



All About Plastics

Plastics Investigations

Grades K-5

Plastics Poetry

Plastics Sight Words

Living Bar Graph

Properties of Plastics

Materials: See individual lessons for materials needed.

Activity Time: PLEASE NOTE: The activities contained in this lesson packet can be conducted over the course of a week as a unit or the activities can also stand alone.

- Conducted as a unit: 4 periods of 30 minutes each
- Conducted individually: 30 minutes per lesson

Concepts Taught: Sorting/grouping objects, personal expression through poetry, recognizing sight words, graphing, density, temperature

Correlations to NCSCOS: Kindergarten: ELA Objectives 1.03, 4.03, Math Objectives 1.01, 2.01, 4.01, 4.02, 5.01, Science Objectives 3.01, 3.02, 3.03, 3.04; **Grade One:** ELA Objectives 4.02, 4.03, 4.06, Math Objectives 4.01, 5.01, Science Objectives 3.01, 3.02, 3.03, 3.04; **Grade Two:** ELA Objectives 4.05, 4.07, Math Objectives 1.03, 2.01; **Grade Three:** ELA Objectives 3.05, 4.04, 4.07, 4.08, 4.09, 5.07, Math Objectives 2.02, 4.01; **Grade Four:** ELA Objectives 1.05, 4.05, 4.07, 4.08, 4.09, 5.02, 5.06, Math Objectives 4.01, 4.03, Science Objectives 1.01, 1.04; **Grade Five:** ELA Objectives 4.07, 4.08, 4.09, 5.07, Math Objectives 2.01, 4.01, 4.02,

Objectives:

- Students will understand which kinds of plastics can be recycled at their school.
- Students will sort and identify plastics by their number.
- Students will recognize that plastics can be found in our homes and at school.
- Students will investigate some of the properties of plastics.

Preparation: Ask students to bring in different –numbered plastic items from home. These should be collected by the teacher and kept aside until the day of the lesson. Please be aware that you will likely receive more 1's and 2's since they are the most prevalent type. Have examples of numbers 3-7 in case those are not collected and brought in. Students should not bring in items that may be dangerous, such as motor oil containers.

Examples:

- One (PETE): soda bottle
- Two (HDPE): milk jug
- Three (PVC): coffee container, cooking oil bottle, shampoo bottle
- Four (LDPE): mustard container
- Five (PP, say "double P"): yogurt tub, syrup bottle, ketchup bottle
- Six (PS): coffee cup, some plastic flower pots
- Seven (Other): mixed plastics containers, some detergent bottles

There are seven main types of plastics. Most plastic items (not just bottles or cups) have a number within the three-arrow recycling symbol located somewhere on them. These numbers are used in different parts of the country to help people identify which items their recycling program will accept.

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If your school recycles cans and bottles through Feed the Bin, only plastic bottles can be recycled. Yogurt cups, margarine tubs, and other containers that do not have a neck cannot be recycled. Check with your school's recycling coordinator to determine where your can and bottle recycling bins are located.

Lesson One: Plastics Poetry

Materials Needed: "Puppy" cinquain (below); copies of cinquain graphic organizer sheet for each student; one plastic item per student.

Students will as a class create a type of poem called a cinquain to describe a plastic item. Students can choose from items such as a plastic bottle, plastic fleece, plastic ruler, or others. According to your grade level, you can simply write the poem as a class and count out syllables or look for patterns in the words, or write a class poem as well as individual poems.

1. Explain to students that a cinquain is a poem that has five lines and does not rhyme.
2. The structure of the poem is:
 - First Line: One-word title (noun)
 - Second Line: Two descriptive words (adjectives)
 - Third Line: Three words that express action (verbs)
 - Fourth Line: Four words that express feeling
 - Fifth Line: One word that is a synonym or reference to the title in line 1.
3. Review parts of speech included in the poem: nouns, adjectives, verbs, adverbs, synonyms if appropriate.
4. Review the "Puppy" cinquain with students, classifying each word as one of the parts of speech as appropriate or with younger students, clap out the syllables in each line.
5. Using a plastic bottle as the subject, have students brainstorm words for Line 1, writing their suggestions on the board or an overhead. Continue brainstorming for all five lines, making sure to count out syllables for each word.
6. Select the appropriate number of words from each line of suggestions to create a model cinquain.

