Plastic Pollution and You

AN INTERDISCIPLINARY CURRICULUM TO EXPLORE OUR ROLE IN PLASTIC POLLUTION

NEW YORK SEA GRANT

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New York Sea Grant

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Clarifying Question 1

WHAT IS MARINE DEBRIS?

The National Oceanic and Atmospheric Administration (NOAA) defines marine debris as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, is disposed of or abandoned into the marine environment or the Great Lakes. Additionally, marine debris also includes land-based debris that is intentionally or unintentionally littered or dumped into rivers and streams or enters the watershed through storm water discharges and improper waste management practices.

Clarifying Question 2

WHAT IS PLASTIC POLLUTION?

One of the most common forms of marine debris is plastic pollution. Plastic pollution is the accumulation of plastic objects and particles (e.g. plastic bottles, bags and microbeads) in the Earth's environment that adversely affects wildlife, wildlife habitat, and humans.

ATLANTIC OCEAN

LETTER TO EDUCATORS

DEAR EDUCATORS,

The Plastic Pollution and You curriculum is designed to supplement existing educational materials on plastic pollution and marine debris that connect students to these issues in their watershed.

We offer these materials as extension activities that incorporate the social, economic, and public policy context of one of the most pressing environmental issues our society faces - plastic pollution and marine debris.

To build upon the existing efforts to educate students on the ecological impacts of this issue, we have created a cross-disciplinary curriculum that can be adapted to a wide range of grade levels. These activities will not only increase your student's environmental literacy and develop interest in environmental careers but also deepen the understanding of the inequities that many students, educators, and communities contend with and how we can all play a role in addressing them. We have found that a broader approach to environmental education that incorporates civic responsibility and environmental justice components is engaging for educators and students and can empower them to respond to environmental issues in their own communities.

Finally, we would like to encourage educators to adapt these activities to the individual needs of their students and classrooms. Our goal was to create lesson plans that are flexible and versatile enough to accommodate rapidly changing learning environments and instructional time. Many of these activities can be used in-person or virtually and can be shortened or lengthened, depending on individual needs.

Sincerely,

Kathleen

Coastal Processes and Hazards Specialist

Nate

Great Lakes Literacy Specialist

UNIT 1
PLASTIC POLLUTION

Overview:

This lesson set includes five activities that will allow students to think about what plastic is, how they use plastic every day, and what the unseen consequences of plastic production and pollution are. Students will think about how plastic pollution impacts the environment and their community.

Lessons:

Lesson 1.1—Activating Knowledge on Plastic
Students will use a K-W-L chart to guide a discussion about what they already know and what they wonder about plastics. After completing other activities in this curriculum, students will return to this chart to track what they learned.

Lesson 1.2—Plastic Pollution and You
Students will watch a TEDTalk by Van Jones, "The Economic Injustice of Plastic Pollution", contemplate their reactions, and answer discussion questions.

Lesson 1.3—Types of Plastic
Students will compare a chart of various types of plastics with common plastic items they may use in their daily lives.

Lesson 1.4—Plastic Pollution in Your Life
Students will track and create a map of plastic pollution around their school, in their neighborhood, or at a local park, shoreline, or beach.

Lesson 1.5—Developing a Position on Plastic Pollution
Students will develop a position statement on whether they agree or disagree with plastic pollution as an environmental issue and can work together to create a class TEDTalk.

LESSON 1.1
ACTIVATING KNOWLEDGE ON PLASTIC

Foundation Lesson

GRADE LEVEL	TIME
ALL GRADE LEVELS	0–30 MINUTES

Overview:

This lesson will activate students' existing knowledge and experiences, stimulate their desire to learn more, and provide an opportunity to reflect on their knowledge acquisition in the future. Activating their prior knowledge is helpful to assess what students already know, understand any misconceptions, and pinpoint areas of interest. This process will be organized and recorded on a Know-Wonder-Learn chart. The K-W-L chart can be revisited while completing other activities in the curriculum as knowledge is acquired and more questions arise.

Instructions:

1. Place a large plastic container filled with common plastic items in the front of the classroom and ask students to make observations and ask questions about the items. After discussing their observations, ask them to spend 1-2 minutes writing down what they noticed (what did they see, what did it make them think about, where have they seen these items before), and what they wonder (what questions do they have about the contents of this container). They should write as much as they know about plastic, as well as the questions they have about plastic, for 60 seconds. This will activate any prior knowledge about plastics or their experiences with plastic usage.

They can use blank paper, multiple sticky notes, or a chart.

Example chart:

	I NOTICED...	?	I WONDER...

Materials:

- K-W-L chart
- Flip chart, white board, Google Docs, or other method of recording responses
- Large bin filled with common plastic items

** NOTE: For a list of suggested items see the recycling chart in Lesson 1.3*

Notes:

Learning Standards:

Foundation Lesson

2. After the individual free-writing, the class will fill in the K-W-L chart as a whole group using individual sticky notes or markers on a large piece of chart paper, white board, or digital tools like Google Docs.
    a. First, students will fill in the "K" column based on their 60-second free write.
    b. Second, either with a partner or in groups, students will come up with a list of things they would want to learn about. These can be written as questions. As a group, fill in the "W" column based on student suggestions.
    c. Third, explain to students that the "L" column will be completed after they have completed other activities from the lessons and they have acquired new knowledge.

NOTE:
This activity should be revisited when other activities from the curriculum are completed. Students will gain knowledge to complete the "L" column and may also develop new questions for the "W" column. It is important to circle back to questions students have identified to acknowledge and build off of their curiosity. It can be used as a launching point for student questioning and discovery.

Example K-W-L chart:

K	What I **KNOW**	W	What I **WONDER**	L	What I've **LEARNED**
I already know plastics are durable		*What are plastics made of?*			

Plastic Pollution and You

WONDER WORKSHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

I NOTICED...	I WONDER...

Plastic Pollution and You

K-W-L WORKSHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

K	What I already **KNOW**	W	What I **WONDER**	L	What I have **LEARNED**
Plastics are durable.		*What are plastics made of?*		*Plastics are made of petroleum.*	

LESSON 1.2
PLASTIC POLLUTION AND YOU

GRADE LEVEL	TIME
6-8, 9-12	30–60 MINUTES

Objective:

By listening to and reflecting on a TEDTalk from author and political commentator Van Jones, students will explore how the life cycle of plastic has various ecological impacts and can have a disproportionate impact on different communities. Students will critically discuss the production, consumption, and disposal of plastic, reflect on the personal implications of this process, and consider how the items we use every day can have far ranging consequences for people and the planet.

Instructions:

1. Before watching the "Where Do Plastics Come From" video, discuss and pre-teach the following vocabulary terms:
    a. Renewable Resources: a resource that is unlimited and/or can be replenished naturally (e.g. wind energy, solar energy)
    b. Nonrenewable Resources: a resource that is limited or finite and/or is not able to be replenished at the same rate as it is used (e.g. oil, coal, metals)
    c. Disposability: the property of an item that is intended to be thrown away after a single use (e.g. disposable diapers, plastic utensils).
    d. Biomimicry: the imitation or inspiration of nature in design and engineering
2. Distribute the Video Notes Sheet to students. Ask them to read the sheet and prepare to write several things they learn and several questions they have while watching the videos.
3. Have students watch "Where Do Plastics Come From?" and Van Jones' 12-minute TEDTalk: "The Economic Injustice of Plastic Pollution".
4. After watching the videos, do a Think-Pair-Share:
    a. Give students 5 minutes to think and respond to questions on the Student Response Sheet individually.
    b. Following that, have the students Pair-Share their responses on the Student Response Sheet and their questions from the Video Notes Page with the classmate next to them for 5 minutes.
    c. Finally, open the discussion to the class. Have students share their responses and ask any unanswered questions they have.

Materials:

- Where Do Plastics Come From?
- Van Jones' TEDTalk: The Economic Injustice of Plastic Pollution
- Writing materials or electronic device to capture thinking
- Video Notes sheet
- Student Response Sheet

Notes:

Learning Standards:

SCI:
5-ESS3-1, MS-ESS3-1, HS-ESS3-1, MS-ESS3-4, HS-ESS3-4

SS:
8.8.c, 10.9.a, 10.9.b

GLLP:


TED
IDEASWORTHSPREADING

Plastic Pollution and You

VIDEO NOTE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: While watching Where do Plastics Come From? and Van Jones' TEDTalk: The Economic Injustice of Plastic Pollution, use this sheet to take notes and record your thoughts on the videos.

List **3-5 facts or claims** you learned while watching the videos.

1.

2.

3.

4.

5.

List **3-5 questions** you have after watching the videos.

1.

2.

3.

4.

5.

Plastic Pollution and You

STUDENT RESPONSE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: Answer the following questions.

1. How do you feel after watching the video? Was there anything in the video that you personally connected with or have experienced? If so, what?

2. The population of the world has more than tripled since the end of World War II. How has the use of nonrenewable resources changed over that time period? How has the use of disposable items changed over that time period? What impacts might this be having on people and the natural environment?

3. Who does Jones think is most impacted by disposable plastic products? Do you agree or disagree with this and why?

4. Jones uses the term biomimicry to describe how humans learn from nature. He gave the example of a clamshell. What are some examples of how humans could use biomimicry to design new products or processes? What are some challenges humans may face using biomimicry?

LESSON 1.3
TYPES OF PLASTICS

GRADE LEVEL	TIME
6-8, 9-12	30–60 MINUTES

Objective:

Students will learn about the different types of plastics. They will explore how plastics are characterized and how this influences the recycling process. After reviewing a recycling chart, the students will answer questions posed on the Student Response Sheet and complete the Personal Plastic Use Sheet.

Instructions:

1. Review the Recycling Chart as a class to discuss the differences between the 7 types of plastic.
2. Display and pass around different plastic items so students can see and feel the differences, and identify which number each item corresponds to.
3. After examining each item, have students group items into different piles based on their number codes. Ask students what they notice about the items in each number code. What is similar about the items? What is different about the items? If an item does not have a number code, encourage students to use the characteristics of each type of plastic in the recycling chart to determine what type of plastic it is.
4. Have students fill out the Student Response Sheet.
5. Distribute the Personal Plastic Use Sheet and have students take the sheet home. While at home, students should look around their home and try to find a plastic item from each category (Numbers 1-7). Encourage them to use the Recycling Chart as a guide. Once they identify an item, have them write down what it is and how often they use it. After their chart is filled out, have students answer the reflection questions.

Materials:

- Recycling Chart
- Container of common plastic items, such as those listed in the Recycling Chart
  NOTE: can be the same plastic items used in Plastic Pollution Lesson 1.1
- Student Response Sheet
- Personal Plastic Use Sheet

Notes:

Learning Standards:

SCI:
5-ESS3-1, MS-ESS3-4, HS-ESS3-4

GLLP:
6

RECYCLING CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

PETE

NUMBER 1 • *PETE or PET (polyethylene terephalate)*

IS USED..... microwavable food trays, salad dressing, soft drink and water bottles

IS RECYCLED TO MAKE... carpet, furniture, new containers, polar fleece

HDPE

NUMBER 2 • *HDPE (high-density polyethylene)*

IS USED..... household cleaner and shampoo bottles, milk jugs, yogurt tubs

IS RECYCLED TO MAKE... detergent bottles, fencing, floor tiles, pens

V

NUMBER 3 • *V or PVC (vinyl)*

IS USED..... cooking oil bottles, clear food packaging, mouthwash bottles

IS RECYCLED TO MAKE... cables, mudflaps, paneling, roadway gutters

LDPE

NUMBER 4 • *LDPE (low-density polyethylene)*

IS USED..... bread and shopping bags, carpet, clothing, furniture

IS RECYCLED TO MAKE... plastic envelopes, floor tiles, artificial lumber, trash-can liners

PP

Number 5 • *PP (polypropylene)*

IS USED..... ketchup bottles, medicine and syrup bottles, drinking straws

IS RECYCLED TO MAKE... battery cables, brooms, ice scrapers, rakes

PS

Number 6 • *PS (polystyrene)*

IS USED..... disposable cups and plates, egg cartons, take-out containers

IS RECYCLED TO MAKE... foam packaging, insulation, light switchplates, rulers

OTHER

Number 7 • *Other (miscellaneous)*

IS USED..... 5-gallon water jugs, nylon, some food containers, and other items

IS RECYCLED TO MAKE... custom-made products

The above is not an exhaustive list; there are many other items that are comprised of multiple types of plastic

Plastic Pollution and You

TYPES OF PLASTICS
STUDENT RESPONSE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: You will use the recycling chart for this activity. As you look over the chart, make annotations to point out important information and also record questions you might have. These annotations can be helpful for quick reference when you respond to the questions on this worksheet. You can use the space below for your notes

1. What type of plastic is used in plastic bags?
2. What type of plastic is used in plastic bottles?
3. What type of plastic is used in plastic straws?
4. For questions 1-3, do you have the same answers? Are you surprised by what you found?
5. Identify some items on the list you use.

What items on the recycling chart do I use?	What type of plastic are these items made of?	What can these items become if they are recycled?

6. What number plastic do you think you use the most and why do you think that?

Plastic Pollution and You

PERSONAL PLASTIC USE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: Look around your home and try to find a plastic item from each category (Numbers 1-7), you can use the Recycling Chart to guide you. Once you identify the item, write down what it is and how often you use it. After your chart is filled out, answer the reflection questions.

Plastic Number	Common Item	Single Use, Multi-Use, or Long Term Use?*	What Do You Do With This Item When You Are Done With It?
			
			
			
			
			
			
			

*How Many Times Do You Use This Item Before You Throw It Away:

SINGLE USE	MULTI-USE	LONG TERM
These are items that are designed to be used once and then disposed of. Examples include plastic silverware, to go containers, fast food packaging, and water bottles. These items can be used again but are not constructed to withstand multi or long- term use.	These are items that are designed to be used repeatedly, often in the place of single use items. Examples include reusable water bottles, reusable shopping bags, pens, and other common items. These items are constructed to withstand repeated use over time.	These items are durable goods that are designed to be used frequently over extended periods of time. Examples of these items can be composed predominantly of plastic (ie: kayak) or plastic can be a key component of a larger item (ie: laptop computer, car)

Plastic Pollution and You

PERSONAL PLASTIC USE SHEET REFLECTION QUESTIONS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. What do you notice about the items on your list?

2. Are you surprised about how often you use plastic?

3. Were there items you didn't realize were plastic?

4. Look up your local recycling chart, which items you use are recyclable in your area?

5. Could any of these plastic items be replaced by non-plastic alternatives? Would the non-plastic alternative require additional resources, time, support or money?

6. There are almost 20 million people in the state of New York. Some people believe it would be helpful if people used less plastic. Do you agree or disagree? Explain your response.

LESSON 1.4
PLASTIC POLLUTION IN YOUR LIFE

GRADE LEVEL	TIME
3-5, 6-8, 9-12	MULTIPLE CLASS PERIODS

Objective:

Students will record what type of plastic pollution they find in their community as they walk through their neighborhood, around their school, or in a local park, shoreline or beach using a map. This data collection will indicate the type(s) of pollution found, identify its potential sources, and begin to think about local solutions to plastic pollution.

Instructions:

1. Select area(s) for data collection and print out Google maps of the area or have students draw a map by hand.
2. Have students examine the map of their data collection area and complete the first four columns of the Plastic Pollution Prediction Chart.

   Recommendations:
   a. If using your school campus, consider speaking with maintenance and custodial staff about areas that tend to accumulate trash and litter if not regularly maintained. Potentially invite these staff members to speak with the students about how much work is required to keep these areas free of debris.
   b. For non-school campus locations, survey the area prior to student visit to assess the amount and location(s) of plastic pollution.
3. If students are working independently, provide each student with: a printed map, plastic pollution tracking sheet, clipboard, and pen.
   OR
   If working as a class, you can divide different subsections within your area to each group of students. Each group should have: a printed map, tracking sheet, pen, clipboard, gloves, and optionally a bucket to collect the plastic pollution.
4. As students walk, have them mark each location on the map where they find a piece of plastic pollution with its own letter (e.g. Location A). On the plastic pollution tracking sheet, have them record the type and number of items found at that location.
   a. Option: Have students pick up the plastic pollution item and place it in the bucket.
   b. Bonus: If a camera or smartphone is available, take a picture of the item(s).

Materials:

- Map of neighborhood, school, park, shoreline, or beach (printed or hand drawn)
- Plastic Pollution Prediction Chart
- Plastic Pollution Tracking Sheet
- Clipboard, pen/pencil
- Gloves, bags, buckets
- Smart phone to access Google Maps, Google My Maps, and/or the camera feature

Additional Resources:

- NOAA: Estimating the Effects of Marine Debris on Coastal Economies

Notes:

Learning Standards:

SCI:
5-ESS3-1, MS-ESS3-3, HS-ESS3-4

SS:
8.8.c, 10.9.a, 10.9.b, S5-KI #4

GLLP: 6, 8

5. Repeat this process as time allows or until your entire area has been completed.
6. If students covered different sections of the area, have them bring their maps together to compile them and tally up all of the items that were recorded and collected.
    a. If using Google My Maps, students can upload photos to each location.

> NOTE:
> Students can also contribute their data to community science marine debris mobile applications like NOAA's Marine Debris Tracker or the Ocean Conservancy's CleanSwell.

    b. If students covered the same area, you can compare the maps and tracking sheets.
7. Following the mapping and data collection process, have students fill out the fifth column of the Plastic Pollution Prediction Chart to see if their predictions were correct.

