Polymers

Teach 1	Names of student(s) teaching:
Teach date: Teach time: Teach length: 45 minutes	Title of lesson: Polymer Properties (Day 3) Source (Kit, Lesson, Page #):

Concept statement/Main idea:
Polymers are a long chain of hundreds or thousands of tiny molecules. Polymers make up many of the objects around us such as plastics, fabrics, and even naturally occurring paper, rubber and leather.

Standards for the lesson:
PS1.A: Structure and Properties of Matter Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1) Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

Objectives	Evaluation
Write objectives in SWBAT form	Write at least one question to match the objective you listed or describe what you will look at to be sure that students can do this.
SWBAT **classify** plastics based on the polymers used to make up the various types of plastics used in everyday life.	Which of the following was NOT a characteristic of the plastic's physical appearance?
SWBAT **explain** reuse, reduce, and recycle.	What are the three R's?
SWBAT **determine** what a polymer is.	A polymer is:

Engagement

Estimated time: 15 minutes

Description of activity:

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will administer a Kahoot that does a competition style quiz on what the students have learned over the past two different lessons. http://tinyurl.com/polymerkahoot The teacher may want to have a certificate/none food prize for the students who receive the top 3 highest scores. The teacher will then go over the slides as a short recap, asking the students for their own explanation of what a polymer and monomer are. Then the teacher will remind them that on Thursday they	The students will answer the questions the teacher asks and come up with any questions that they need clarification on from the previous lessons.	What do the ingredients for Flubber represent? Can you use physical characteristics to describe other objects? What does polymer & monomer mean? What is plastic made up of? What is recycling? Why do we separate different plastics?

went over the different polymer abbreviations. They will also ask the students why they believe different plastics are categorized.		

Resources needed:

Electronic device compatible with Kahoot

Safety considerations:

Exploration

Estimated time: 30 minutes

Description of activity: Students will observe the entire life cycle of plastics through an oil experiment.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will monitor the students' activity and answer any questions the students may have throughout the lab. The teacher will ask the students for everyday examples of things that consist of polymers. The teacher will make the transition to the explain section by explaining the life cycle of plastics. The teacher will explain that today the students will be investigating the life cycle of plastics.	Students will get into different groups and perform the different activities laid out at the different stations. The students will collect a cup of "oil" that has different paper clips, nuts, and bolts; that represent the oil unrefined/purified. At station 2 the students will separate the paper clips and nuts and bolts into different piles to purify the oil. At station 3 the students will link the paper clips together to form different plastics. The students will form the	Why is it necessary to separate the oil? How many different items are you able to make with the oil sample you received? What happens to the 2 or more paper clips that do not get used when the polymers are recycled?

The teacher will direct the students to get into different groups that visit each station that display to the students the different stages of plastics.	different chains of 10 purple, 8 green and 20 silver to see what plastics they can create. The students will identify the different RIC Codes that go with the materials they got out of their station 1 cup of oil. At station 4 they will dispose of the parts of the polymers that cannot be recycled. Then they will go and unhook the paper clips showing how much of the plastic they will get to recycle. Give the students the opportunity to decide if they should throw out their newly formed toys, bags, and bottles or recycle them.	

Resources needed:

Paperclips, bolts, pebbles, and cups.

Safety considerations:

Do not consume or break any of the materials!

Edges of the paperclips are sharp.

Explanation

Estimated time: 15 minutes

Description of activity:

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses

The teacher will ask the students to each create a poster that explains the life cycle of plastics. The teacher will walk around to the different groups to monitor the progress of the groups. The teacher will direct the students to present their ideas to the class in groups.	The students will share their posters that explain the life cycle of plastics and what happens during each cycle. The students will work in groups independently to make these posters that they will then present to the class.	What happens to the 2 or more paper clips that do not get used when the polymers are recycled? Why is it necessary to purify the oil/ any substance before it's made into plastic?

Resources needed:

Large paper and markers.

Safety considerations:

Elaboration

Estimated time: 10 minutes

Description of activity: The students will perform a board game in group.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
The teacher will have the students complete a board game over recycling. The teacher will monitor the students' progress and then bring the students back to the front (so that the students are away from the correct responses) for some assessment questions.	The students will complete the game and then share where they put different game pieces under the categories of the reduce, reuse and recycle.	Why is it important that we recycle rather than throwing out everything? What are some different examples of items to reuse that you use everyday? What are some different examples of items to recycle that you use everyday?

