**Lesson 1:Project Introduction**

**Problem statement:** How can we create a sustainable package that delights the customer and meets the needs for both budget and specs?

**Learning objectives:** Students will learn about the design process and the expectations for the project.

By the end of the lesson, students will be able to verbalize and rationalize the purpose of package design.

**Lesson standards (NGSS, CCSS, CTE):**

3-5-ETS1 Engineering Design: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost

3-5-ETS1 Engineering Design: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1 Engineering Design: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved

**Soft skills:**

**Collaboration:** Students will be explicitly asked to collaborate on making observations of multiple packages and recording these onto a chart.

**Critical Thinking:** Students will think critically about the purpose of the packages and how they differ from one another

**Communication:** Students will communicate regarding their observations of packages and come to a consensus about what to record in their chart.

**Locally and/or personally relevant for students:**

Think about a time you received a package - What did it look like? How was it designed? How did you open it?

Why do you think packaging is different? How do you think companies decided on which materials to use? Who designs those materials?

**Connections to career and educational pathways:**

Packaging design crew at Microsoft -Pathway to the field via Skype

Who designs the packages? What do you think their background could be in? What knowledge would they need to be able to design that package?

**Materials:**

-6 different sample empty boxes/packages with different purposes (Microsoft vs Old Navy, etc)

-Packaging 101 Worksheet (Appendix A)

-Project Plan Outline (Appendix B)

-Shipping Facility Rubric/Blank Rubric (Appendix C)

-Exit Ticket (Appendix D)

- Plastic or hard-boiled egg (teacher discretion)

**Optional: Video to show shipping facility/shipping process (Inside one of UPS’ busiest days** [**https://www.youtube.com/watch?v=l0-ukGIwcH8**](https://www.youtube.com/watch?v=l0-ukGIwcH8)); this can also be shown in lesson 9

**Lesson preparation:**

* Organize class into groups (3-5 students per group)
* Collect at least 6 different empty packages to introduce to students, preferably ranging in size, shape, and purpose (1 package per table group needed)
* **Copy Packaging 101 worksheet** for each group
* \*Copy a completed **Rubric** for each student (teacher/class can decide whether to use the premade **Shipping Facility Rubric** for the packaging tests or the **Blank Rubri**c to design their own tests)
* Copy **Exit Ticket** for each student
* Have **Project Plan** ready to project/copy for students

**Time required: 45 minutes**

|  |  |
| --- | --- |
| **Teacher** | **Student** |
| Introduction: 5 minutes  Imagine you work for a big company that makes toys or electronics. Your company spent years designing and testing your product, and now you’re ready to ship it to your customers!  Begin by introducing the big question  **How can we create a sustainable package that delights the customer and meets the needs for both budget and specs?**  If needed, teacher breaks down this problem into kid-friendly language such as:  “How does your company design a package that doesn’t cost too much, keeps your product safe, and that looks good? | Students listen |
| Table Talk: 3 minutes  Teacher asks students to begin by sharing a personal experience they’ve had with packaging. | Students go around table group telling their stories to link to their prior knowledge. |
| Project explanation: 20 minutes  Hands out 1 package to each table group and one Packaging 101 sheet to each group and give expectations of what to do during their 3 minutes with each package. | Students discuss and record observations about each package on Packaging 101 Sheet.  Students pass package to the next table at the end of each 3 minutes |
| Whole class discussion: 5 minutes  Collect boxes, collect ideas and observations on a class chart.  Purpose for packaging:  Materials for packaging:  Packaging design:  Other: | Students share out observations, add any thinking to their own worksheet. |
| Rubric explanation: 10 minutes  In this unit, in our design groups, we will be designing a package that will be transporting a highly valuable artifact to a country on the other side of the globe. You must ensure that your artifact (a highly-valuable egg) survives a “shipping facility test”. This test will be in our school playground. Your artifact may, or may not, survive all of the tests because of the choices you will make in the design process  \*Teacher/class can choose to use pre-made rubric or design new tests with the class\*  Let’s now talk about the tests we want to design.  Teacher sets up project by sharing rubric (either Blank or Completed Rubric) and the plan for the unit.  Share project plan with students | Students follow along with their rubric.  Class observes outline and asks questions, as needed |
| Exit Ticket: 2 minutes  Teacher passes out exit ticket/ collects at end. | Students complete exit ticket |

**Accommodations:**

-An alternative to completing the Packaging 101 chart is for students to draw each of the boxes and label them

**Extensions:**

-Students can use the blank rubric to design their own tests instead of the Completed Rubric

**Assessment:**

*Formative Assessment in the Lessons*

Collect and review the Packaging 101 worksheet; this will provide insight into the students’ perceptions about packages

*Summative Assessment for the Unit*

Students conduct the tests, complete the rubric, and reflect on the design process that allowed their package to be successful/unsuccessful in each section of the rubric.

**References/Resources:** *See below*

*Appendix A*

Packing 101

Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Table #/Name\_\_\_\_\_\_\_\_

For each package, you will have **three** minutes to write down what you notice and what you think you know about the package

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | What do you notice? | Materials Used | Colors and Design | What purpose does the package serve? |
| Package 1 |  |  |  |  |
| Package 2 |  |  |  |  |
| Package 3 |  |  |  |  |
| Package 4 |  |  |  |  |
| Package 5 |  |  |  |  |
| Package 6 |  |  |  |  |

*Appendix B*

**Project Plan Outline**

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| --- | --- |
| Day | Project Plan |
| Day 1 | Introduction to problem |
| Day 2 | Technical Drawing/models |
| Day 3 | Prototyping and manufacturing:  Does your model actually work?  How do you assemble the materials? |
| Day 4 | Procedural writing |
| Day 5 | \*Researching sustainable resources |
| Day 6 | \*Budget, Purchasing and Construction |
| Day 7 | Volume and surface area |
| Day 8 | Art/Design |
| Day 9 | Shipping Test Day |
| Day 10 (extension) | Extension lesson:  How do videographers uses music, images, and colors to convince consumers to buy their product? |
| Additional days as needed | Unit Overview |

*Appendix C*

**BLANK SHIPPING FACILITY RUBRIC**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SHIPPING FACILITY TEST |  |  |  |  |  |  |
| FAIL/PASS TEST:  (✓ or X) |  |  |  |  |  |  |
| NOTES |  |  |  |  |  |  |

**COMPLETED SHIPPING FACILITY RUBRIC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SHIPPING FACILITY TEST | 1. Drop test   Drop package from top of red pole; if any part of package becomes detached or cut during test, package fails test | 1. Slide test   Release package at top of green slide; if it becomes stuck, the package fails the test | 1. Swing test   Hold package on swing 1 meter high; if package falls out of swing, the package fails the test | 1. Ramp   Push package up yellow ramp with 1 hand. Package must start at bottom of ramp and remain on the ramp until the top. | 1. Throw test   Package must be thrown and caught between each group member 2 arm-lengths apart. If package is dropped, test fails |
| FAIL/PASS TEST:  (✓ or X) |  |  |  |  |  |
| NOTES |  |  |  |  |  |

*Appendix D*

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| Exit Ticket Name:  What are the two biggest take aways you noticed in terms of the purpose of packaging? |

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