Optional Activity:

- Have students repeat this activity over an extended period of time to monitor the amount of pollution in a given area (ie: daily for a week, weekly for a month, etc.). Have students compare how the data and maps do or do not change.
- Teachers can save data and maps for comparison to future data collection.
- Students can design or refine technological solutions or behavior change campaigns, and evaluate if the solutions have an impact on plastic pollution.

PLASTIC POLLUTION
PREDICTION SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Map Location *(describe the location)*	What types of plastic pollution do you think you will find there?	Why do you think that type of plastic pollution will be there?	How many of these items do you think you will find?	How many of these items did you find at this location?

Plastic Pollution and You

PLASTIC POLLUTION TRACKING SHEET

Location: _____ *Group:* _____

Observations: (include weather, land use, presence/lack of garbage cans, etc.)

Map Location	Item(s) Found	Number of Items
A.	*Plastic Bottle*	*2*

1. What were the most commonly found items?

2. Where were the most items found? Was there anything specific about that location that might cause there to be more plastic pollution there?

3. What surprised you the most about the plastic pollution you saw in your community?

4. What impacts might this plastic pollution have on humans and the natural environment?

5. What are some ideas for how you or others could help reduce the amount of plastic pollution in your neighborhood, school yard, and/or park?

LESSON 1.5
DEVELOPING A POSITION ON PLASTIC POLLUTION

GRADE LEVEL	TIME
9-12	MULTIPLE CLASS PERIODS

Objective:

In this lesson, students will use the knowledge gained from the previous activities and/or independent research to develop a personal position on plastic pollution in their lives and communities. They will support this position with factual information from credible sources, write a concise position statement, and present it to their class.

Instructions:

1. Have students watch Dr. Sherri Mason's TEDTalk on plastic pollution.
2. Have students find 2-3 additional sources of information on plastic pollution, using the PBS.org Research Guide as needed.
3. Review Position Statement Guide Sheet with students.
4. Have students each write a short position statement of at least 100 words (i.e., 7 sentences or 1 paragraph).

*if time and technology allow:

5. Student position statements can be used as the basis for a class TEDTalk, like those presented by Dr. Sherri Mason. Consider partnering with a teacher from another subject area, such as Language Arts or Reading, for this step.
6. Record students reading their position statements on camera.
7. Have students assist with creating video montages of their position statements for class TEDTalk video.

Materials:

- TEDTalk: Beads of Destruction
- PBS.org Research Guide: Assessing Sources
- Position Statement Guide Sheet

Notes:

Learning Standards:

ELA:
W1, W6, WHST1, WHST7

SCI:
HS-ETS1-1, HS-ESS3-4

SS:
8.8.c, 10.9.a, 10.9.b, S5-KI #4

GLLP: 6, 7, 8

Photo credit Erica Cirino

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POSITION STATEMENT GUIDE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Position Statement: A position statement is a stance you have on a topic. It describes one side of an arguable viewpoint.

How to write a position statement	
State your position on a topic Choose a topic with two or more arguable viewpoints	**Example:** Is plastic pollution an issue in your life and your community? (how/why?) 1.
Justify your position	Create a list of reasons for your position: 1. 2. 3.
Research and cite credible sources	Research sources that support and oppose your position. Consider opposing viewpoints. Summarize and record sources: 1. 2. 3.
Draft your position statement	• Write a sentence that summarizes your position in a clear and concise manner. • Write additional sentences that provide the supporting evidence for your position. • Read your position statement to a friend or classmate.
Revise your position statement.	• Respond to questions about your position or sources. • Re-write your statement to address questions and opposing arguments. • Try to respond to at least two opposing arguments in your final statement.

Plastic Pollution and You

POSITION STATEMENT WORKSHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Imagine you are preparing to deliver a **TED**Talk about plastic pollution in your life and your community. In 100 words, write a clear position statement about whether or not you think plastic pollution is an issue in your life and your community. Be sure to include evidence from credible sources to support your position.

UNIT 2
PLASTIC POLLUTION REDUCTION

Overview:

This lesson set includes five activities that will allow students to explore ways to reduce the impact of plastic pollution in their communities and the environment. Students will utilize various tools from reading and writing to creative outlets and acting to learn about behavior changes, solid waste management, and public policies.

Lessons:

Lesson 2.1—Recycling in Your Community
Students will learn which plastic items are recyclable in their local communities and create alternative or new products to use in the place of nonrecyclable items.

Lesson 2.2—Spotlight on a Scientist
Students will read several articles written by, and watch a TEDTalk video of, Dr. Sherri "Sam" Mason and then answer questions.

Lesson 2.3—Plastic Pollution Policies
Students will learn about different forms of public policies that communities have used to address plastic bag pollution, research any proposed or implemented policies in their communities, and answer response questions.

Lesson 2.4—Create Your Own Outreach Campaign
Students will read about a law enacted in 2020 that banned plastic bags in New York State and communication tools created to educate the public on this policy. They will then develop their own public outreach communication tool to educate a target audience about the policy and encourage them to bring their own reusable bags.

Lesson 2.5—Public Hearing: Plastic Pollution Policy
Students will work together in a community meeting role play where they will each represent various community members to determine whether or not they should implement a public policy on plastic pollution for their community.

LESSON 2.1
RECYCLING IN YOUR COMMUNITY

GRADE LEVEL	TIME
6-8, 9-12	60-90 MINUTES

Objective:

Students will apply their acquired knowledge of different types of plastic and learn about which items are recyclable in their community. NOTE: This may be in their city, county, town, village, etc. depending on what municipal level manages the community's recycling program. Students will take this new knowledge and creatively think of alternative items that could be used or invent new items to serve the same purpose to reduce the amount of plastic items that enter the waste stream.

Instructions:

1. Watch PBS News Hour Video: Why it will take more than basic recycling to cut back on plastic
    a. Discuss takeaways, questions, and surprises from the video as a class, encouraging students to think about how the recycling process impacts populations around the world in different ways.
2. Complete the first three columns in the My Community's Recycling Chart.
3. Have students look up their local recycling guidelines to learn if the items on their list are recyclable in their community and complete the fourth column in the My Community's Recycling Chart.
    - Check Recycle Right New York for your local guidelines https://recyclerightny.org/local-recycling-guidelines
        - *Tip: If you can't find your local recycling guidelines, try searching for "waste management in (fill in the name of your community)" or "recycling in (fill in the name of your community)."*
    - Use the Recycling in My Community Response Questions to guide students' research.
    - *Optional activity: go through your class' or home recycling bin and make sure everything is correctly sorted. Separate out the non-recyclable items.*
4. For the items that are not recyclable in the My Community's Recycling Chart,
    - Discuss with students what alternatives exist that would allow people to Refuse (not accept or use an alternative to a plastic item),

Materials:

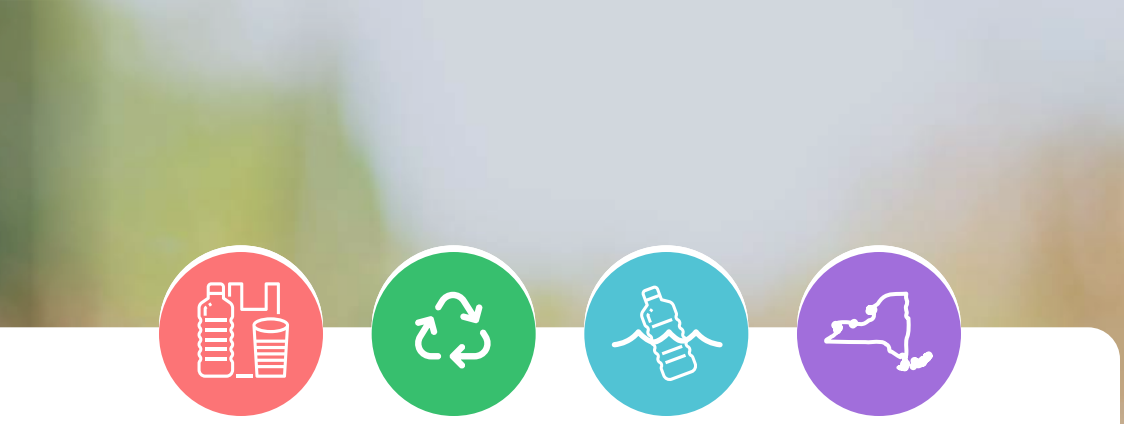
- Various recyclable and non-recyclable items
- Craft supplies – tape, scissors, paper, etc.
- My Community's Recycling Chart
- Recycling in My Community Response Questions
- PBS News Hour Video: Why it will take more than basic recycling to cut back on plastic

Notes:

Learning Standards:

SCI:
MS-ETS1-1, HS-ETS1-1

GLLP: 6, 8



Reduce (decrease the frequency or amount of a plastic item(s)' use) or Reuse (use a plastic item multiple times) this item, so it wouldn't end up in a landfill or as plastic pollution.
    - Ask students what potential barriers may exist that would keep people from recycling or being able to use more sustainable options?
- Have students place their ideas in the fifth column of the My Community's Recycling Chart.

5. For one item that is not recyclable in My Community's Recycling Chart, have students invent a new product or adapt an existing product that could replace this nonrecyclable item using the invention process:
    - *Concept phase:* Identify a problem, conduct research and brainstorm solutions. Identify the criteria (requirements) and constraints (limitations) for the design.
    - *Design phase:* Create a plan, calculate costs, select the best solution and determine necessary resources.
    - *Build phase*: Sketch, model or build a prototype. (A sketch of the invention is sufficient.)
    - *Review and redesign phase:* Review the design, assessing how well it met the design criteria and constraints. Identify its strengths and weaknesses. Redesign to improve weaknesses.

MY COMMUNITY'S RECYCLING CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Item	Do you think it is Recyclable or Nonrecyclable? Why or why not?	Is it Recyclable in your community?	What else could you use or create?

RECYCLING IN MY COMMUNITY
RESPONSE QUESTIONS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. What plastics are recyclable in your area?

2. Was this information easy or hard to find?

3. Was there anything surprising about what you found? If so, what or if not why?

4. Go back to Recycle Right NY and choose another municipality to explore. Compare what you found to your community, are things very similar or very different? What might cause these differences? What effects could these differences have on the recycling system and on individuals?

LESSON 2.2
SPOTLIGHT ON A SCIENTIST

GRADE LEVEL	TIME
6-8, 9-12	60-90 MINUTES

Objective:

In this activity, students will learn more about the career of a research scientist who studies plastic pollution. Dr. Sherri "Sam" Mason is a leading researcher in the field of plastic pollution and has published numerous peer reviewed academic articles. This activity utilizes the collaborative learning structure called a Jigsaw to allow students to work together to read, summarize, and present findings from an article written by Dr. Mason.

Instructions:

1. Using a cooperative learning structure called 'Jigsaw', divide the class into groups of four to five students per group. This will be their "Home Group". Assign each student a section of the article. Each student will be responsible for reading only their portion of the article.
2. The students will then collaborate with students from other Home Groups that read the same section of the article that they had just read. These are their 'Expert Groups". Each of these groups will be given a worksheet that will help them to organize the information contained in their section.
3. Next, have the students return to their Home Groups. Each student will present the information from their Expert Group section of the article to their Home Group. The whole group will then learn from each other as they discuss it together.
4. Last, have each student put together one Google Slide for the section they are an expert on in their Home Group. Once each student has added their slide, have each Home Group present their summary of the article to the class.

- Additional activities
    a. Have students watch "Beads of Destruction" TEDTalk.
    b. Have students complete the Student Response Sheet.

HOME GROUP

Each group contains all pieces

EXPERT GROUP

Each group contains one piece

Materials:

- Article: "Plastic, Plastic Everywhere" Dr. Sherri Mason
- TEDTalk: Beads of Destruction
- Jigsaw Worksheet
- Student Response Sheets

Notes:

Learning Standards:

ELA:
W6, R8

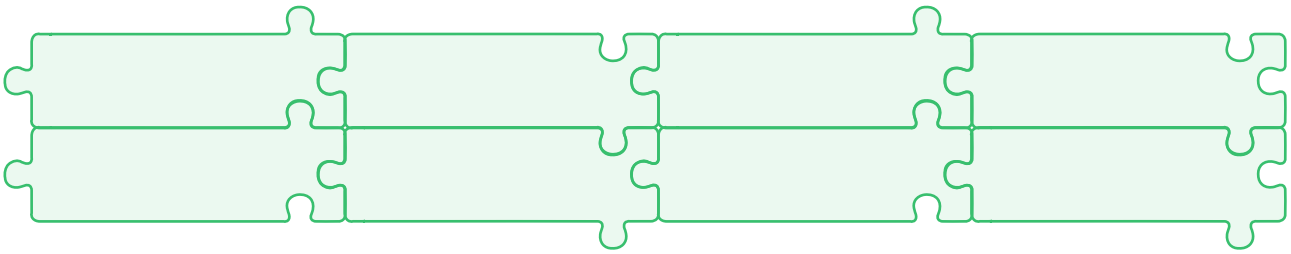
GLLP:
6, 7

PLASTIC, PLASTIC EVERYWHERE
JIGSAW WORKSHEET

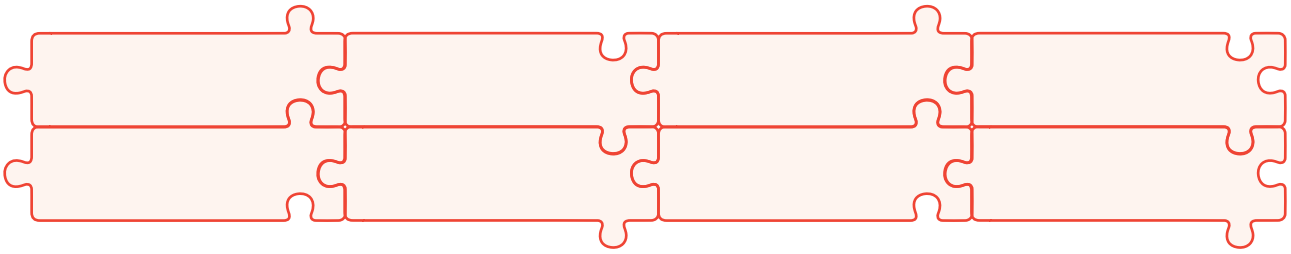
Name: _____ *Class:* _____ *Date:* _____/_____/_____

Home Group Section assignments for Jigsaw activity

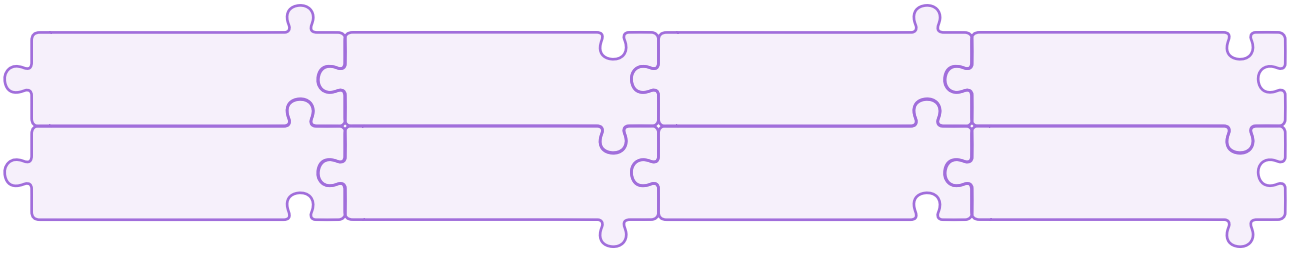
1. INTRODUCTION



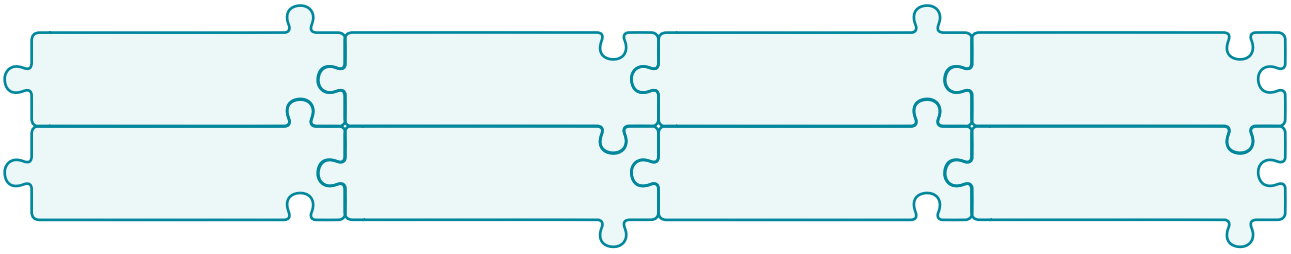
2. TINY PLASTIC IN WASTEWATER



3. A GREAT LAKES PERSPECTIVE



4. A GLOBAL VIEW



Plastic Pollution and You

PLASTIC, PLASTIC EVERYWHERE
JIGSAW WORKSHEET 2

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Main Idea A:

SUPPORTING DETAIL 1:

SUPPORTING DETAIL 2:

SUPPORTING DETAIL 3:

Main Idea B:

SUPPORTING DETAIL 1:

SUPPORTING DETAIL 2:

