**Lesson Plan Format**

**School of Education**

**The College of New Jersey**

1. Title or Topic of the Lesson and Grade Level

Making Eco Friendly Packages, Sixth Grade

1. Lesson Essential Question(s):

What are some ways to compare two dependent things?

How can we make an impact on our environment?

1. Standards: Identify the appropriate standards that you will *assess* in this lesson.

NJ Common Core:

8.2.8.B.1 Design and create a product that addresses a real-world problem using the design process and working with specific criteria and constraints.

Common Core State Standards:

[CCSS.MATH.CONTENT.6.RP.A.1](http://www.corestandards.org/Math/Content/6/RP/A/1/)
Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Next: Generation Science Standards:

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| **MS-ESS3-3.** | **Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment** |

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| --- | --- |
| **MS-LS2-5.** | **Evaluate competing design solutions for maintaining biodiversity and ecosystem services** |
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4. A. Learning Objectives and Assessments: Write a sentence for each of your desired

 learning outcomes. These must be written in observable terms and be assessable. These must also

 correlate to the NJCCC Standards addressed above.

B. Assessments: Describe the assessments you will use to measure student progress towards or success in attaining the learning objectives. You may include homework assignments.

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| Learning Objectives | Assessments |
| Students will be able to use the design process to create a design to decrease over packaging to benefit recycling in our community with an accuracy of 100 percent. | I will assess how well each student can use the design process by meeting with each group to discuss how they are using the design process to create their package.  |
| Students will be able to recall the concept of ratio and produce the ratio language to describe the relationship between the weight of their package with the contents and the weight of the contents alone with an accuracy of 90 percent.  | I will assess how well each student can use the correct language of ratios by listening to the students state their ratio they have created with their package. |
| Students will be able to integrate responsible recycling methods to design a package using the minimum of materials to safely send a package with an accuracy of 85 percent.  | I will asses how well each student can design a package using the minimum of materials by the appropriate ratio based on the constraints of the design given of the two gross weights of the package with the contents and the weight of the contents alone.  |
| Students will be to evaluate the differences using a previous design they made in class and the more eco friendly design they make in class today with consideration of our environment with an accuracy of 90 percent.  | I will asses how well each student can evaluate the competing design solutions by having a whole class discussion about how each design affects the environment in our community.  |

5. Materials: List materials/resources you and the students will need to teach/learn this lesson.

Four pieces of poster board

8 Styrofoam cups

Four feet of masking tape

Four scales

Four Ziploc bags with four chips in each bag

8 paper clips (two for each group)

Smart Board

Lay’s potato chip package worksheet (12 copies)

Rectangular prism template (4 copies, one for each group)

6 . Pre-lesson assignments and/or prior knowledge:

Students will have done research on recycling in their community. Also they will bring in a package from home with contents in them. The students will also have prior knowledge of how to use the design process to their benefit without given the time for each individual step.