Extensions for Grades 3-5

1. **For older students**, use the "true" cinquain format:
 - First Line: One-word title, two syllables
 - Second Line: Two descriptive words, four syllables total
 - Third Line: Three words that express action, six syllables total
 - Fourth Line: Four words that express feeling, eight syllables total
 - Fifth Line: One word that renames title, two syllables
2. Using the same poem, students should use a thesaurus to choose replacement words for the words in their poem. Instruct students to continue to be mindful of the number of syllables required in each line.
3. Divide students into groups to inspect different areas of the classroom. Students should sit in one location and without getting up, record all objects that are made of plastic. Write a haiku that describes how plastics are everywhere

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Cinquain Poetry

A cinquain is a five – line poem that describes a person, place, thing, or animal.



Puppy
Fluffy, Playful
Jumping, Barking, Running
Always makes me laugh
Pet

Use the boxes below to write your own cinquain.

What is your poem about? (one word)

Write two words that describe it.

Write three words that describe something it does.

Write four words that describe how you feel about it.

Write one word that renames your poem.

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Lesson Two: Plastics sight words

Materials: Plastic items collected from students; number and color sight word cards (below), Unifix cubes (optional).

This lesson uses numbers commonly found on plastics to reinforce number and color sight words.

1. Arrange different-numbered plastic containers for students at their center.
 - a. One: soda bottle
 - b. Two: milk jug
 - c. Three: coffee container, cooking oil bottle, shampoo bottle
 - d. Four: mustard container
 - e. Five: yogurt tub, syrup bottle, ketchup bottle
 - f. Six: coffee cup, some plastic flower pots
 - g. Seven: mixed plastics containers, some detergent bottles
2. Encourage students to look for the three-arrow recycling symbol with number.
3. Have students match the number they find with the appropriate sight word card (use cards below).
4. Show students that plastics can be many different colors, no matter what number they are. Have students match the color of the plastic item with the appropriate sight word card (use cards below).
5. Students can also use the worksheet below to count items and write the appropriate number word.

Extensions:

1. Have students draw pictures of an imaginary bottle for numbers 8-10 and make their own word card.
2. Have students count plastic Unifix cubes and match to word cards.

one

two

three

four

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five

six

seven

white

green

blue

red

yellow

purple

orange

black

brown

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Name _____

Count the  .

Write how many. Use words.



three



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Lesson Three: Living Bar Graph Activity

Materials: Masking tape; plastic items collected from students; graphing sheet (below).

This lesson uses different numbered plastics as a subject to create a bar graph.

1. Review graphing by asking each student to call aloud their eye color. Instruct all students to keep track of each response by making tally marks or other techniques.
2. Discuss different methods students used to collect data: tally marks, numbers, etc.
3. Explain that using a bar graph is one way of displaying information in an organized way.
4. Make a sample bar graph on the board or on a transparency of the eye colors.
5. Explain to students that bar graphs are a way to count numbers of different things.
6. Using a line drawn on the floor or a piece of masking tape, create a “baseline” or x-axis with the numbers 1-7 so that students can use their bodies to create a bar graph. Use the attached page 42 from the NEED book Trash Flipbook to identify common items with the different numbers.
7. Give each student a piece of plastic with a different number. The numbers on plastic are usually found on the bottom of the container inside the three-arrow recycling symbol.
8. Have students stand in a line at the number that matches their container.
9. Have students in each line count off and record numbers.
10. Ask students questions about the graph while still standing: Which line is longest? Shortest? Did any lines have the same number?
11. Have students return to their seats and use the worksheet below to graph the data generated by the activity if appropriate for their level.

Extensions for Grades 3-5:

1. Have students make another bar graph using favorite colors or foods of students.
2. Students can make Venn Diagrams using certain characteristics of plastics such as color, presence of a neck on the bottle, and etc.
3. Discuss which plastics were easiest to find in the classroom and at home. Why do you think this is?
4. Have students create another graph of favorite colors, foods, etc. using different colors of construction paper for the bars. Discuss how graphs visually depict data and the importance of neatness and simplicity in making a graph.

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Shade in the boxes below to show how many of each kind of plastic you saw today.

Amount of Plastics

eleven							
ten							
nine							
eight							
seven							
six							
five							
four							
three							
two							
one							

Kinds
of
Plastic

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Lesson Four: Properties of Plastics

Materials: Pieces of cut up plastic bottles number 1-7; container of water for each student group; prediction worksheet; aluminum foil; #1 2-liter plastic soda bottle with cap; #2 1-gallon milk jug; hot tap water; 4 thermometers; Styrofoam coffee cup; 1-liter plastic bottle with the neck cut off; paper cup; plastic picnic-style disposable cup; pieces of fabric-OPTIONAL (fur, flannel, silk, cotton, synthetic fabrics).