SUPPORTING DETAIL 3:

Important Terms and Definitions:

TERM 1:

TERM 2:

Personal Connections or Responses:

PLASTIC, PLASTIC EVERYWHERE
JIGSAW WORKSHEET 3

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Personal Connections or Responses:

Other notes from "Expert Group:"

Notes from "Home Group" about selections:

1. INTRODUCTION

2. TINY PLASTIC IN WASTEWATER

3. A GREAT LAKES PERSPECTIVE

4. A GLOBAL VIEW

Plastic Pollution and You

PLASTIC, PLASTIC EVERYWHERE
STUDENT RESPONSE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

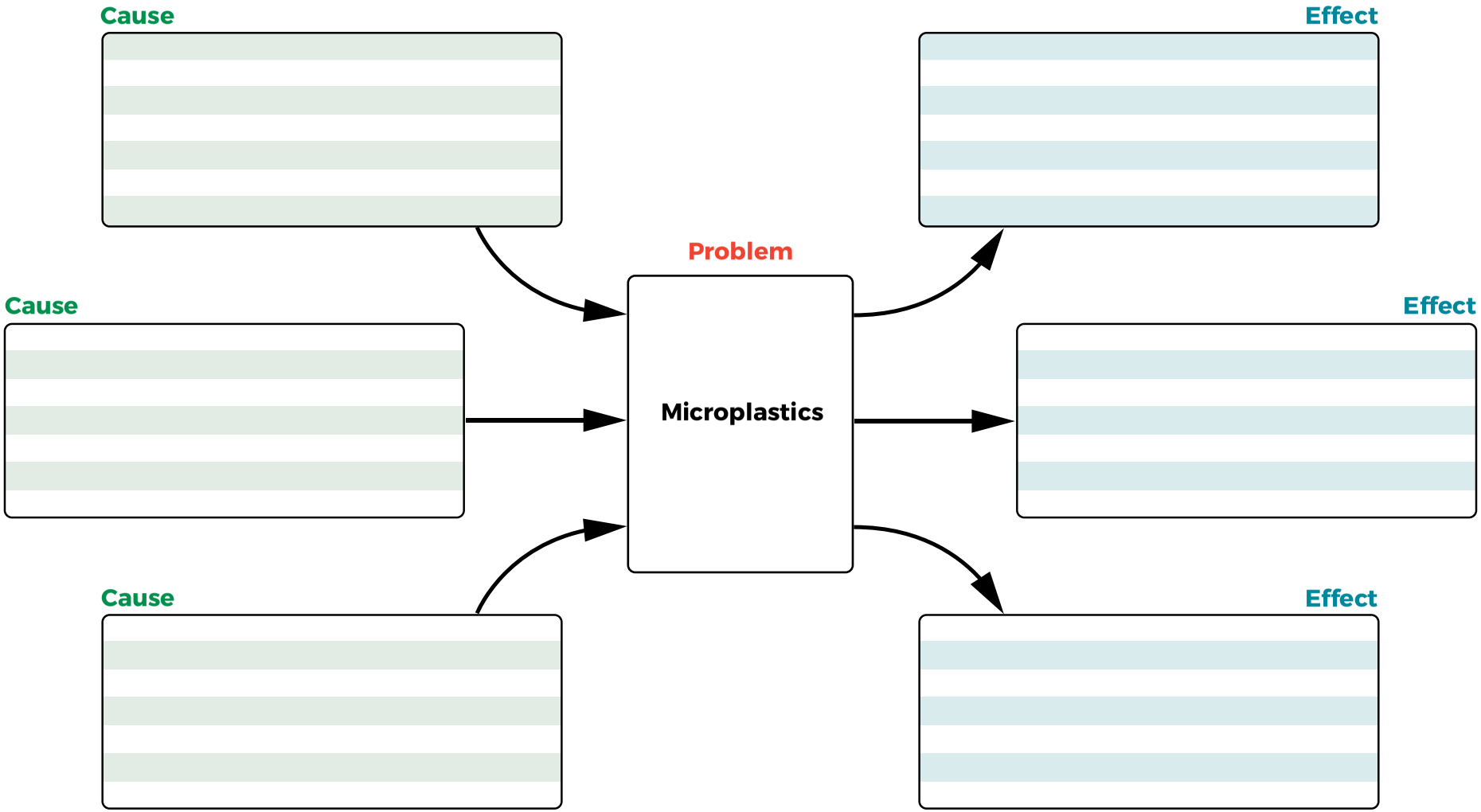
1. Summarize in your own words what you have learned from Dr. Mason's article. Be sure to include at least three key points, with at least one comment about how valid and relevant the research data are or are not.

2. Do you think plastic is good for the environment? Why or why not?

3. Think about a plastic object tossed into the Great Lakes or in the Ocean: It will be whole at first, but then it will break into smaller pieces. The amount of microplastics in our environment is a problem. What causes the plastic pollution to break down? Fill in the three circles on the left of the chart with what has caused this problem. What might happen to those smaller pieces? Fill out the three circles on the right of the chart with the effects, or impacts, of this problem on the environment?

PLASTIC, PLASTIC EVERYWHERE
MICROPLASTICS CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____



Plastic Pollution and You

PLASTIC, PLASTIC EVERYWHERE
STUDENT RESPONSE SHEET 2

Name: _____ *Class:* _____ *Date:* _____/_____/_____

4. Describe how you would design an investigation to determine whether plastics are having any impacts (either positive or negative) in your neighborhood.

5. How did you feel after reading the article? What about the article influenced your feelings?

6. Did this article change whether you think plastic pollution is a problem? Why or Why not?

7. How does the idea of "disposability" have potential impacts on people and the natural environment?

8. Dr. Mason described how her research provided new information about plastics in the Great Lakes. Summarize in your own words, what her research has helped us understand.

9. What do you think Dr. Mason would encourage elected government officials, like a mayor, legislator, or governor, to consider when they think about plastic pollution in their communities?

LESSON 2.3
PLASTIC POLLUTION POLICIES

GRADE LEVEL	TIME
9-12	60-90 MINUTES

Objective:

Communities across the world have implemented various policies to reduce the presence of plastic pollution. Policies that aim to change personal and business use of disposable plastic items, in the forms of bans or fees, have grown in number. In this activity, students will read about the current status of these policies in the United States and their local communities.

Instructions:

1. Read the National Geographic Article: See the complicated landscape of plastic bans in the U.S.
2. Complete Part 1 of the student response sheet (questions 1-3). Discuss the students responses as a class.
3. Have students research plastic pollution policies that have been debated in their local community or state, using the PBS.org Research Guide as needed.
4. Have students complete Part 2 of the student response sheet (questions 4-6). Discuss the students responses as a class.

Optional activities:

Count how many students in the class selected a ban or a fee.

Materials:

- National Geographic Article: See the complicated landscape of plastic bans in the U.S.
- Map of U.S. Plastic Reduction Policies
- Student Response Sheet

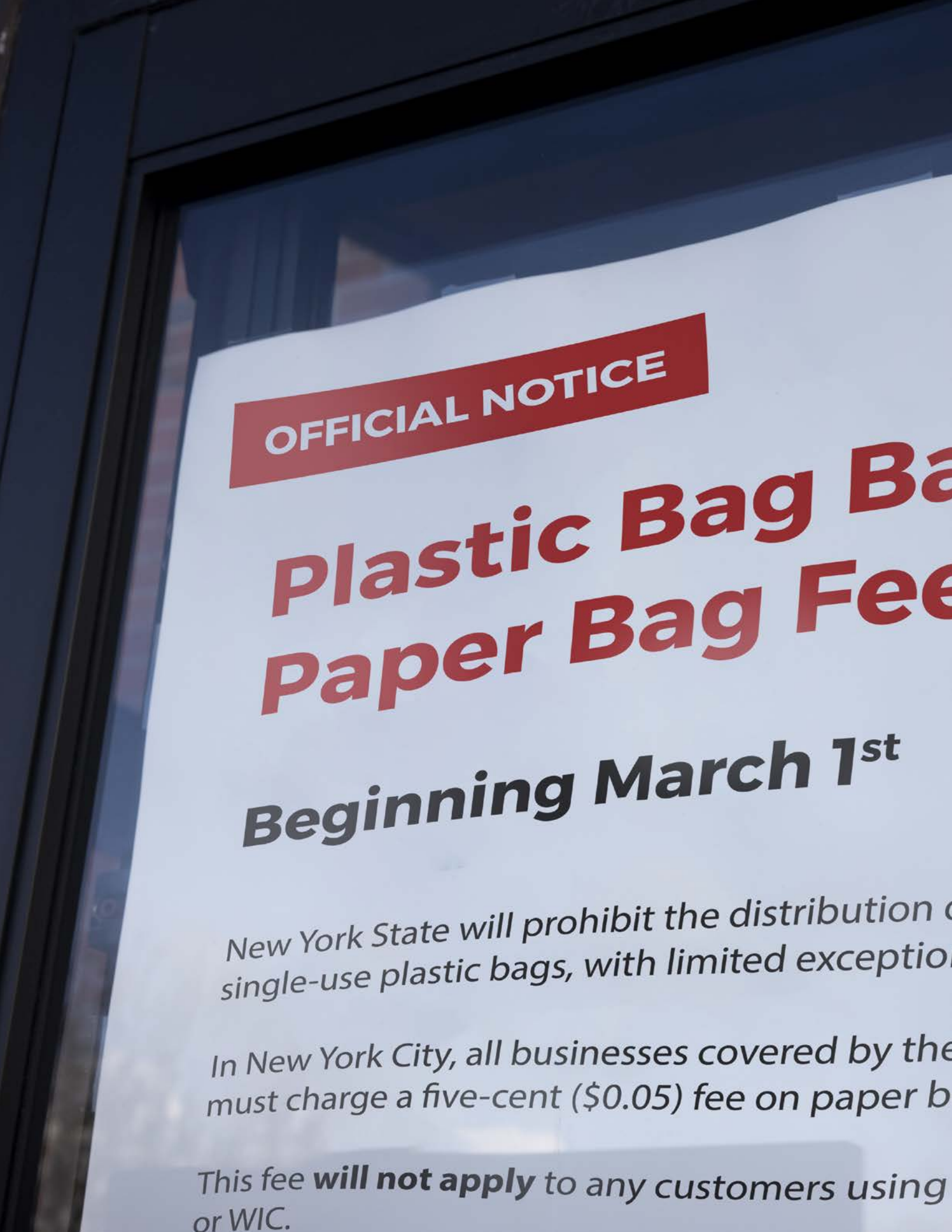
Notes:

Learning Standards:

SCI:
MS-ESS3-3, HS-LS2-7,

SS:
8.8.c, 10.9.a, 10.9.b, S5-KI #3, S5-KI #4

GLLP: 6, 7, 8


OFFICIAL NOTICE
Plastic Bag Ba
Paper Bag Fee
Beginning March 1st
New York State will prohibit the distribution
single-use plastic bags, with limited exceptio
In New York City, all businesses covered by the
must charge a five-cent ($0.05) fee on paper b
This fee will not apply to any customers using
or WIC.

Plastic Pollution and You

STUDENT RESPONSE SHEET
PART 1

Name: _____ *Class:* _____ *Date:* _____/_____/_____

PART 1

1. Do you think there should be a policy/rule (such as a ban or a fee) about using plastic bags? Why or why not?

2. What are some advantages of having a state-wide policy/rule instead of a local law? What are some disadvantages?

3. Some states do not want to allow local or county governments to make rules about how people use disposable plastic items. What do you think about this?

STUDENT RESPONSE SHEET
PART 2

Name: _____ *Class:* _____ *Date:* _____/_____/_____

PART 2

4. What have you observed about how plastic bags are used and disposed of in your area? How do you use plastic bags?

5. Has your community had a debate about plastic pollution policy? If so, which policies have been proposed? If not, share an example from another community you researched.

6. Which type of public policy do you think would work best in your community?

LESSON 2.4
CREATE YOUR OWN OUTREACH CAMPAIGN

GRADE LEVEL	TIME
9-12	MULTIPLE CLASS PERIODS

Objective:

Students will learn about public outreach campaigns and the communication tools that are used to educate and encourage the public to change their behavior. Students will then utilize their creative talents to explore and develop a component of an outreach campaign to educate consumers about New York State's Bag Waste Reduction Law.

Instructions:

1. As a class, review the different communication tools created by New York State for the BYOBag campaign. Discuss the advantages and disadvantages of their different methods used. Encourage students to consider who the audience is and what the message is for each tool.
2. Have students complete the questions on the "Create Your Own Outreach Campaign Sheet".
    a. Encourage your students to think about who their target audience is (i.e., shoppers, store owners, etc.) beyond the general public (i.e., parents, students, teachers, etc.). What messages would work in their community versus state- or nation-wide campaigns?
3. Students then design and can share their campaigns with the class (slide presentation), their school (in a display case or school event), or even their community by partnering with a local business or other institution (public library, sports complex, etc.)
   Optional: Record presentations and post to the school website or share broadly within the community.

Additional resources:

The Conversation article: Plastic Free Campaigns

Stockholm Environment Institute (SEI) and the United Nations Environment Programme (UNEP): Reducing Plastic Pollution Campaigns That Work

Materials:

- New York State Department of Environmental Conservation BYOBagNY campaign
- Create Your Own Outreach Campaign Sheet (templates in Appendix 4)

Notes:

Learning Standards:

ELA:

W1, W6, WHST1, WHST7

SCI:

MS-ESS3-3, HS-LS2-7

SS:

8.8.c, 10.9.a, 10.9.b, S5-KI #3, S5-KI #4

GLLP: 6, 8


BYO
BAG
NEW YORK STATE
Department of Environmental Conservation

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: In this activity, you will create your own outreach campaign to educate consumers about the "Bag Waste Reduction Law'' and provide options for reducing plastic bag waste. Before you design your outreach campaign tool, it is important to determine:

1. Target audience (who do you want to talk to?):

2. Key message (what do you want people to do/learn?):

3. Format (What is the best way to reach your target audience? Why do you think this method will be effective? Examples include: social media, e-mail, text messages, posters, letters in newspaper, videos):

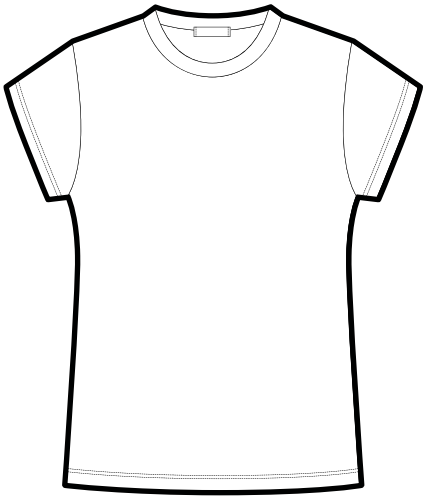
4. Use the space below to brainstorm and sketch out your public outreach campaign. Then place your final design in the template.