7. Lesson Beginning:

<http://kids.nationalgeographic.com/kids/games/actiongames/recycle-roundup/>

8. Instructional Plan:

* The lesson will begin with students coming right in and following the directions on the board to open the website. Once students are settled teacher explains they will be exploring how different items are recycled in our environment. Teacher will explain they do not start playing the game until everyone is ready. <http://kids.nationalgeographic.com/kids/games/actiongames/recycle-roundup/> . After they finish the game, ask does anyone see this done in there home or anywhere else. “How would sorting items that need to be disposed benefit our community.” (4 minutes)
* Once the students finish playing the game. Begin to prompt the students to discuss the research they have found regarding their recycling program in their community. This will lead to why recycling is important for our environment. ( 3 minutes)
* Students brought in a package from home. Teacher will model how to weigh a package using the scale in the classroom. The students will then weigh their package and the contents in the package separately. Teacher will explain quickly again what a ratio is, the comparison of two quantities. Teacher will also go over the right type of language to use while speaking about ratios. The students will share the four scales with their classmates. They will then compare the two numbers, creating a ratio. We will create a table on the smart board with everyone’s ratios and create a ratio equivalent to each one. Teacher will guide the students to use the correct language for comparing the two quantities. Students will state the ratio they have to the teacher using the correct language for ratios while the teacher is recording them on the smart board. (15 minutes)
* “Does anyone have any ideas why over packaging may be an issue?” This question will lead into students discovering that if there was less over packaging there would be less for our community to recycle saving economic costs. However teacher will stress that it is important that the package is protecting the object. Bring up past activity asking if they believe if it would be possible to safely package the four potato chips with a smaller volume than 36 inches cubed. (2 minutes)
* Teacher hands out the worksheet that introduces the problem. Introduce the problem: We are going to create a package now for us to send every home on the west coast four potato chips of a new flavor Lay’s potato chips invented. Teacher prompts the students to state what they believe a good ratio would be between the weight of the package with the contents and just the contents of the package. Teacher will clarify the ratio the class and teacher decide on will be one of the constraints for this design. The students will then add the appropriate ratio to their worksheet the ratio as a class we decided to use. Teacher will also go over other constraints such as they package needs to safely send the chips to all homes, only can use materials supplied by teacher. Explain to students they are encouraged to use the scale to weigh the package materials. Teacher gives students full creative control on how they want to make the package with the Styrofoam cups or the poster board. Teacher asks the students what do they remember about the dimensions of rectangular prism, if they would like to make a rectangular prism with either material given they can. Students will know that the dimensions are length, width, and height. (5 minutes)
* Teacher will divide the 12 students into four groups, and hand out the already organized materials to the students. Teacher will instruct the students to use their previous knowledge of the design process before they begin creating their package. Teacher will put a 15-minute timer on the computer and instruct the groups to begin designing and to keep the constraints in mind. (1 minute)
* Students will begin designing their package using the design process. Teacher will visit each group numerous times questioning their plan to meet the ratio given. While meeting with each group teacher will first ask what material they plan to use and why. Also what type of shape package they are going to make with their materials. (15 minutes)
* The alarm will tell the students their designing time is done. Teacher will instruct each group to weigh their package with the four chips in it and then just weigh the chips. The students will create a ratio and see how close they are to the ratio they were to meet. (5 minutes)
* Teacher will tell each group they will present to the class the ratio they received and what they would do differently next time. Each group will present to the teachers directions. (5 minutes)
* Closure: See below (5 minutes)
	+ Differentiation:

I will create the groups for the design challenge to benefit all children. I will put different intelligences in the same group so they can feed off each other for coming up with this design. While observing the group work I will make sure that all students are incorporating their ideas in this design

* + Questions:
		- Make an inference on how over packaging can be an issue?
		- As a review, define a ratio?
		- How can you manipulate the weight of your package for it not be considered over packaging?
		- Compare this design to our previous Lay’s Photo Chip challenge in regards to our environment?
	+ Classroom Management:

The materials will be easily distributed as they are already organized on the teacher’s desk. The teacher to meet behavioral expectations and learning expectations will create groups prior to the beginning of the lesson. Teacher will explain that they are middle school students and they should know how to behave correctly as they will soon be heading to high school. I will instruct the students that they only have 15 minutes to complete so it is necessary to stay on track. The students will also see the timer on the board.

* + Transitions: Describe how you will transition and make connections between activities.

The beginning activity, will transition into the discussion on how they see recycling being done throughout the day, and how it benefits our community. This will lead into over packaging by creating the ratios of their packages brought in from home, which transitions right into the scenario.

9. Closure:

Teacher will now lead a final discussion asking one more time, “Why is it important not to over package?” And how can it better our environment in our community due to the research they found. “ How does this design compare to the our previous design for Lays potato chip challenge according to our environment and recycling?”

**Lay’s Potato Chip Package**

**The Scenario**

The Lay’s Potato Chip Company is about to introduce a new flavored potato chip into the marketplace. They have sent four chips to every home on the east coast, and got positive ratings on them. So, now they are planning to mail four sample chips to every address on the west coast, but with using a more eco-friendly package this time.

As a packaging engineer for the company, you have been asked to develop the mailing package for the sample.

**The Problem**

Design, model a mailing package for Lay’s while staying within the following criteria.

1. You may only use the materials provided to you by the teacher.
2. The package must hold four chips.
3. The chips cannot be glued or taped together or into the package.
4. The package must protect the chips from damage during testing.
5. The package must be easy to open and the chips must be easy to remove.
6. The package’s weight and the content’s of the package need to have a ratio of\_\_\_\_\_\_\_\_\_.

Rectangular Prism Template