The teacher will have the students from each table share 5 of the different game pieces they decided to put under the reduce, reuse, recycle categories.		How can you 'reduce' your use daily? What impact does recycling, reducing and reusing have on the environment?

Resources needed:

Game board (pdf)

Safety considerations:

Evaluation

Estimated time: 5 minutes

Description of activity: The students will take a short quiz on their own.

What the teacher does	What the student does	Possible questions to ask students — think like a student and consider possible student responses
Administers the quiz for students to complete on their own based on the information they just learned.	The student will complete the quiz on their own.	

Resources needed:

Evaluation Quiz

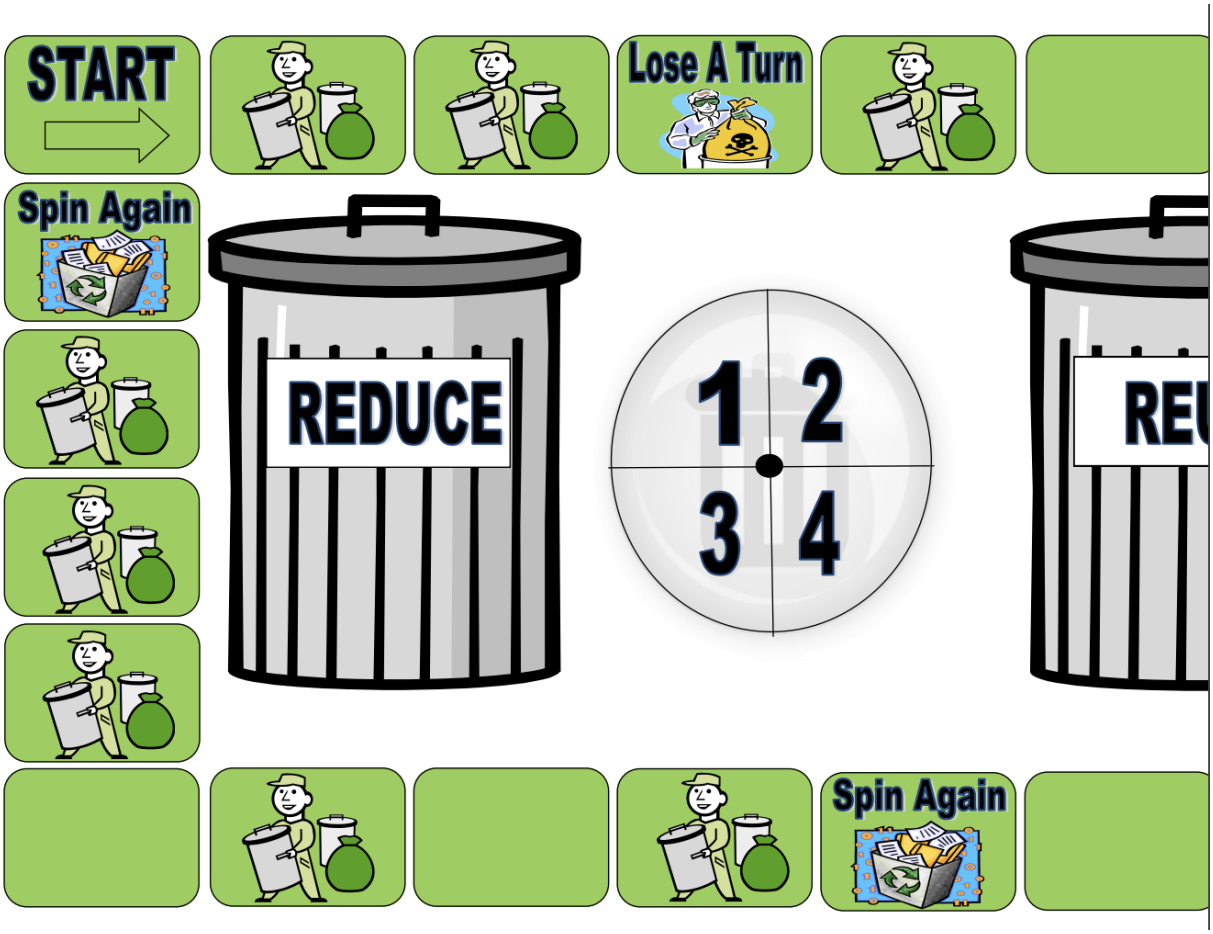
Safety considerations:

3 Rs Game

How To Play

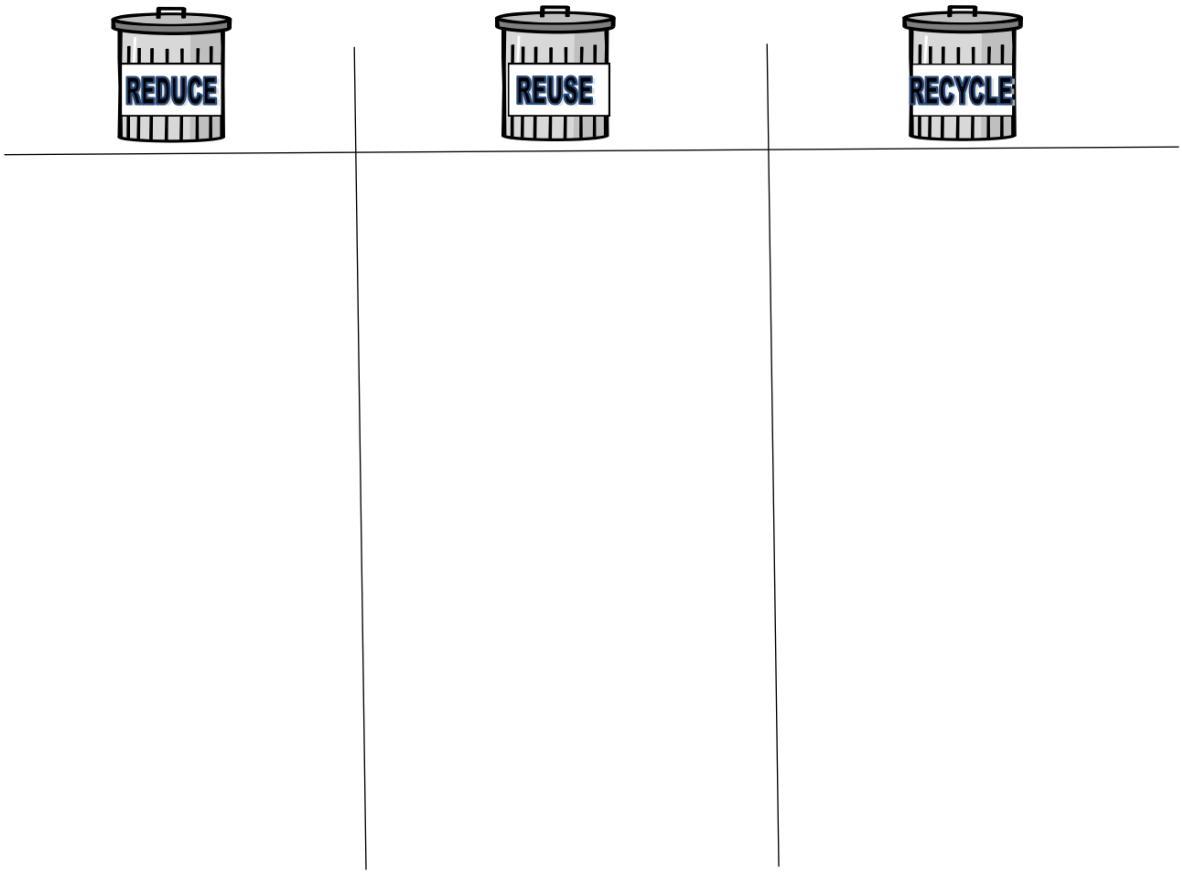
2-4 Players

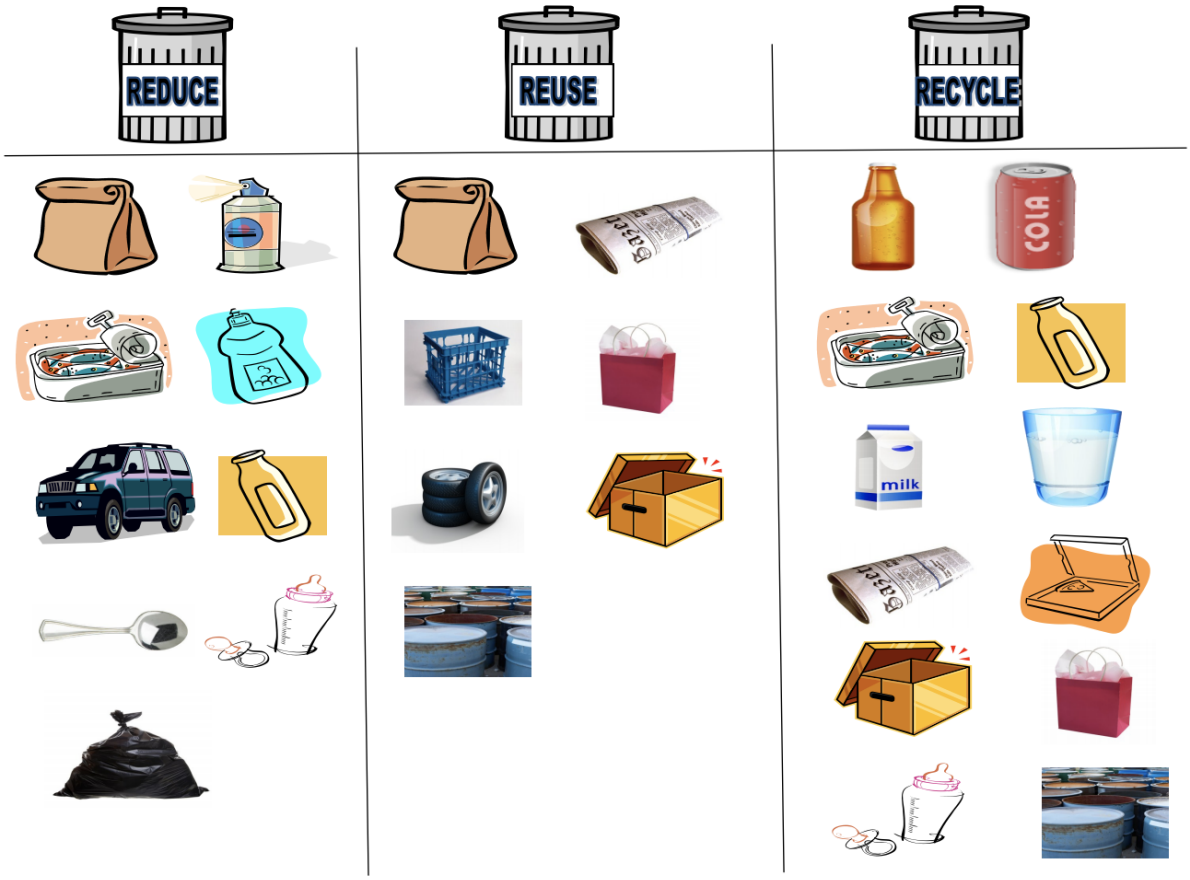
1. All players begin on start and move continuously around the board until all the cards have been drawn.
2. Spin the spinner and move forward based on the number you land on.
3. If you land on a picture of a garbage man, draw a card.
4. After you draw a card , decide if the item should be reduced, reused, or recycled . Place the card in the column you think is correct.
5. Continue playing until all the cards have been drawn.
6. Use the answer key to check the placement of each players cards. Players receive one point for every correct answer. Some items fit into more than one category.
7. The player with the most points wins.


START
Lose A Turn
Spin Again
REDUCE
1 2
3 4
Spin Again


Move Back 2
Spin Again
USE
RECYCLE
Move Ahead 3
Lose A Turn


Game pieces: Cut and fold.
Glass Bottle
Paper Bag
Soda Can
Aerosol Can
Can
Empty Plastic Bottle
SUV
Plastic Bottle
Milk Carton
Glass
Old Newspaper
Plastic Spoon
Pizza Box
Plastic Crate
Plastics
Gift Bag
Plastic Bag
Rusty Barrels
Cardboard Box
Old Tires


REDUCE
REUSE
RECYCLE


REDUCE
REUSE
RECYCLE
COLA
milk

Name:_____
Date:_____

Polymer Evaluation

1. A polymer is:
   A) A long string of a single molecule
   B) Multiple monomers put together
   C) The main ingredient for "Flubber"

2. True or False: Many polymers have different physical properties?
   A) True
   B) False

3. Which of the following was **NOT** a characteristic of the plastics physical appearance?
   A) Cloudy
   B) Opaque
   C) Clear
   D) Dusty

4. A monomer is:
   A) A single molecule
   B) Multiple monomers put together
   C)The main ingredient for "Flubber"

5. What are the three R's?