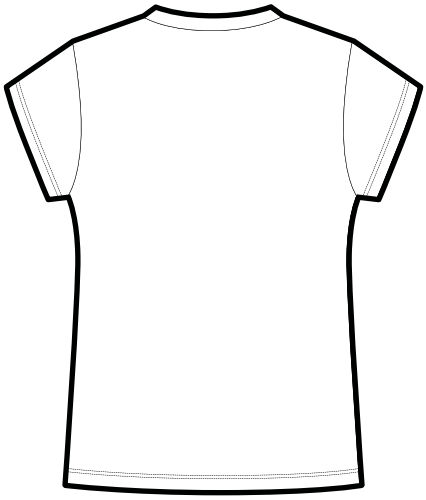
New York State BYO Bag Outreach Materials - more available at
https://www.dec.ny.gov/chemical/117781.html#Outreach

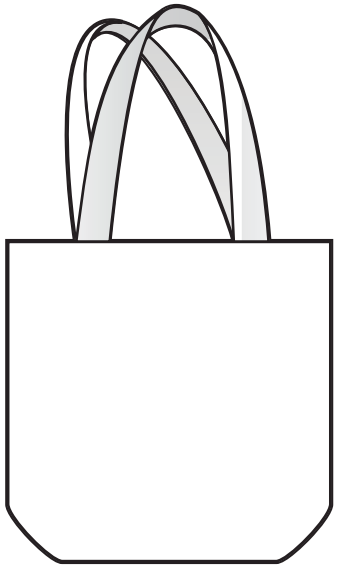
Plastic Pollution and You

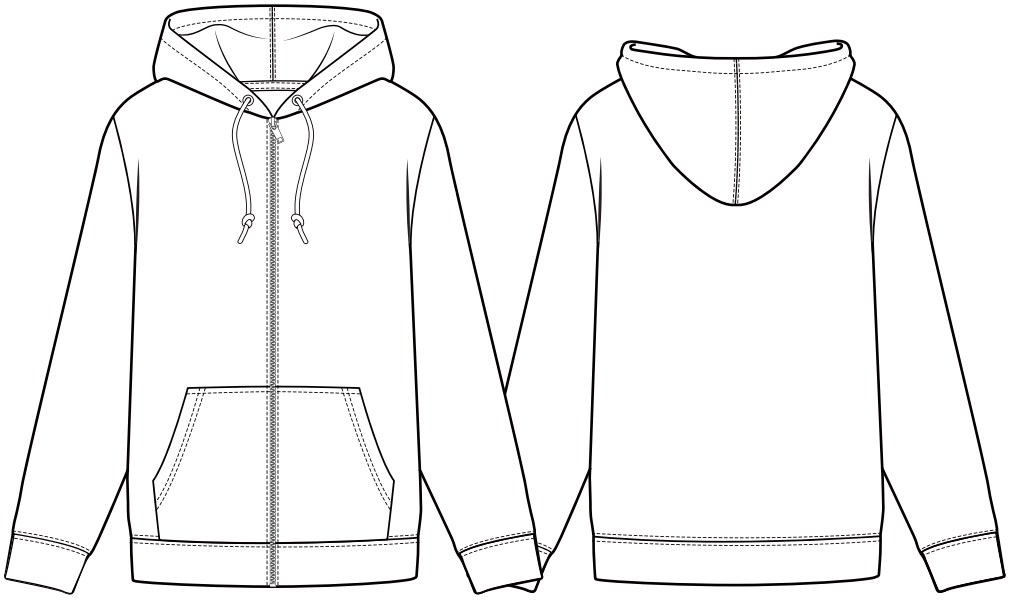
CREATE YOUR OWN
OUTREACH CAMPAIGN TEMPLATE
APPAREL

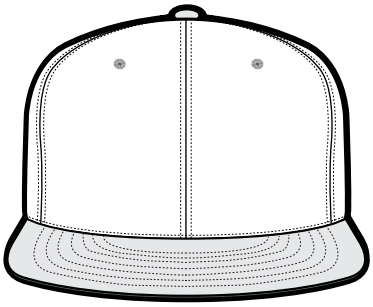
Name: _____ *Class:* _____ *Date:* _____/_____/_____

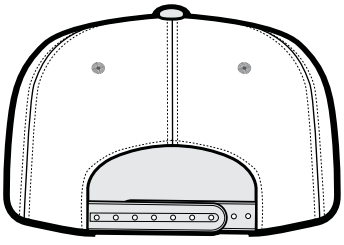








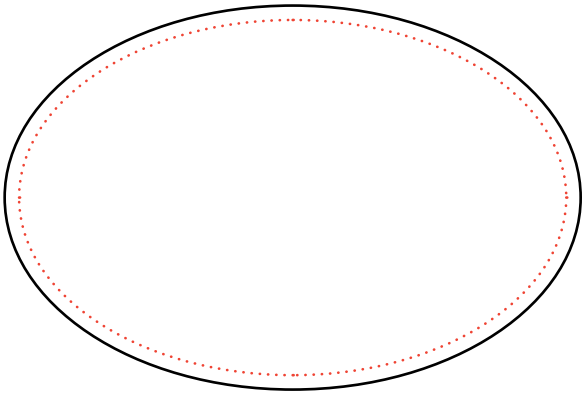


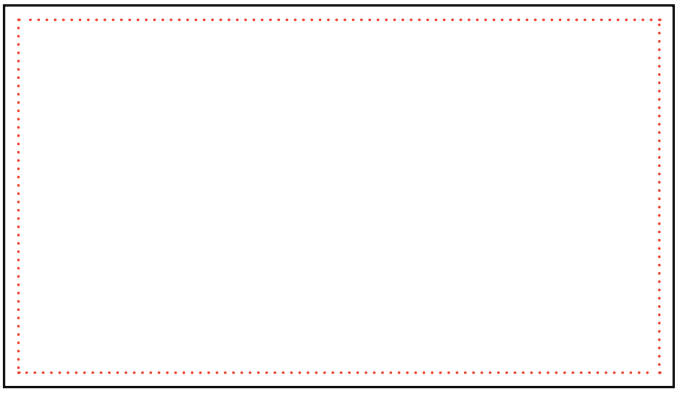


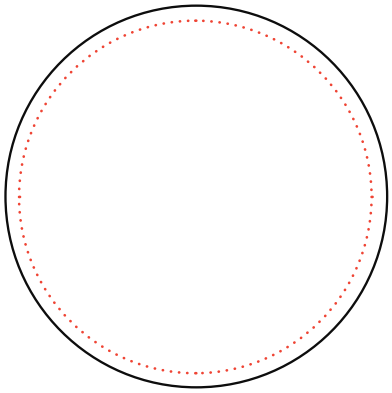
Sample Page: See appendix for individual campaign materials

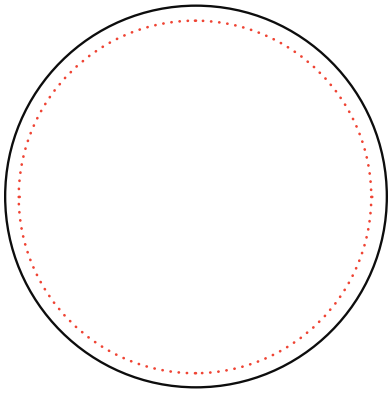
CREATE YOUR OWN
OUTREACH CAMPAIGN TEMPLATE
STICKERS, BUTTONS & KEYCHAINS

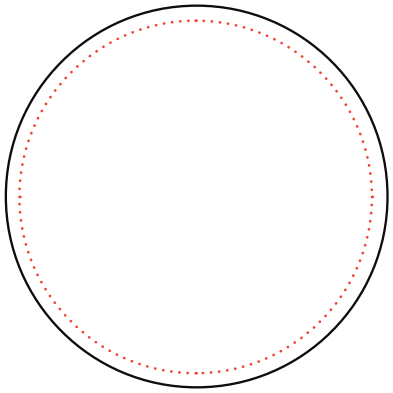
Name: _____ *Class:* _____ *Date:* _____/_____/_____

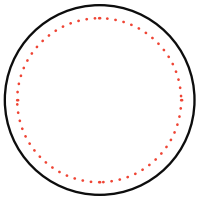


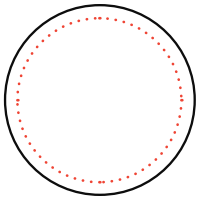


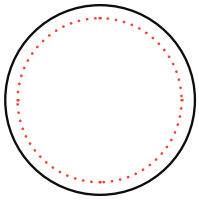








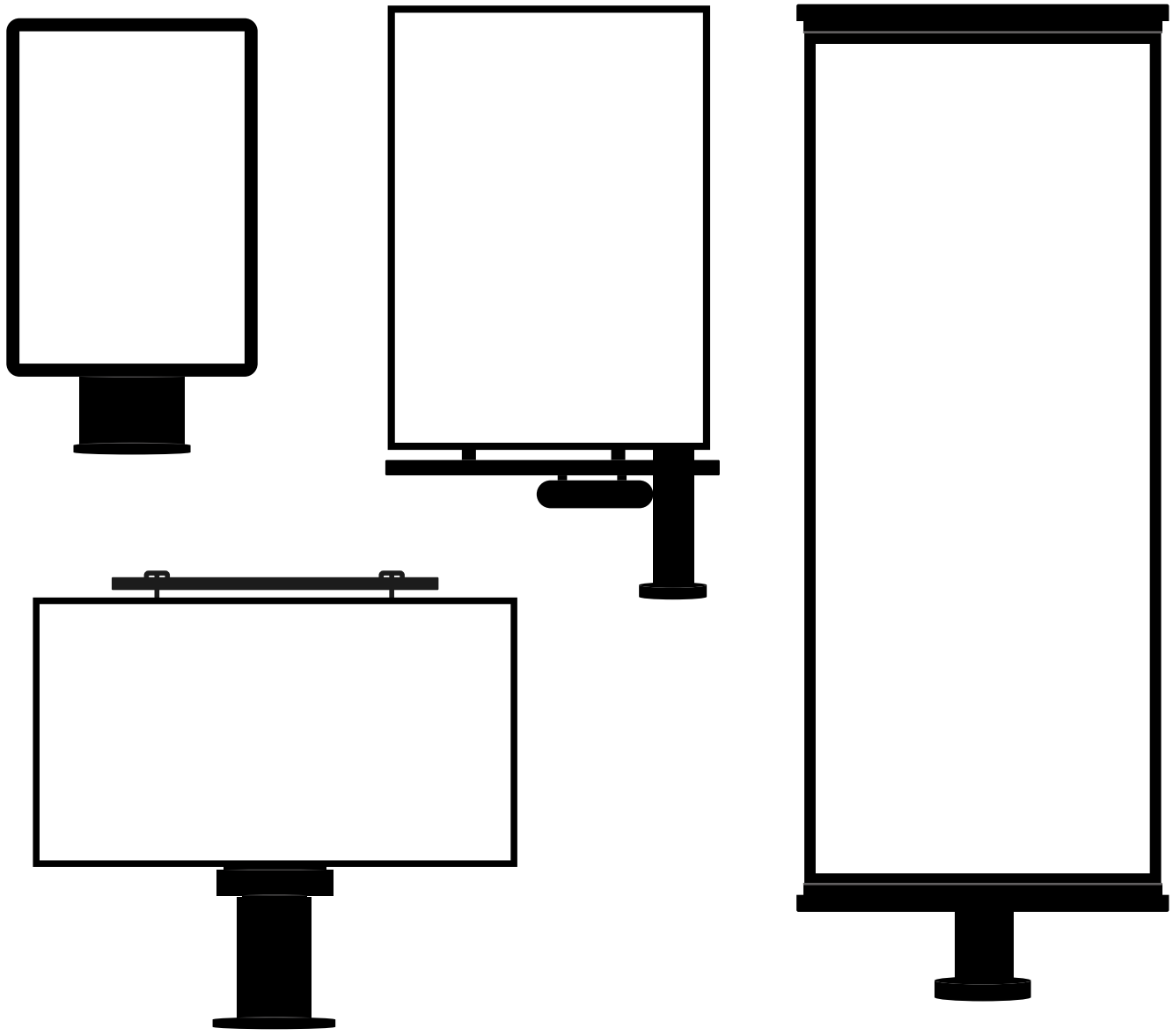




Sample Page: See appendix for individual campaign materials

CREATE YOUR OWN
OUTREACH CAMPAIGN TEMPLATE
BILLBOARDS / SIGNS

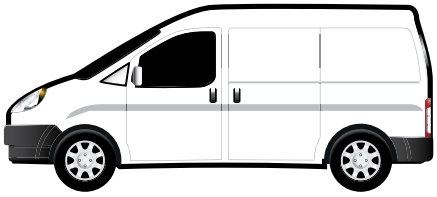
Name: _____ *Class:* _____ *Date:* _____/_____/_____

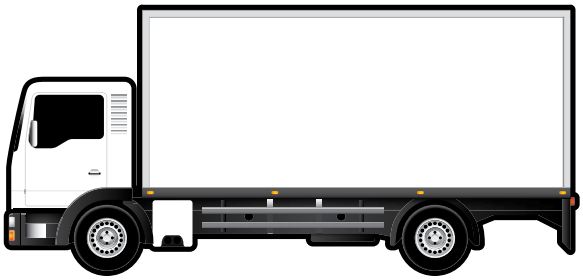


Sample Page: See appendix for individual campaign materials

CREATE YOUR OWN
OUTREACH CAMPAIGN TEMPLATE
VEHICLE WRAPS

Name: _____ *Class:* _____ *Date:* _____/_____/_____





Sample Page: See appendix for individual campaign materials

LESSON 2.5
PUBLIC HEARING: PLASTIC POLLUTION POLICY

GRADE LEVEL	TIME
6-8, 9-12	MULTIPLE CLASS PERIODS

Objective:

In this activity, students will have the opportunity to research and present different perspectives from community members considering a policy on plastic bags. They will utilize a 'town hall' style role play to voice the opinions of their character and then together work to decide if their community will or will not implement a policy on plastic bags. This activity is an exercise in research, public speaking, civic duty, and learning about the roles in community participation.

Instructions:

1. Distribute role description cards, instructions, and rubic.
2. Have students develop their character's perspective by asking questions and conducting research using the articles and resources from previous activities or from the PBS.org Research Guide as needed.
3. Have students turn in their prepared materials at least one day prior to the activity to offer feedback and ensure they have properly prepared for the activity.
4. Hold a public hearing. The length of public speaking will vary depending on the age of students.
5. The facilitator will open the meeting and introduce the characters.
6. The Councilmembers present their statements one at a time.
7. The facilitator will invite the community members one at a time to present their opinions
8. The facilitator will address the audience and allow them to ask questions of the Councilmembers one at a time.
9. If voting, the facilitator asks each voter to present their decision.
10. The facilitator closes the meeting and states if the bag ban has been passed.
11. Have students complete the Student Response Sheets.

Note: There are many recordings of local town hall and public hearing meetings available. Many of these recordings contain the entire length of the meeting (ie: 1-2 hours) but you can show students several minutes of a meeting to give them an example of a public hearing.

Materials:

- Role Description Cards
- Student Response Sheet
- Student Rubric

Notes:

Learning Standards:

ELA:

W1, W6, WHST1, SL4

SCI:

MS-ESS3-3, HS-LS2-7

SS:

8.8.c, 10.9.a, 10.9.b, S5-KI #4

GLLP: 6, 8

Student Roles:

1. Two Councilmembers: students will research and prepare a statement of their position and present it.
    a. Councilmember who supports the plastic bag policy.
    b. Councilmember who opposes the plastic bag policy.
    * These councilmembers would also vote if class is voting
2. Three Voting Councilmembers (optional if conducting a vote).
    a. These councilmembers will listen to all statements from the other councilmembers and opinions of community members. After observing, they will be given a set time to deliberate and make a decision. They will then present their decision to the class.
3. Notetaker/Facilitator (this can be the same person or divided between two students)
    a. Note taking is important to create a public record of what was stated
    b. Facilitating ensures that the public hearing runs smoothly by keeping time for questions and public statements, calling speakers, keeping order, etc.
4. Town Recycling Coordinator
5. Community Members: Students will prepare a statement about their perspective and opinion on the plastic bag policy.
    a. Grocery Store Owner
    b. Retail Store Owner
    c. Restaurant Owner
    d. Non-govenmental organization
    e. Researcher
    f. Environmental Activist
    g. Plastic Bag Manufacturer
    h. Shopper in support of the bag policy
    i. Shopper who opposes bag policy
    j. Audience Members
    k. Journalists

NOTE:
Suggested roles listed above. The community members listed have role decription cards. If there are more students than roles, feel free to expand beyond or have students develop their own ideas on the blank role cards. Students could also work in pairs or double up to have multiple people with the same role.

Town Council

Councilmember 1

You are a member of the Town Council who introduced the plastic bag policy and is speaking in support of it at the meeting. You feel that there are several reasons that this is good for your community. These reasons include reducing plastic pollution in the community's neighborhoods, streets, and parks as well as raising money from a fee on plastic bags for the town's environmental and recreation programs. Together with the other councilmembers, you will present the decision to the class.

Town Council

Councilmember 2

You are a member of the Town Council who is opposed to the plastic bag policy and is speaking against it at the meeting. You feel that there are several reasons that this would not be good for your community. These reasons include the increase in costs for people at stores if there is a fee on plastic bags and the increase cost for stores if they must buy reusable bags. Additionally, you feel that there are other problems that the Town Council should be concerned about that are more important. Together with the other councilmembers, you will present the decision to the class.

Town Council

Councilmember 3

You are a member of the Town Council who has not made up their mind about the plastic bag policy yet. You will listen to all statements from the other councilmembers and opinions of community members. After listening, you will think about the statements, and do your own research and then decide. Together with the other councilmembers, you will present the decision to the class.

Town Council

Councilmember 4

You are a member of the Town Council who has not made up their mind about the plastic bag policy yet. You will listen to all statements from the other councilmembers and opinions of community members. After listening, you will think about the statements, and do your own research and then decide. Together with the other councilmembers, you will present the decision to the class.

Town Council

Councilmember 5

You are a member of the Town Council who has not made up their mind about the plastic bag policy yet. You will listen to all statements from the other councilmembers and opinions of community members. After listening, you will think about the statements, and do your own research and then decide. Together with the other councilmembers, you will present the decision to the class.

Town Employee

Town Recycling Coordinator

You are the recycling coordinator for your town. You oversee collecting recyclable items from businesses and residents each week in their curbside recycling bins. You have noticed that plastic bags are often put in the recycling bins, even though they frequently get tangled in the gears and moving parts of your recycling trucks and the machines at the materials recovery facility. Undoing these jams takes a lot of time and is costing the town money.

Town Employee

Timekeeper

You will be keeping time for any public statements and questions from the speakers and the community members. Time limits will be determined before the meeting begins. Sticking to these time limits ensures that the public hearing runs smoothly.

Town Employee

Notetaker

You will be taking notes for a public record of what was stated. These notes should include the name of anyone who speaks at the meeting and what their main points were. Councilmembers will use these notes while they make their decision. Community members may also request to see notes after the meeting.

Community Members

Grocery Store Owner

You own a grocery store and have concerns about the plastic bag policy. You are worried that it may drive customers away, increase your costs, and you want to know how it would be enforced. However, you are interested in selling reusable bags with your store's name on it as well.

Community Members

Retail Store Owner

You own a retail store that has already eliminated the use of plastic bags in your business by switching from single use bags to reusable bags. You can discuss how the difference in costs of these bags has affected your budget and the response you have received from your existing and new customers.

Community Members

Restaurant Owner

You own a restaurant that relies on take-out orders that use plastic bags and cups to transport food and beverages from the restaurant to the consumer's home. You understand the impact of plastic pollution and only distribute plastic silverware if customers request them. But you worry that paper bags will leak if food spills and you will lose business if you are not allowed to use plastic bags.