This lesson will allow students to investigate how different numbered plastics have different properties, among them the ability to sink or float and ability to change shape or be malleable when heated and insulate.

Sink/Float display:

1. Using some common objects found in the classroom and a clear container filled with water, demonstrate that some objects sink and some float. Those that have a greater density than water will sink and those that have less density than water will float. Plastics also behave the same way. Show students the cut up pieces of plastic. Explain to students that some of these plastics will sink and some will float. Using the attached chart, have students predict which pieces will sink and which will float. Allow students to examine the plastic in small groups.
 - a. #1: sinks
 - b. #2: floats
 - c. #3: sinks
 - d. #4: floats
 - e. #5: floats
 - f. #6: sinks if condensed (party cups, etc.); floats if “expanded” (polystyrene coffee cups, etc.)
 - g. #7: some will sink and some will float since it is an unpredictable mixture of plastics
2. Put all plastic pieces in the water and record observations.
3. Have students answer the questions on the sheet.

Extensions for Grades 3-5:

1. Discuss with students how the shape of an item can affect its ability to float or sink. Demonstrate with an empty soda bottle with the cap on. Why does it float? Now take the cap off and fill it with water? Why does it sink?
2. Have students use pieces of aluminum foil and make “boats” that will float.
3. Discuss why floating litter would be a problem for aquatic animals.
4. How would the plastics behave if the water was very salty (like the ocean)? To test this, add several heaping tablespoons to the water and stir well. Retest plastics.
5. Discuss how to keep warm on a cold day. What kind of clothes do we wear? Investigate animals that must have insulation. How do you think they would adapt to a warmer climate considering the amount of insulation they have? How do humans adapt to a warmer climate?

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Heating and Cooling:

1. Explain to students that when heat is applied to substances, they can change state. When heat is applied to ice (a solid), it will melt into liquid water and will remain a liquid at room temperature. When wax is heated by the wick of a candle, it melts from a solid to a liquid. However, when it is allowed to cool at room temperature, it returns to a solid.
2. Plastics behave more like wax when heated. To demonstrate this, pour hot water (as hot as your tap allows) into a clean, empty, 2-liter soda bottle. Fill $\frac{3}{4}$ full and cap. Using gloves, demonstrate to the students that the bottle becomes more flexible when it is heated by gently squeezing the sides of the bottle.
3. Note that the plastic used in the above step was a number 1 plastic bottle.
4. Repeat the same experiment using a plastic milk jug, a number 2 plastic. Allow students to predict the results. The milk jug will not become as malleable when hot water is added.
5. Continue this line of thinking by arranging four containers for the students: a Styrofoam coffee cup, a 1-liter plastic bottle with the neck cut off, a paper cup, and a plastic picnic-style disposable cup.
6. Using hot tap water, fill each container with 50 mL of water. Immediately put a thermometer in each container and record the temperature.
7. Using the worksheet, have students predict which container will be the best insulator after 15 minutes and write one sentence to explain their reasoning.
8. During the 15 minute wait time, discuss with students the transfer of energy that occurs when something cools.
9. After 15 minutes, note the temperature in each container for students.
10. Have students complete the data collection and answer the critical thinking questions.
11. Discuss with students how to increase the insulation value of different plastics. They could wrap material around each one (fur, flannel, silk, cotton, synthetic fabrics) and retest results. Also, they could stack the cups in different ways to increase heat retention. Retest ideas if desired.

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Will it Float?

	Kind of Plastic						
	1	2	3	4	5	6	7
Do you think it will it float? Write yes or no.	yes						
Did it really float? Write yes or no.	no						

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Will it Float?

	Kind of Plastic						
	1	2	3	4	5	6	7
Prediction: Will it float or sink?							
Results: Did it float or sink?							

- Which pieces float: number 1 or number 2? _____
- How many of your predictions were correct? _____
- Did number 3 plastic sink or float? Why? _____

Which cup insulates best?

	Plastic bottle	Coffee Cup	Paper Cup	Picnic Cup
Prediction: Put a check under which cup you think will keep the water warmest.				
Starting temperature				
Temperature after 15 minutes				

- Which cup was the best insulator (kept the water warmest)? _____
- Which cup was the worst insulator (did not keep the water warm)? _____
- What was the difference in temperature between the best and worst insulator? _____
- What is one way you could help the picnic cup keep the water warmer? _____