**Using the Engineering Design Process to…**

**Design an Organizational System**

Greetings, engineers! Today, you will start putting your knowledge of the production process to the test! Your engineering team will be building the prototype for an organizational system for your classroom that will help prevent F.O.D. (foreign object debris) from occurring. Your assignment is to design and build an attractive and easy-to-use system that will keep a particular area of the classroom neat & tidy. This area might be your ‘Makerspace Area’, art supplies, science supplies, class games, library, etc. For this project, you will be using material provided by your teacher or items that can typically be found around the classroom or school. (In other words, you may not buy drawers or trays or other premade organizers.) The students in your class will help to ‘test’ your design for one week. You will get feedback from your ‘consumers’ (your classmates) and make any necessary changes to your design. Your organizational system will be considered a ‘success’ if that area of the classroom stays clean, tidy, and F.O.D.-free for a week. You will also be ‘graded’ on your systems design and ease-of-use by your classmates. Your final product should look appealing and add to the décor of the room, rather than looking like a structure being held together by tape & rubber bands. Please be sure to keep this in mind during your design phase.

You will be given some materials that you can use to create your system. You will also be given a budget sheet to purchase additional materials (see below) as needed. Your team will need to stay within the assigned design budget to purchase the supplies for your prototype. Good luck! ☺

**Your mission is to:**

**Build an organization system that will keep a section or area of the classroom clean, tidy, and F.O.D.-free. This system must be easy to use, attractive, and sturdy.**

**Extra Available Materials:**

Your organization system must be cost-efficient to build.

You have a budget of $350 to build your system.

Material Cost:

* Aluminum Foil = $50 per 12 in. by 12 in. sheet
* Popsicle Sticks = $15 per stick
* Masking Tape = $35 per 12 inch strip
* Plastic Straws = $25 per straw
* Colored Paper = $20 per sheet
* Yarn = $10 per foot

**Using the Engineering Design Process to…**

**Design an Organizational System**

1. **Ask: Define the problem**
   1. How can I build an organization system for an area of my classroom that will help to keep that area neat, tidy, and F.O.D.-free for a week?
   2. **Identify Limiting Factors/criteria:**

* Engineers must use only the materials provided by the teacher. Your teacher will initially provide you with a choice of boxes and some important supplies. Use your supplies wisely!
* Engineers will initially get only 30 cm of masking tape. They more purchase more with their budget.
* The organizational system should be easy to use. You may include simple instructions and/or graphics on the side of the system for your consumers.
* The organizational system should look appealing and add to the décor of the room.
* The organizational system should keep that particular area of the room and F.O.D.-free for a week.
* The organizational system ‘fails’ if more than 2 students have to ask how to use it; if the system doesn’t hold-up to regular use after one week, or if your consumers (classmates) continue to misplace the items that are meant to go in the system.

1. **Imagine: Gather information & generate ideas:**

Compare and contrast the task you have been assigned with organizational systems that you may have around your house or ones that you have seen elsewhere like at a store. What do you think would make such a system effective? What would make it difficult to use? Include any information that may help you solve the problem.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Plan –explore ideas by drawing & then select a solution:**
   1. Sketch two **different** designs of possible organization systems. Be sure to include ALL of the supplies that you will need and add **labels!**

1.

2.

**Pick the organizational system that you think will be most effective. Explain WHY you think this is the best design. (Please use the advantages/disadvantages chart on the next page as a guide.)**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Advantages:** | **Disadvantages:** |
|  |  |
|  |  |

**B. Select a Solution**

1. **Discuss your ideas with your groups and decide on the best features of your organization system to use. Your group will design and build ONE system on this first day to test.**
2. **On the next page, calculate the additional supplies that you want to purchase for this initial prototype and sketch a detailed diagram of the design you have chosen for your first organization system with labels and color.**

**Calculate Cost**

**Directions:**

**Write down the quantity and cost of each type of material you will be using for your organization system. Use that information to find the total cost of your extra supplies.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Aluminum**  **Foil** | **Popsicle Sticks** | **Masking Tape** | **Plastic Straws** | **Colored**  **Paper** | **Yarn** |
| **Cost per Item** |  |  |  |  |  |  |
| **Quantity**  (Number you are purchasing) |  |  |  |  |  |  |
| **Total Cost of Materials** |  |  |  |  |  |  |
| **Total Cost of Supplies** (add up your materials cost in the 3rd row): **\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | | | | |

**Draw Prototype Design Below**

1. **Create – Make the Organization System!**

Did your design go together as planned? Did you make any changes?? Explain:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

1. **Test & Evaluate** **your** **organization system**.

Describe exactly how your organization systemperformed. What worked well? What needs to be improved?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

How did your group perform as a team? What improvements would you make to help you communicate or collaborate better during your next phase of design?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**6. Improve/Redesign ~ Make changes as needed:**

Based on your observations, how would you modify (change) or redesign your organization system?

* Did your system meet the basic design change criteria?
* If so, could you make your organization systemmore interesting or innovative?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Draw Your Improved Prototype Design Below**