Community Members

Researcher

You are a researcher who is interested in learning about how the bag policy will affect people's lives and the decisions they make. You have conducted research like this in other communities and can present what you've learned.

Community Members

Non-governmental Organization
(non-advocate)

You work for an organization that studies the effectiveness of laws, regulations, and other policies. You have been following the impacts to communities across the country that have created plastic bag policies and can talk about the advantages and disadvantages of these types of laws.

Community Members

Environmental Activist

You are member of the community who is worried about the impact of plastic pollution on the planet, animals, and humans. You are also concerned that plastic is produced from fossil fuels, which are contributing to many other environmental problems around the world. You are very supportive of a plastic bag policy and would like to see more laws passed to limit the use of disposable plastic items.

Community Members

Plastic Bag Manufacturer

You own a manufacturing factory that makes plastic bags and sells them to stores, restaurants, and other businesses. Plastic bags are one of your most popular items and are important to the success of your business.

Community Members

Shopper
(who supports plastic bag policy)

You are a community member who shops at local stores and supports the plastic bag policy. You feel that plastic bags are harming the community and local environment and would like to see more shoppers switch to reusable bags.

Community Members

Shopper

(who opposes plastic bag policy)

You are a community member who shops at local stores and opposes the plastic bag policy. You feel bringing a reusable bag with you is inconvenient and do not want to pay any fee associated with purchasing a paper bag at the store.

Community Members

Journalist

You represent a local, regional, or national newspaper and are at the hearing to report on what happened. You will pay attention to the speakers, the community members, and councilmember's statements. You may ask additional questions to participants in the meeting.

Community Members

Audience Member

You are a member of the community who is at the public hearing to learn about the issue. You haven't made up your mind about the policy yet.

Community Members

Audience Member

You are a member of the community who is at the public hearing to learn about the issue. You haven't made up your mind about the policy yet.

PLASTIC POLLUTION POLICY
ROLE CARD TEMPLATE

Each card should have: *Group: (insert group name), Name: (insert role name), Description: (insert description)*

Plastic Pollution and You

PLASTIC POLLUTION POLICY
STUDENT RESPONSE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Instructions: Your class will act as a community hosting a public hearing about a possible plastic bag policy. As you prepare for the hearing, please list your role, opinion, and the research or evidence you have to back up your opinions. Answer questions 4 & 5 after the hearing.

1. Community Role:

If you did not have a role, which role do you most relate to?

2. What is your opinion of the proposed plastic bag ban?

3. List Evidence and Reasoning for Your Opinion:

A.)

SOURCE:

B.)

SOURCE:

C.)

SOURCE:

After the hearing is finished, answer the following questions...

4. What other opinions did you learn about? How did the other opinions surprise you?

5. Did your community decide to implement the bag ban? Do you agree with this decision? why or why not?

Plastic Pollution and You

Student Rubric:

	1 Emerging Proficiency	2 Approaching Proficiency	3 Demonstrates Proficiency	4 Exceeds Expectations of Proficiency
Town Hall Preparation	Develops opinion, but does not cite sources	Develops opinion, using 1 source ahead of time	Develops and submits opinion, using 2 sources	Develops and submits clear opinion, using 3 sources
Clarity of Opinion/ Argument	Unclear, disorganized opinion	Somewhat clear opinion	Mostly clear and organized opinion	Well thought out, clear, strong opinion
Evidence to Support Opinion	Facts or examples are not related to or do not support opinion	1 fact or example to support opinion	2 facts and examples to support opinion	3 or more facts and examples to support opinion
Participation in Town Hall Meeting	Listens to others, but does not raise hand	Listens to others, raises hand 2+ times but is off topic	Listens to others, raises hand 2+ times, responds to others appropriately	Listens to others, uses eye contact, raises hand 3+ times and responds or provides rebuttals appropriately
Speaking Voice	Voice is not clear and/or too quiet to hear	Voice is somewhat clear but also quiet	Voice is mostly clear and loud enough to hear	Voice is clear and loud enough to hear at all times

UNIT 3
PLASTIC POLLUTION IN OUR WATERS

Overview:

This lesson set contains five activities where students will learn how plastic pollution becomes marine debris, the effects that plastic pollution have on ecosystems, and how marine debris impacts people and their communities. Students will also think through how they can prevent plastic pollution from entering our waterways, both directly and through behavior and policy changes.

Lessons:

Lesson 3.1—How does Plastic Pollution Get Into the Water?
Students will watch a short video developed by NOAA's Marine Debris Program, build a watershed model to learn about how plastic can move through a watershed, and answer questions related to what they learned.

Lesson 3.2—Plastic Pollution in Our Water
Students will learn about the challenge that microplastics pose to the treatment of wastewater and test different filters to capture microplastics.

Lesson 3.3—Persuading Parker's Party Place
Students will use persuasive communication methods to contact a local party store to discuss the potential negative impacts balloons are causing and try to persuade them to consider alternative options.

Lesson 3.4—How to Capture Plastic Pollution
Students will learn about trash capture technologies and design a device to capture plastic pollution before it becomes marine debris.

Lesson 3.5—Creating an Action Plan: What Can You Do about Plastic Pollution?
Students will work together to create an action plan to reduce plastic pollution in their lives and communities.

LESSON 3.1
HOW DOES PLASTIC POLLUTION GET INTO THE WATER?

GRADE LEVEL	TIME
3-5, 6-8, 9-12	MULTIPLE CLASS PERIODS

Overview:

In this activity, students will learn how plastic pollution that is in our communities and on our shorelines can end up in our lakes, rivers, and oceans. Beginning with a video from NOAA that introduces the concept of marine debris, students will learn how water moves through a watershed and then construct a watershed model to observe how trash, litter, and plastic pollution move throughout a watershed.

Instructions:

1. On the Wonder worksheet, have students add claims or evidence they notice, as well as questions they have about plastic and plastic pollution and their watershed, while watching these two videos:
    a. "TRASH TALK: Marine Debris and Plastics" from NOAA Marine Debris Program and Ocean Today
    b. "What is a Watershed?" from Niagara Peninsula Conservation Authority
2. As a class, find your watershed by using the Environmental Protection Agency's "How's My Waterway" website. Once you find your watershed, compare the EPA's map to other maps of your community, such as Google Maps.
    a. Use different views, including satellite and topographic to demonstrate different land uses (ie: urban, rural) and changes in elevation.
    b. Encourage students to think about where major local landmarks, parks, and other parts of their community are located within their watershed.
3. Have a class discussion about what students noticed and are wondering about. Here are some additional questions you can ask to prompt a discussion:
    a. Where does most of the trash in lakes, rivers, and the ocean come from?
    b. Where have you seen trash around our school or your neighborhood?
    c. What do you notice about trash and litter around our school or your neighborhood?
    d. What might happen if trash and litter in neighborhoods is not picked up and there is a big rainstorm?

Materials:

- National Oceanic and Atmospheric Administration's Trash Talk Video
- "What is a Watershed?" video
- Environmental Protection Agency's "How's My Waterway" Website
- Local watershed maps, online or print
- Wonder worksheet
- Student formative assessment
- Supplies for watershed model – tray or large basin, plastic items, plastic sheet, sprinkles, spray bottle, small sponges or other absorbent material.

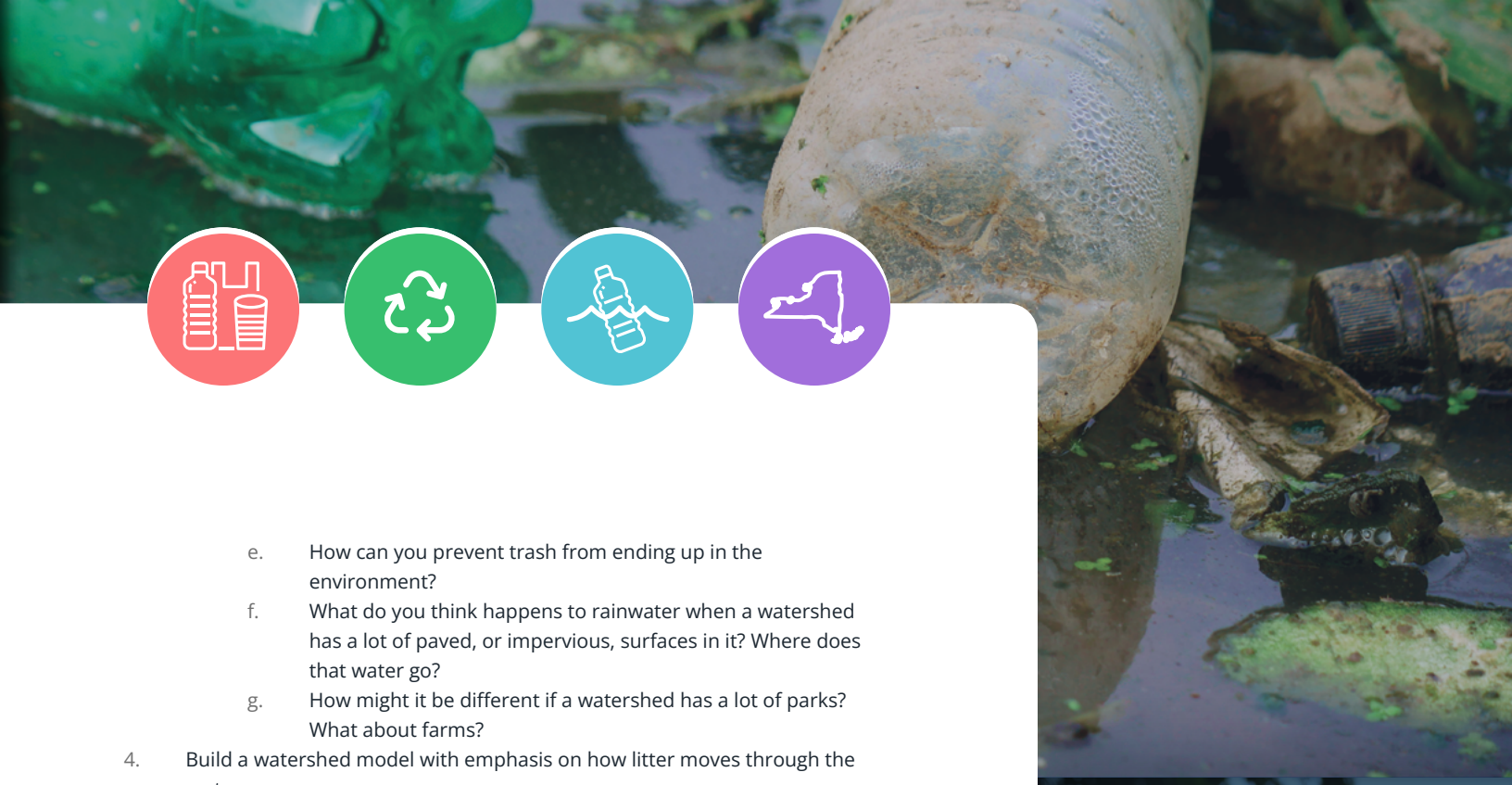
Notes:

Learning Standards:

SCI:

5-ESS3-1, MS-ESS3-1, HS-ESS3-1

GLLP: 1, 6



e. How can you prevent trash from ending up in the environment?
f. What do you think happens to rainwater when a watershed has a lot of paved, or impervious, surfaces in it? Where does that water go?
g. How might it be different if a watershed has a lot of parks? What about farms?

4. Build a watershed model with emphasis on how litter moves through the system.
    a. Make sure each student has their Student Formative Assessment.
    Gather the group around the table holding the materials.
    b. Build a large watershed model by placing plastic items on the large tray/basin. Make an irregular mound with peaks, ridges, and valleys. Drape a tarp or large plastic sheet over the items.
    c. Talk with students about the model.
        i. What do you notice about this model? Where are there mountains or hills? How many mountains and hills do we have? What do you predict will happen? Where do you think rivers and lakes might form?
        ii. If we spray water on the mountain peaks, what will happen to it?
    d. Have students take turns spraying the watershed with the spray bottle.
        i. What happens as they add water to the system? Can they see rivers and lakes forming?
        ii. Have students fill out the questions on the Student Formative Assessment.
    e. Have students place sprinkles throughout the model to symbolize litter in the watershed.
    f. Have students take turns spraying the watershed again and watch where the litter flows and accumulates.
        i. Where do the sprinkles end up once the students are done spraying water?
    g. Add pieces of sponges to the watershed model that can absorb moisture as well as trap sprinkles.

NOTE:
If you completed Lesson 1.4 (Plastic Pollution in Your Life), compare the litter tracking map the students created with the watershed maps in this lesson.

Plastic Pollution and You

WONDER WORKSHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

As you watch the videos about plastic pollution and watersheds, make annotations in the left column below to record important information you noticed. Also record questions or things you are wondering about in the right column.

I NOTICED...	I WONDER...

Plastic Pollution and You

STUDENT FORMATIVE ASSESSMENT

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. Draw and label how water flows through your watershed.

2. How do you think water flows through the natural environment?

3. Go back to your drawing and add litter. How do you think litter flows through the natural environment?

LESSON 3.2
PLASTIC POLLUTION IN OUR WATER

GRADE LEVEL	TIME
3-5, 6-8	60-90 MINUTES

M`hcarg tc:

In this activity, students will learn about the fundamentals of water treatment systems and the challenges that microplastic particles present to both waste and drinking water systems. By testing filters of different sizes with plastic particles of different shapes and sizes, the students will observe how the sizes of materials influence each other.

Instructions:

1. Have students watch the video Here's Where New York City's Sewage Really Goes and discuss as a class the step in the wastewater treatment process that removes large items from wastewater.
2. Show students the different items and filters that will be used in the demonstrations.
    a. Have students make observations about the different sizes and shapes of the items and the different types of filters.
    b. Ask each student to write down their predictions about which items will pass through which filters on the Plastic Pollution in Our Water Prediction Chart.
3. Test out different types of filters to capture different sizes of plastic.
    a. Set up different filters over buckets.
    b. Fill pitchers with water and different size plastic items.
    c. Pour the water filled with plastic items over each filter and have students observe what happens.
    d. Have each student record which items move through each filter on the Plastic Pollution in Our Water Results Chart.
4. As a class or individually, have students complete or discuss reflection questions.

Learning Standards:

SCI:

5-ESS3-1, MS-ESS3-3, HS-ESS3-4,
3-5-ETS1-1, MS-ETS1-3, HS-ETS1-3

GLLP: 6, 7, 8

Materials:

- Here's Where New York City's Sewage Really Goes

Solid items of different sizes*

- Items less than 1cm: sand, coffee grounds, sprinkles, rice, couscous, etc.
- Nurdles** and other small fragments from larger plastic items (ie: plastic bottle, caps, etc.) found during cleanups or personal use (can cut these items into smaller pieces as needed)
- Small items: plastic craft beads, dry beans, gravel, etc.

Different gauge filters

- Various nets or mesh fabric
- Kitchen strainer
- Coffee filter

Water

Pitchers

Buckets

Prediction chart

Results chart

Reflection questions sheet

*While this lesson focuses on plastic pollution, the items used in this demonstration do not necessarily have to be plastic - they can represent how plastic pieces of different sizes and shapes would function. The list of materials include some examples of what can be used but feel free to incorporate a wide variety of materials.

**Nurdles are small pre-production plastic pellets that are often lost during the plastic production process. To learn more about nurdles, check out this NOAA Ocean Podcast Episode: The Nurdle Patrol or visit the Nurdle Patrol's website.

PLASTIC POLLUTION IN OUR WATER
PREDICTION CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Prediction: Will the filter capture the item? Why or Why not?

	Item #1 _____	Item #2 _____	Item #3 _____	Item #4 _____
Filter #1 _____				
Filter #2 _____				
Filter #3 _____				

Plastic Pollution and You

PLASTIC POLLUTION IN OUR WATER
RESULTS CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Results: Describe what happened with each item and filter.

	Item #1 _____	Item #2 _____	Item #3 _____	Item #4 _____
Filter #1 _____				
Filter #2 _____				
Filter #3 _____				

PERSONAL PLASTIC USE SHEET
REFLECTION QUESTIONS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. Explain the similarities and differences among the filters used, and identify the best characteristics of each filter.

2. What part of the wastewater treatment process could remove large plastic items? What about small plastic items?

3. What size filter would best remove plastic pollution from wastewater? What are the advantages and disadvantages of using this technology to filter water?

LESSON 3.3
PERSUADING PARKER'S PARTY PLACE

GRADE LEVEL	TIME
3-5, 6-8, 9-12	60-90 MINUTES

Objective:

In this activity, students will use persuasive communication methods to contact a local retailer to educate and encourage them to shift to more sustainable practices.

Note: Environmental science and marine debris is an interdisciplinary field. Scientists need to use effective communication techniques to educate the public about their research in order to result in community behavior change. This lesson presents an opportunity to align and work with english language arts standards and teachers.

Instructions:

1. As a class or in small groups, have students inspect balloons and other materials to think about their different characteristics.
    a. Use the Marine Debris Entanglement and Ingestion lessons if students have questions about the risk of discarded balloons.
2. As a class, review the Virginia Coastal Zone Management Program's Joyful Sendoff Campaign and discuss alternatives to balloons and balloon releases.
3. Have students find 2-3 additional sources of information on plastic pollution, using the PBS.org Research Guide as needed.
4. Have students read the case study of Parker's Party Place.
5. Review the Persuasive Communications Tipsheet (and additional video if needed) as a class.
6. Students will complete the Persuasive Communication Activity to suggest alternative products for Parker to promote at his store.

