day](https://www.youtube.com/watch?v=RPpaxZavN4M) - <https://www.youtube.com/watch?v=RPpaxZavN4M>
 - d. Project Rubric
 2. Show example of a real bobblehead (if you have one available)
 - a. Show an example of your own 3D printed bobble head if you have time to design and print on before the project.
 3. Let students know they need to have three quality concept sketches of bobbleheads related to a theme night and a decision matrix turned in by next class.

Day 2

1. Review concept sketches and decision matrix of each student. Make sure students select one of their idea sketches based off of criteria in their decision matrix. Then have students begin taking their sketches and turning them into CAD models.
2. CAD Models due by the middle of the 2nd week.
 - a. Students will need to reverse engineering the 3D printed spring and create a 3D model of it for use in their CAD bobblehead assembly.
 - b. Alternative - create a spring CAD model and share it with the entire class through Google Drive or LMS

Day 3-7

1. Time to create CAD models and drawings
 - a. *At a minimum*

- i. 1 Head model
 - ii. 1 Spring model
 - iii. 1 body/base model
 - iv. 1 assembly model
 - v. 1 drawing file of assembly - needs to show front, top, right side, and shaded isometric
 - vi. 1 drawing file of exploded assembly - with balloons and parts list
2. Models must be submitted to the teacher for 3D printing by end of 7th period.

Day 8-10

1. 3D Printing time
2. Students can work on promotional material for their 3D bobblehead and chosen theme night.
 - a. Poster/Pamphlet and Presentation
 - b. 30 second video commercial

Day 11-13

1. 3D bobble heads are assembled together
 - a. If there is time students should paint their bobbleheads
2. Students present their bobbleheads
 - a. Either through their poster and presentation or showing their commercial to the class.

Bobblehead Project Overview

Introduction

You are a freelance designer who has been contacted to design a bobblehead for the Mega Awesome Superdome, the biggest arena for sports, concerts, events, and conferences in the city of Super Awesome Coolville. You need to come up with a bobblehead that will entice people to come out to the Superdome for one of their upcoming events. The bobblehead should be based around a theme night for the event you choose. You may come up with your own theme night or use one from the calendar. If you come up with your own it must be approved. Use the Mega Awesome Superdome Event Calendar to choose your event and theme night. Review the Bobblehead Project Design Brief to see your constraints for your bobblehead design. At the conclusion of this project you will have to present/pitch your bobblehead to the class using promotional marketing materials you create that will get the word out around town about your bobblehead night.

Student Deliverables

- Three Bobblehead Concept sketches based on a theme night
- Decision Matrix
- Bobblehead CAD Models
 - Head
 - Spring
 - Body/Base
 - Assembly
- Bobblehead CAD Drawing
 - Assembly Drawing
 - Front, top, right side views with shaded isometric
 - Exploded Assembly Drawing
 - Shaded Isometric with balloons and parts list
- Assembled 3D Printed Bobblehead
 - Should be painted if you have time
- Promotional Marketing Material
 - Poster with a 30 second to one minute elevator pitch presentation
 - 30 second video commercial

Due Dates

- ❑ End of 2nd Class
 - ❑ Three Concept Sketches and Decision Matrix
- ❑ End of 7th Class
 - ❑ All CAD models and drawings
- ❑ 13th Class -
 - ❑ Assembled 3D printed bobblehead
 - ❑ Promotional Marketing Material
 - ❑ Poster/Presentation
 - ❑ Video Commercial