Materials:

- Examples of different types of balloons and associated materials - latex balloon, mylar balloon, ribbon, etc.
- Virginia Coastal Zone Management Program's Joyful Sendoff Campaign
- Parker's Party Place Case Study
- Persuasive Communications Chart
- Additional Resource: Texas A&M University Writing Center - Ethos, Pathos, Logos
- Persuasive Communications Sheet

Marine Debris Entanglement and Ingestion lesson plans:

- All Tangled Up - a lesson on marine debris entanglement.
- Eating Plastic is a Deadly Meal - a lesson on marine debris ingestion

Learning Standards:

ELA: WHST1, WHST7

SCI:

5-ESS3-3, MS-ESS3-3 HS-ESS3-3

SS: *8.8.c, 10.9.a, 10.9.b*

GLLP: 6

Name: _____ *Class:* _____ *Date:* _____/_____/_____

PARKER'S PARTY PLACE

Parker's Party Place is a local store that sells party supplies including balloons. Parker's family started their business many years ago and they rely on the store to support themselves and the families of their employees through their successful business. Most people in the community shop for supplies and balloons at Parker's Party Place when planning to host special events, parties, and weddings.

Recently, you have learned that unfortunately, sometimes the balloons sold at Parker's Party Place end up in the environment. Occasionally, the balloons are accidentally released as Parker transports them from the shop to the event or at outdoor events. Other times, people release the balloons on purpose during their celebration. Once the balloons are in the environment, they do not break down and they can get stuck in trees or washed up on the beach. Balloons have even tangled up animals and have been eaten by wildlife. Research scientists have found that these balloons that have been released intentionally or accidentally are injuring or even killing some of these animals.

While you love shopping at Parker's Party Place and you want to continue supporting this business, you also love to spend time at the beach and see healthy animals and clean water. You are concerned about the impacts that the balloons sold at Parker's Party Place are having on your community's environment. You have even read that one of Parker's largest customers, the local aquarium, is considering no longer purchasing balloons from Parker's Party Place due to the impact the balloons are having on the environment and wildlife.

Your community wants Parker to stop selling balloons but does not want to affect the business or its employees. You have volunteered to lead an effort to educate Parker's Party Place about the harmful impacts of the balloons and promote the idea that Parker considers selling alternatives to balloons that customers can purchase instead.

Plastic Pollution and You

PERSUASIVE COMMUNICATIONS
SHEET 1

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Use the Three Appeals to develop a convincing argument to Parker's Party Place to change their business practices. At the bottom of this chart, put your ideas on how you can use each appeal.

Ethical Appeal	Emotional Appeal	Logical Appeal
Make your argument by... • Establishing your credibility • Establishing your trustworthiness • Appealing to widely accepted moral values	Make your argument by... • Telling personal stories (Anecdotes) • Sharing personal beliefs ("I think", "I believe", "I feel") • Using words, phrases, or images that evoke emotion - fear, excitement, sadness, joy • Using figurative language (simile, metaphor) that stirs an audience's feelings • Making a call to action	Make your argument using... • Facts, statistics, and definitions • References to history or the past • Quotes from experts and authorities • Cause and effect statements (If..., then...) • Research results
This approach will... • Demonstrates the author's reliability and competence • Shows respect for the audience's ideas and moral values	This approach will... • Evoke an emotional response • Can lead to an irrational response if not used carefully	This approach will... • Evokes a rational, reasonable response • Provide evidence and proof to support your argument
1. 2. 3.	1. 2. 3.	1. 2. 3.

Plastic Pollution and You

PERSUASIVE COMMUNICATIONS SHEET 2

Name: _____ *Class:* _____ *Date:* _____/_____/_____

After reading the case study of Parker's Party Place and reviewing the Persuasive Communications Tipsheet, write a persuasive communication (ie: letter, email, etc.) to the party store to educate them about how balloons become marine debris, provide examples of alternative products, and persuade them to consider selling environmentally friendly alternatives to balloons.

Your communication should include: an introduction, your claim, at least 3 reasons and relevant evidence, at least 1 alternative solution or design, and a concluding statement (approximately 7 sentences total).

Describe: How do balloons become marine debris and what is their impact on the environment?

Brainstorm: What are some alternative design solutions to balloons that would not become marine debris?

PERSUASIVE COMMUNICATIONS
SHEET 3

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Design (Optional): Draw a sketch or diagram of your solution on a separate page. What size will it be? What materials will it be made of?

Write your communication to Parker's Party Place in the space provided:

LESSON 3.4
HOW TO CAPTURE PLASTIC POLLUTION

GRADE LEVEL	TIME
6-8, 9-12	60 MINUTES

Objective:

Plastic pollution can become marine debris when it is swept up by stormwater and enters a sewer system that has outlets into local waterways. Once plastic pollution becomes marine debris, it has a negative impact on our communities and ecosystems. Many communities have installed various forms of screens, nets, or other physical structures that capture trash and litter before it enters the sewer systems. In this activity, students will learn about the design and management of trash capture technologies that have been installed in watersheds across the country. Students will then design a trash capture device that could be installed in their community.

Instructions:

1. As a class, review the New York City's Department of Environmental Protection Case Study: How New York City is Keeping Our Water Waterways Trash Free.
2. Using the Engineering Design Sheet, each student should design their own capture technology by completing the first five steps. They can draw a picture, describe in words, or construct a model of a trash capture technology.
3. Explore the Environmental Protection Agency's Trash Free Waters Program's Trash Capture Technology Websites and the Trash Capture Technology Example Sheet as a class, in small groups, or independently.
4. As a class, in small groups, or independently, fill out the Trash Capture Technology Comparison Chart for different trash capture technologies. Ask students to think about the advantages and disadvantages of different types of trash capture devices, including the cost of installation, the amount of maintenance required, and any unintended consequences (ie: flooding, debris accumulation, etc.).
5. Have each student present their trash capture device to the class. Each student can evaluate their own model and 2 other students' designs on the Comparison Chart.
6. Have students revisit the Engineering Design Sheet to complete the last step - "Improve" - to make any modifications to their design.
7. Extension activity – explore opportunities for trash capture

Materials:

- Environmental Protection Agency's Trash Free Waters Program: Projects
- Engineering Design Sheet
- Trash Capture Technology Example Sheet
- Trash Capture Technology Comparison Chart
- Trash Capture Technology Innovation Chart
- Trash Capture Technology Reflection Sheet
- Arts and Craft materials to design, draw, construct model trash capture devices

Learning Standards:

SCI:

5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1, MS-ETS1-3, HS-ETS1-3

GLLP: 6

technologies in your community.

a. As a group or independently, encourage students to walk around their school or neighborhood or visit a local park to look for storm drains or drain outfalls.
b. If you students cannot go outside, use the New York State Department of Environmental Conservation's Combined Sewer Overflow Website and Google Earth Map to identify outfalls.
c. On a printed map of your local community or watershed (or hand drawn map of their school or neighborhood), have students make recommendations of which trash capture technology may be appropriate for different locations.

Plastic Pollution and You

ENGINEERING DESIGN SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

	**DESCRIBE:** What is the problem you're trying to solve?
	**BRAINSTORM:** What are some possible solutions to this real world problem?
	**DESIGN:** Draft a sketch or diagram of your solution. What size will it be? What materials will it be made of?
	**CREATE:** Use your plan to draw or create a model of your design.
	**TEST:** If possible, try out your design.
	**IMPROVE:** How well did your design work, or do you think it would work? Can you make your design better? How?

Plastic Pollution and You

TRASH CAPTURE TECHNOLOGY EXAMPLE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

TRASH NETS

Large intersecting mesh placed at the end of a storm or sewer drain or pipe that allows water to pass through but captures trash and litter that is larger than the mesh size. These devices must be secured to the drain or pipe so they can withstand the flow of storm water but also be removable when the nets are full and must be replaced.

CURB INLET COVERS

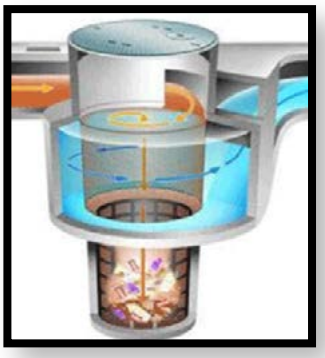
Screens, grates, or other physical devices that allow for water to pass into the storm drain but block trash, litter, and other debris from entering. These structures require routine collection of blocked debris by street sweepers, garbage collection, or volunteers. If debris accumulates to a point that water cannot enter the storm drain, standing water and flooding can occur.

LITTER BOOMS

Floating chain link that traps trash and litter that is on the surface of a body of water. Often placed near the end of drains or pipes to capture debris that is coming out or at a river junction within a watershed. Requires regular collection of debris based on accumulation or water conditions.

TRASH SKIMMING VESSELS

Autonomous or crew operated boats or other floating water crafts that collect trash using skimmers, conveyor belts, or other mechanical methods to remove floating debris. Baltimore's Water Wheel and the Seabin Project are examples.



INLINE DESIGNS

Physical devices placed inside sewer pipes that separate and collect trash, litter, and other debris. These devices require complex engineering and construction as well as ongoing debris collection.

Plastic Pollution and You

TRASH CAPTURE TECHNOLOGY EXAMPLE SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. Describe the problem of plastic pollution.

2. What impact could Trash Capture Technologies have in trying to solve this problem?

Plastic Pollution and You

TRASH CAPTURE TECHNOLOGY COMPARISON CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Trash Capture Technology Name	What are the advantages of this trash capture technology?	What are the disadvantages of this trash capture technology?	Are there any unintended social, cultural, economic, environmental, and/or public health impacts from this technology?
Curb Inlet Cover			
Trash Nets			
Litter Booms			
Trash Skimming Vessels			
Inline Designs			

Plastic Pollution and You

TRASH CAPTURE TECHNOLOGY INNOVATION CHART

Name: _____ *Class:* _____ *Date:* _____/_____/_____

Trash Capture Technology Name	What are the advantages of this trash capture technology? Does it meet the criteria? Is it feasible? Is it creative?	What are the disadvantages of this trash capture technology? Is it ineffective and/or unrealistic?	Are there any unintended social, cultural, economic, environmental, and/or public health impacts from this technology?
Your Design:			
Other Students Design: 1.			
Other Student Design: 2.			

Plastic Pollution and You

TRASH CAPTURE TECHNOLOGY
REFLECTION SHEET

Name: _____ *Class:* _____ *Date:* _____/_____/_____

1. Choose one technology from the table:

2. Would you choose this technology for your community? Why or why not?

3. What is one thing that could be done to improve this technology?

LESSON 3.5
CREATING AN ACTION PLAN: WHAT CAN YOU DO ABOUT PLASTIC POLLUTION?

GRADE LEVEL	TIME
6-8, 9-12	MULTIPLE CLASS PERIODS

Overview:

As a final activity, this lesson provides an opportunity for students to reflect on what they have learned through the curriculum, think critically about their role in the issue of plastic pollution, and plan strategically to take action.

Objective:

Students will learn about the importance of strategic planning, collaboration, and evaluation to achieve shared goals and objectives.

Instructions:

1. Revisit K-W-L chart from Lesson 1.1.
2. As a class, reflect on what was learned throughout the curriculum. Ask them questions like:
    a. What are some solutions to plastic pollution and marine debris?
    b. What are some barriers to solving plastic pollution and marine debris?
    c. What actions have your community taken to help address plastic pollution and marine debris?
    d. What new actions might you or your community take? Why?
    e. How might plastic pollution and marine debris affect different communities?
3. Add a new column to the K-W-L chart called: "What are we going to do?". Generate multiple ideas of what students could do, individually or as a class, to address the issue of plastic pollution.
4. Take ideas from the "What are we going to do?" column and fill out the Action Plan Template.
    a. Determine the goal – use ideas from the "What are we going to do?" column.
    b. Determine the steps needed to achieve your goal – fill in the first row of the Action Plan Template with the steps that are needed to achieve the goal.
    c. Determine what will be needed to complete each step – fill in the second row of the Action Plan Template with any materials, resources, or other things needed to complete

Materials:

- K-W-L Chart from Lesson 1.1 - Activating Knowledge on Plastics in Plastic Pollution Lessons
- Action Plan Template on whiteboard/ chalkboard, Google Docs, etc.

Examples of Action Plans:

- NOAA Marine Debris Action Plans;
- New York Ocean Action Plan

Learning Standards:

SCI:

5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1 MS-ETS1-3, HS-ETS1-3

SS:

8.8.c, 10.9.a, 10.9.b, S5-KI #4

GLLP: 6, 7, 8

each step.

d. Determine who will complete each step – fill in the third row of the Action Plan Template with the name(s) of who will complete each step. This can be specific with actual names or more general (ie: students, principal, community members, etc.).

e. Determine when each step must be completed – fill in the fourth row of the Action Plan Template with a time period when step will be completed.

f. Determine how to know if each step was successfully completed – fill in the fifth row of the Action Plan Template with a clear and specific way to measure/evaluate if and how successfully each step was completed.

5. If students would like to learn more about action plans, explore any region's Marine Debris Action Plan on the National Oceanic and Atmospheric Administration's Marine Debris Program website.

Optional activities:

If students would like to present or implement parts of their action plan, encourage them to explore opportunities to do public presentations or create displays at school or in the community.

Plastic Pollution and You

ACTION PLAN EXAMPLE

Name: _____ *Class:* _____ *Date:* _____/_____/_____

	GOAL: *Science Club will lead volunteer cleanup in our school's neighborhood in April.*			
What steps do we need to take to achieve our goal?	1. *organize – date, time, location, etc.*	2. *get supplies – gloves, bags, buckets, etc.*	3. *promote the event to recruit volunteers – signs, social media, etc.*	4. *hold cleanup - volunteers pick up trash and litter around the neighborhood*
What do we need to do for this step?	*pick a date, time, and location* *get permission from school*	*talk to local businesses, school administration* *collect supplies and store them*	*create flyers, social media* *post sign up sheet (in class, online)*	*lead the cleanup (see separate action plan for event)*
Who needs to do it?	*our club, club advisor, principal*	*committee or science club*	*committee or science club*	*everyone*
When does it need to be done?	*January - February*	*when step 1 is done until the end of March*	*when step 1 is done through the date of the cleanup*	*Earth Day*
How will we know if we completed this step?	*date, time, location set* *we have approval from school*	*supplies are secured and stored (if more volunteers sign up, more supplies may be needed)*	*50 volunteers signed up and are committed to coming to the even*	*volunteers come to the event.* *10 bags of trash and recycling are collected*

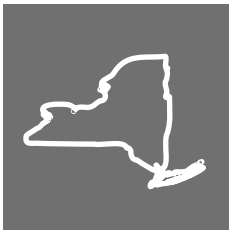
Plastic Pollution and You

ACTION PLAN TEMPLATE

Name: _____ *Class:* _____ *Date:* _____/_____/_____

	GOAL:			
What steps do we need to take to achieve our goal?	1.	2.	3.	4.
What do we need to do for this step?				
Who needs to do it?				
When does it need to be done?				
How will we know if we completed this step?				

APPENDIXES
PLASTIC POLLUTION AND YOU



Overview:

In this section you will find additional curricula, resources, and other information that you can use to compliment the lessons and activities in *Plastic Pollution and You*.

Appendixes:

Appendix 1—Other Recommended Curricula

In addition to *Plastic Pollution and You*, there are many other curricula available to teachers and educators on the topic of marine debris. This appendix includes a list of other curricula, activities, and lesson plans that can be used in conjunction with this resource.

Appendix 2—Additional Resources

Government agencies and non-governmental organizations around the world are learning more about the impact of plastic pollution and marine debris every year. They are also implementing different solutions to the problem. This appendix includes a list of resources that can provide more information and data to compliment the lessons in *Plastic Pollution and You*.

Appendix 3—Learning Standards

Appendix 4—Public Outreach Campaign Templates

Use these templates for Lesson 2.4 - Create Your Own Public Outreach Campaign. The templates represent many common items that have been used by recent public outreach campaigns, such as the New York State BYO Bag Campaign.

Appendix 5—Certificate of Completion


Canada
LAKE ONTARIO
LAKE ERIE
St. Lawrence River
Ogdensburg
Plattsburgh
Lake Champlain
Vermont
New Hampshire
Massachusetts
Connecticut
Pennsylvania
New Jersey
Watertown
Black R.
Oswego
Fulton
Rome
Oneida L.
Oneida
Utica
Syracuse
Mohawk R.
Lake George
Great Sacandaga Lake
Glens Falls
Saratoga Springs
Gloversville
Amsterdam
Schenectady
ALBANY
Troy
Niagara Falls
North Tonawanda
Buffalo
Lackawanna
Lockport
Rochester
Erie Canal
Batavia
Canandaigua
Geneva
Auburn
Cayuga Lake
Seneca Lake
Keuka L.
Genesee R.
Cortland
Norwich
Oneonta
Ithaca
Dunkirk
Jamestown
Salamanca
Olean
Hornell
Corning
Elmira
Binghamton
Susquehanna R.
Pepacton Res.
Delaware R.
Hudson R.
Hudson
Kingston
Pough-keepsie
Newburgh
Beacon
Middletown
White Plains
Yonkers
New Rochelle
NEW YORK CITY
LONG ISLAND SOUND
Riverhead
Long Beach
ATLANTIC OCEAN

Appendix 1: Other Recommended Marine Debris Curricula

1. 5 Gyres Institute: Plastic Pollution Curriculum and Activity Guide
2. Center for Great Lakes Literacy: Trash Trunk
3. Center for Ocean Science Education Excellence Southeast: The Educator's Guide to Marine Debris
4. Duke University Marine Lab Community Science Initiative: Marine Debris Classroom Resources
5. Florida Sea Grant Resources: Florida Microplastics Awareness Project, K-12 Resources
6. Maryland Sea Grant: Biofilms and Biodiversity
7. Monterey Bay Aquarium: Plastic Use Audit
8. New Jersey Sea Grant: Marine Debris Timeline: How long does trash last?, Microplastics Biomagnification Board Game, Microplastics in the Marine Environment
9. Sheavly Consultants: Turning the Tide on Trash
10. University of Toronto Rochman Lab Lesson Plans

Appendix 2: Additional Resources

1. New York Sea Grant and New York Department of Environmental Conservation - Marine Debris Fact Sheet
2. Alliance for the Great Lakes Adopt-a-Beach
3. Environmental Protection Agency's Trash Free Waters Program: Projects
4. European Strategy for Plastics
5. Great Lakes Cleanup
6. International Trash Trap Network
7. National Sea Grant Law Center and Ohio Sea Grant - Plastic Legislation Memo and Plastic Legislation in the Great Lakes Webinar
8. National Oceanic and Atmospheric Administration: Estimating the Effects of Marine Debris on Coastal Economies
9. National Oceanic and Atmospheric Administration's Marine Debris Program and Regional Action Plans
10. New York State Department of Environmental Conservation BYOBag NY campaign
11. Ocean Conservancy International Coastal Cleanup
12. Ocean Conservancy and NOAA - Talking Trash and Taking Action
13. Ocean Today: Marine Debris
14. State Plastic Bag Legislation
15. Virginia Coastal Zone Management Program's Joyful Sendoff Campaign
16. Washed Ashore - Art to Save the Sea

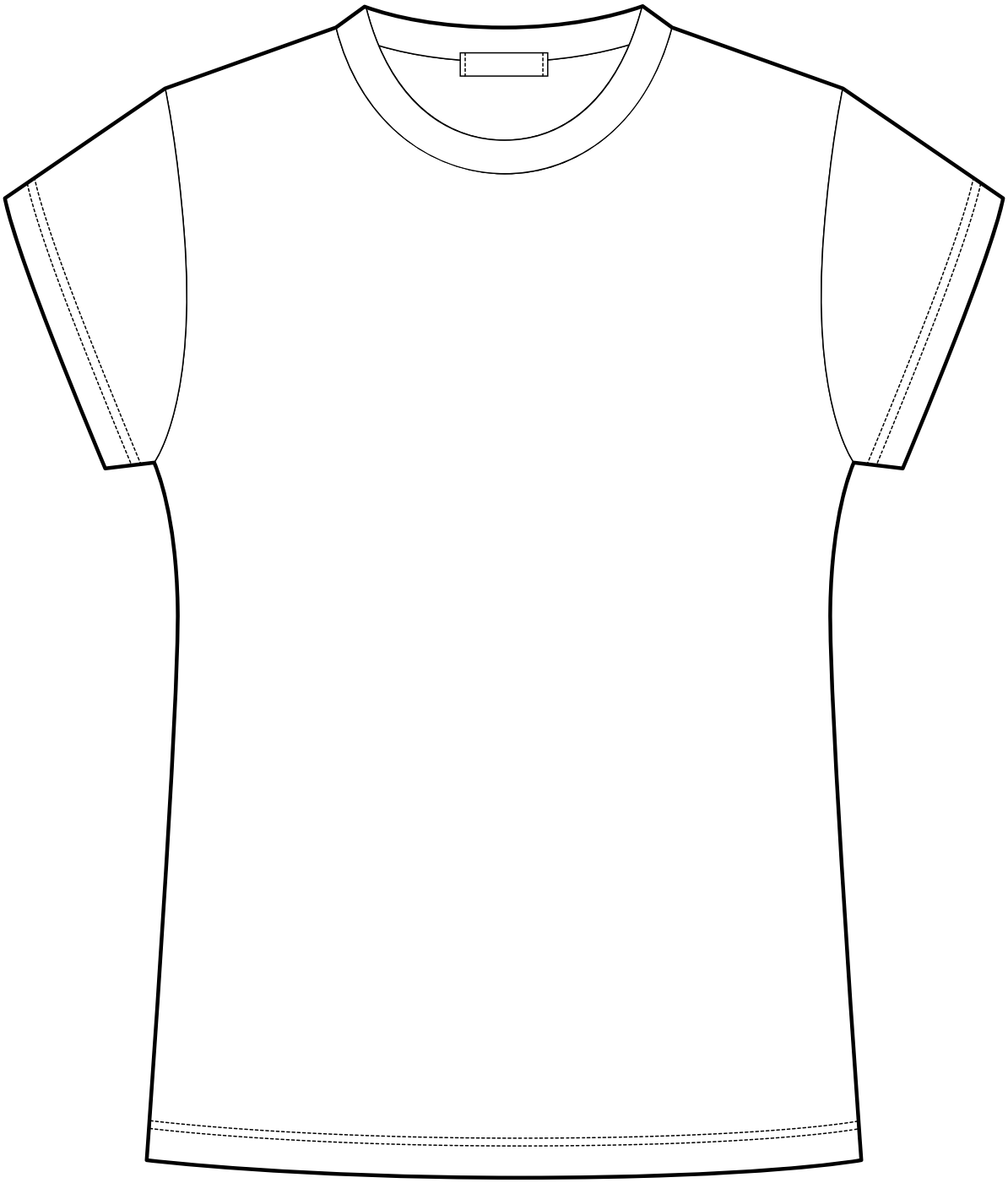
This list is a sampling of other resources; there are many other curricula and resources that exist.

Appendix 3: Learning Standards

LESSON	New York State P-12 Science Learning Standards & Next Generation Science Standards http://www.nysed.gov/curriculum-instruction/science-learning-standards	New York State Social Studies Learning Standards and K-12 Framework http://www.nysed.gov/curriculum-instruction/k-12-social-studies-framework	English Language Arts Standards & Literacy in History/ Social Studies, Science, and Technical Subjects Standards http://www.corestandards.org/ELA-Literacy/
1.2	5-ESS3-1, MS-ESS3-1, HS-ESS3-1, MS-ESS3-4, HS-ESS3-4	8.8.C, 10.9.A, 10.9.B	
1.3	5-ESS3-1, MS-ESS3-4, HS-ESS3-4		
1.4	5-ESS3-1, MS-ESS3-3, HS-ESS3-4	8.8.C, 10.9.A, 10.9.B, S5-KI #4	
1.5	HS-ETS1-1, HS-ESS3-4	8.8.C, 10.9.A, 10.9.B, S5-KI #4	W1, W6, WHST1, WHST7
2.1	MS-ETS1-1, HS-ETS1-1		
2.2			W6, R8
2.3	MS-ESS3-3, HS-LS2-7	8.8.C, 10.9.A, 10.9.B, S5-KI #3, S5-KI #4	
2.4	MS-ESS3-3, HS-LS2-7	8.8.C, 10.9.A, 10.9.B, S5-KI #3, S5-KI #4	W1, W6, WHST1, WHST7
2.5	MS-ESS3-3, HS-LS2-7	8.8.C, 10.9.A, 10.9.B, S5-KI #4	W1, W6, WHST1, SL4
3.1	5-ESS3-1, MS-ESS3-1, HS-ESS3-1		
3.2	5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1, MS-ETS1-3, HS-ETS1-3		
3.3	5-ESS3-1, MS-ESS3-1, HS-ESS3-1	8.8.C, 10.9.A, 10.9.B	WHST1, WHST7
3.4	5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1, MS-ETS1-3, HS-ETS1-3		
3.5	5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1	8.8.C, 10.9.A, 10.9.B, S5-KI #4	

CREATE YOUR OWN OUTREACH CAMPAIGN APPAREL: T-SHIRT (FRONT)

Name: _____ *Class:* _____ *Date:* _____/_____/_____



(Front)

CREATE YOUR OWN OUTREACH CAMPAIGN APPAREL: T-SHIRT (BACK)

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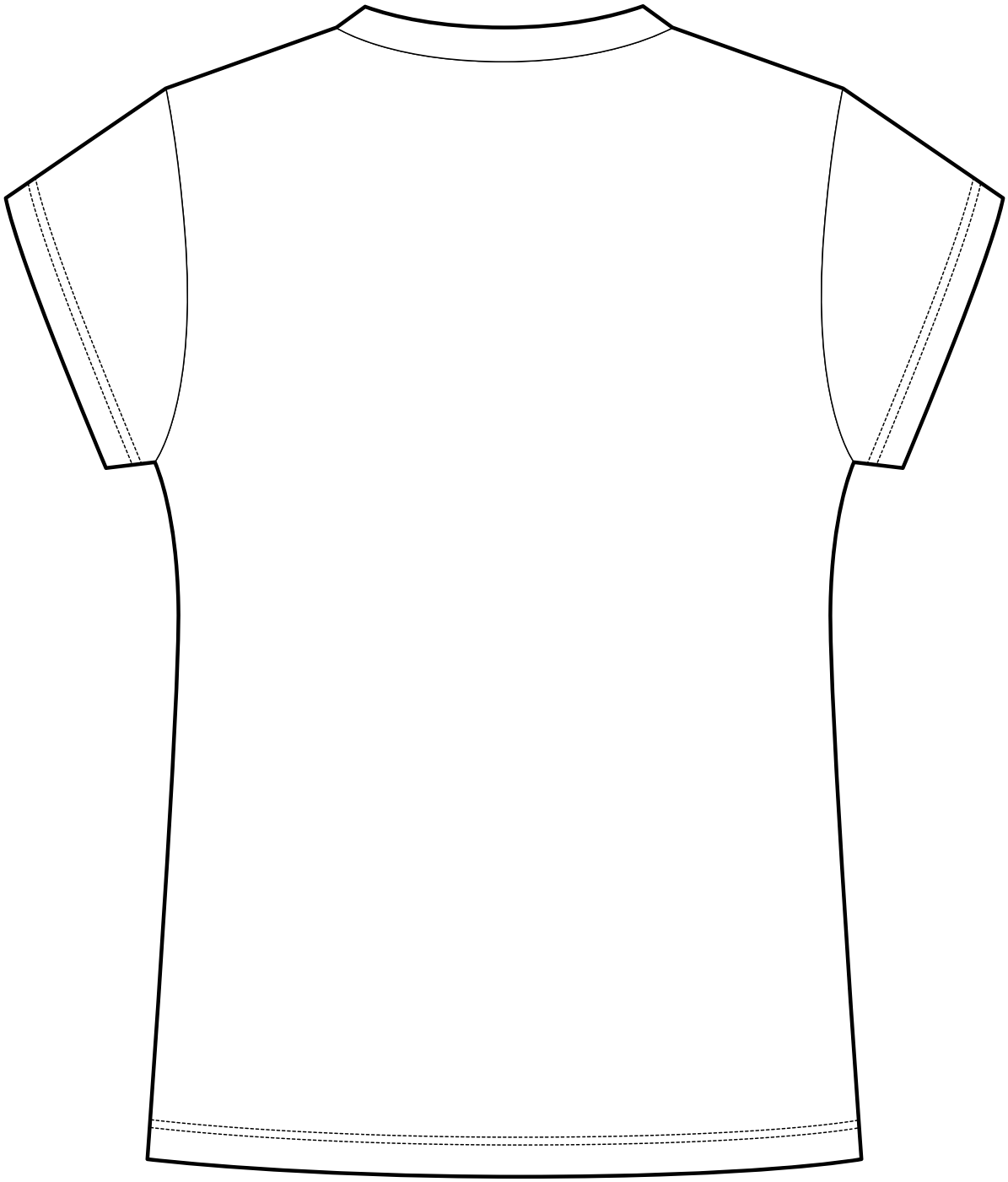
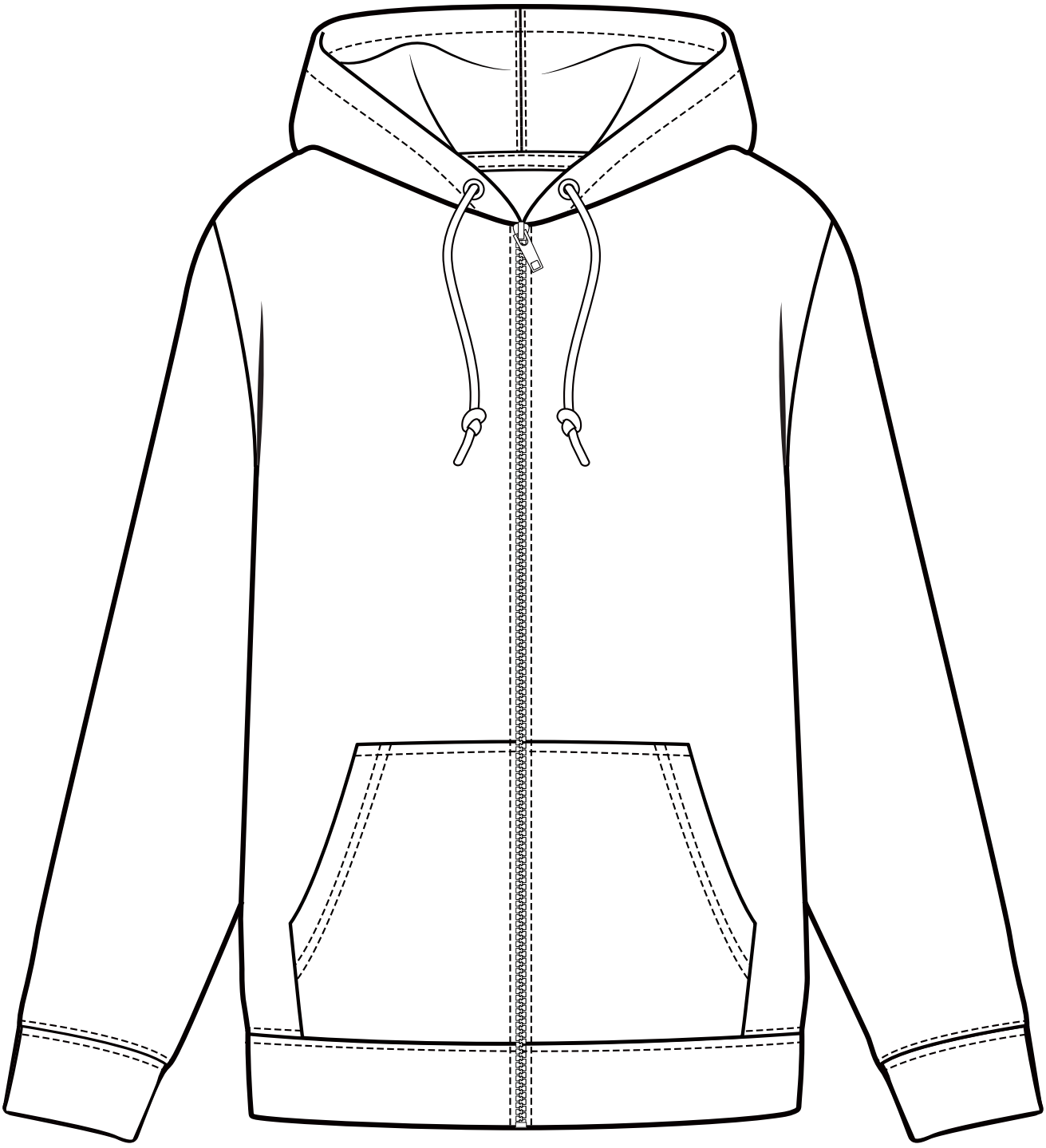


(Back)

CREATE YOUR OWN OUTREACH CAMPAIGN
APPAREL: HOODY (FRONT)

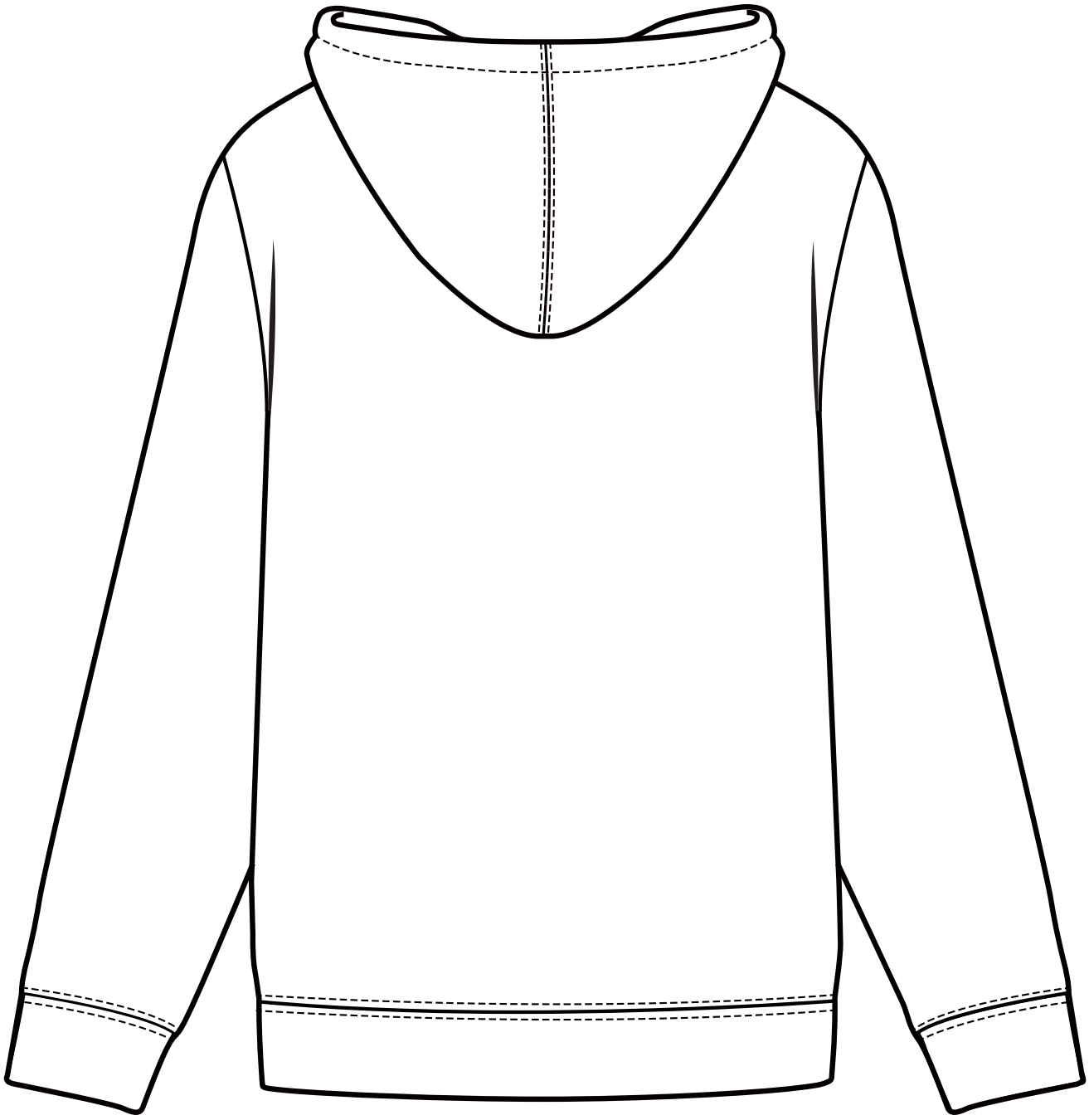
Name: _____ *Class:* _____ *Date:* _____/_____/_____



(Front)

CREATE YOUR OWN OUTREACH CAMPAIGN APPAREL: HOODY (BACK)

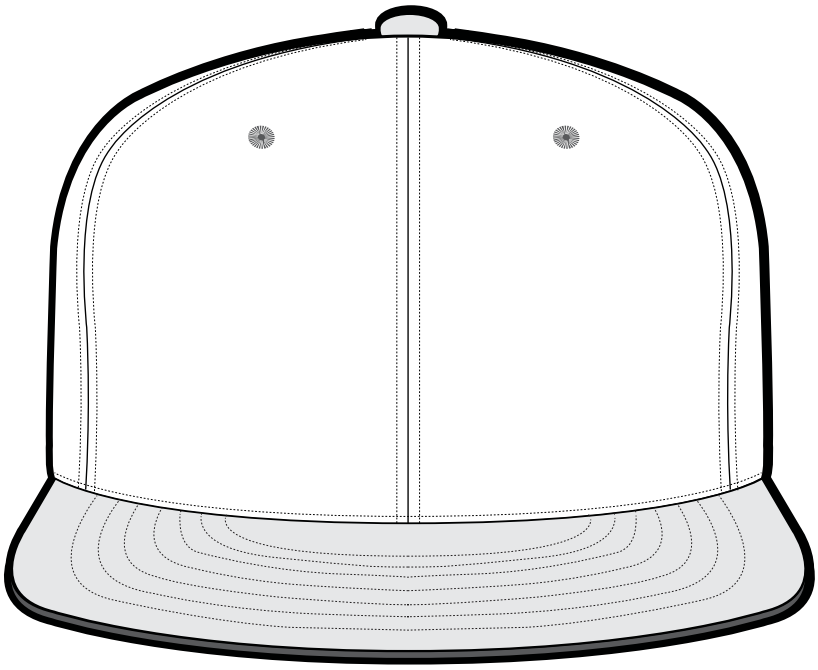
Name: _____ *Class:* _____ *Date:* _____/_____/_____

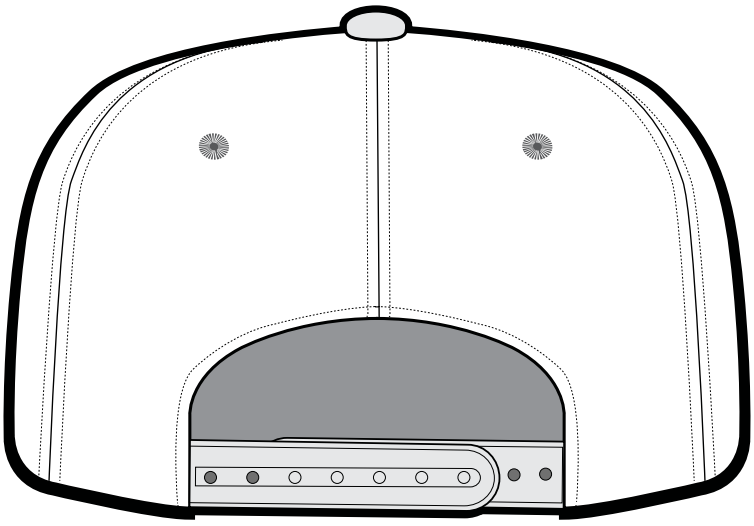


(Back)

CREATE YOUR OWN OUTREACH CAMPAIGN APPAREL: BASEBALL CAP

Name: _____ *Class:* _____ *Date:* _____/_____/_____





(Front & Back)

CREATE YOUR OWN OUTREACH CAMPAIGN
APPAREL: BASEBALL CAP (SIDE)

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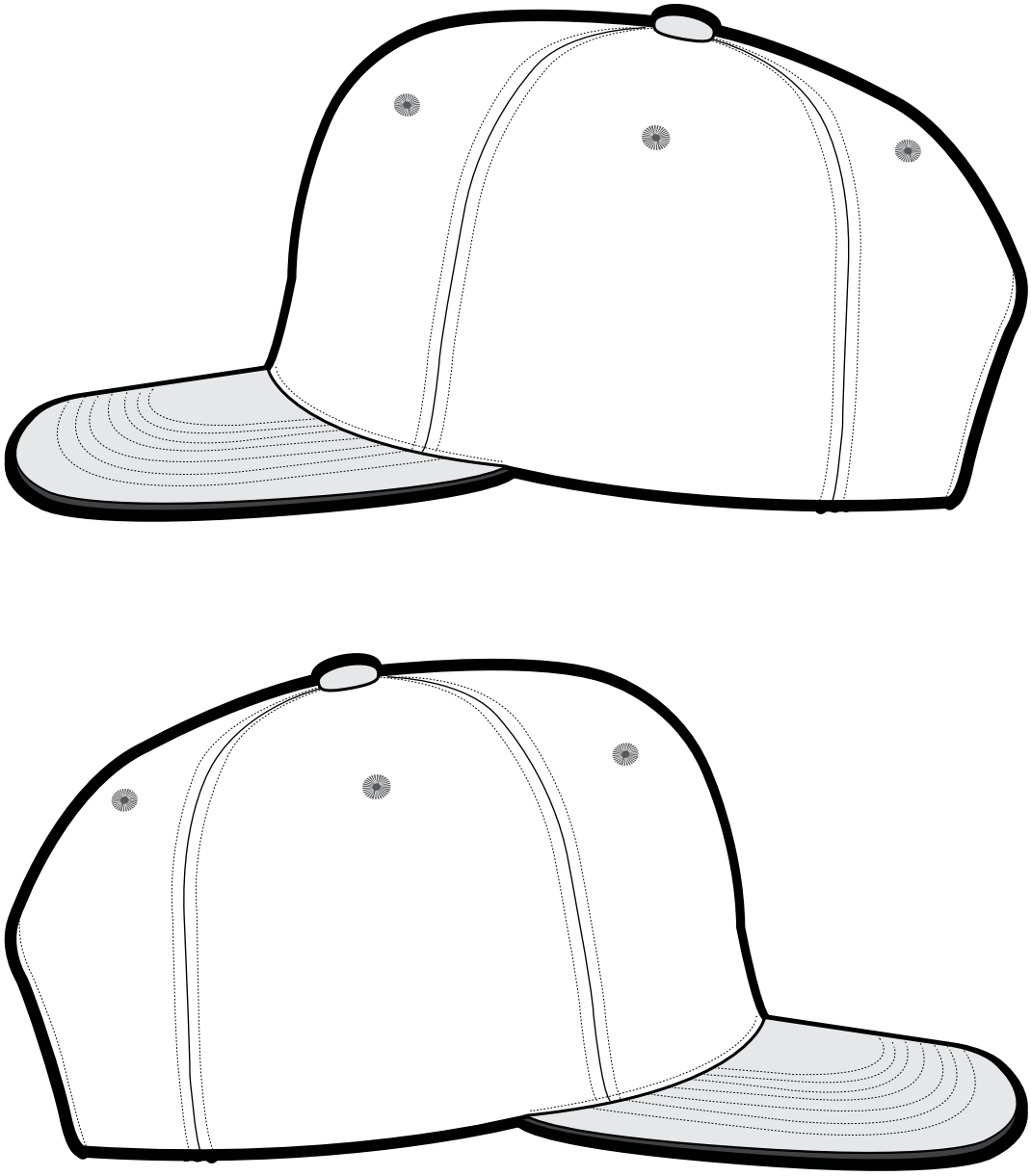
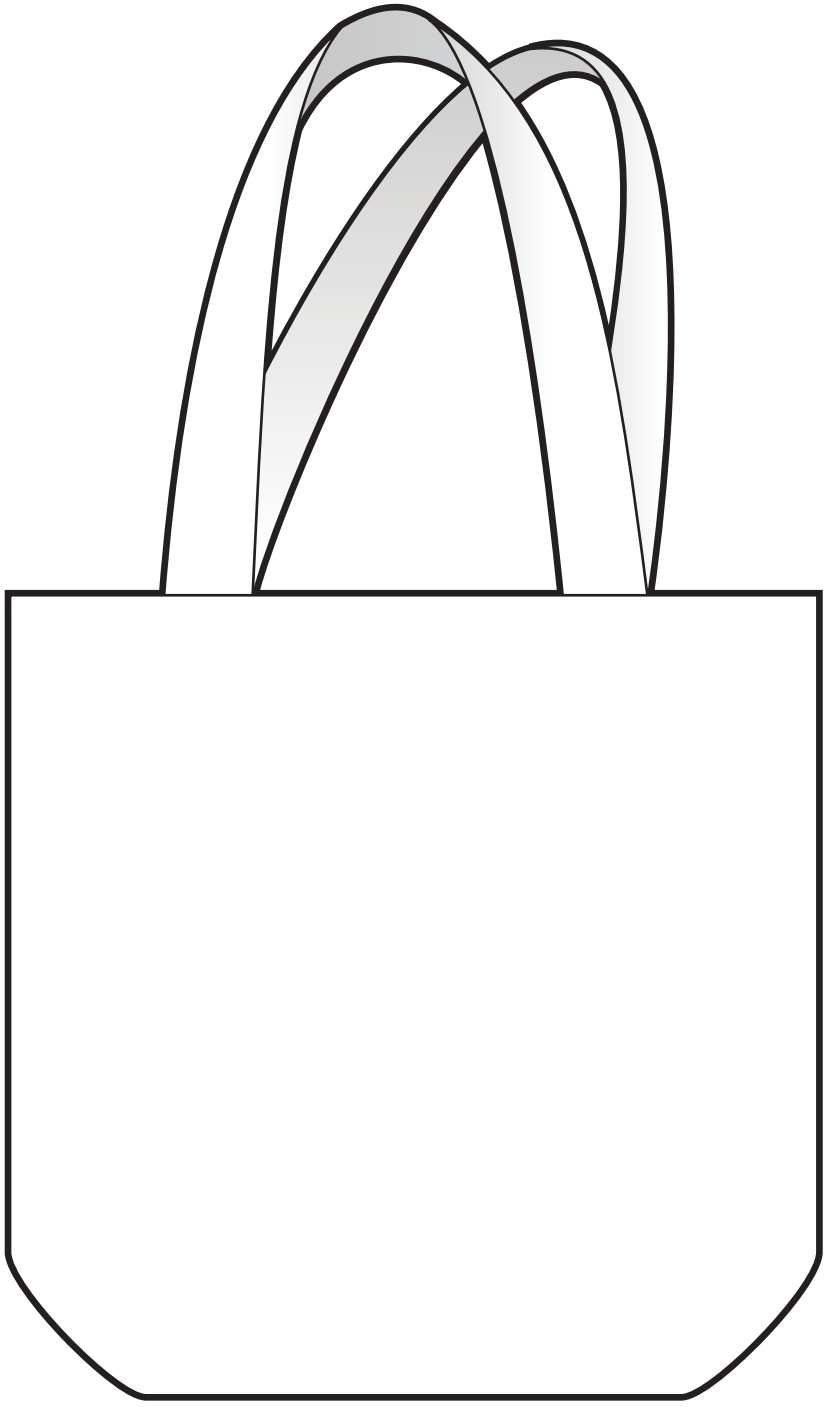


(Left & Right)

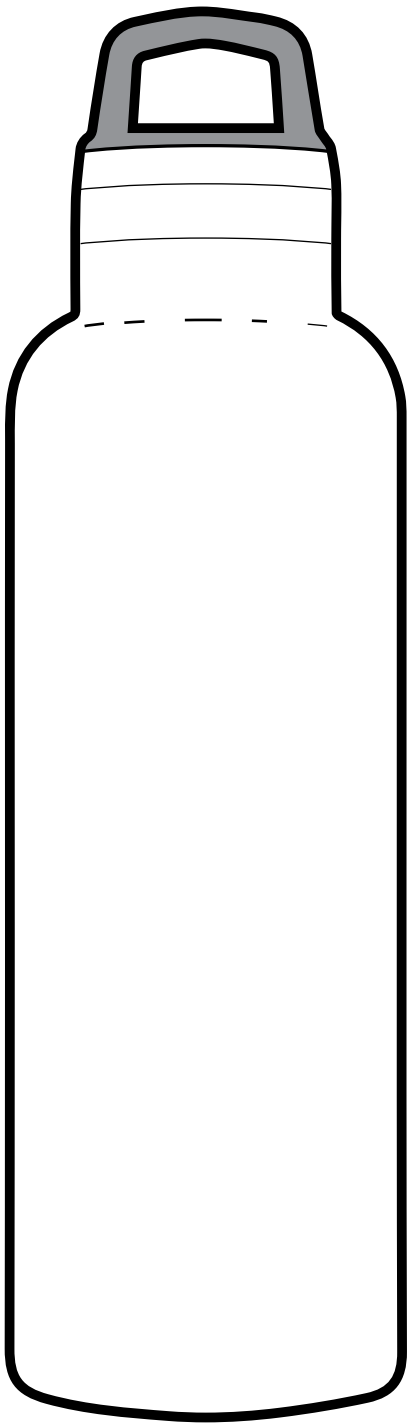
CREATE YOUR OWN OUTREACH CAMPAIGN
APPAREL: CANVAS BAG (FRONT)

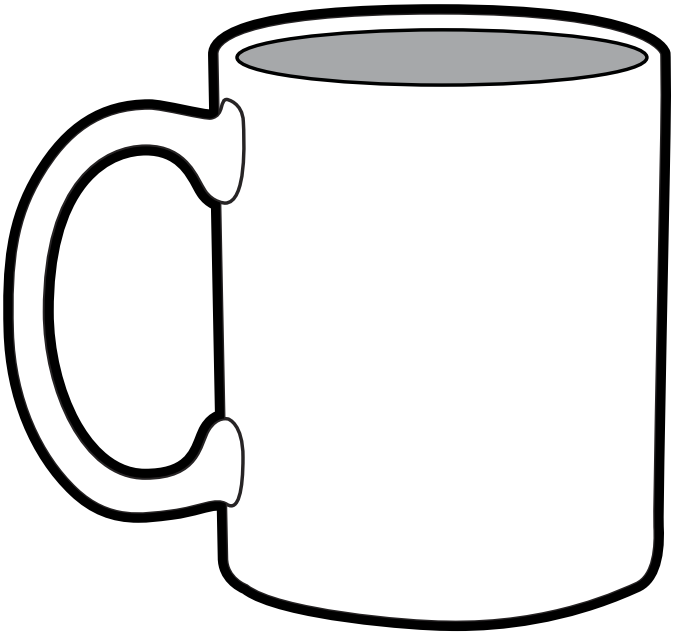
Name: _____ *Class:* _____ *Date:* _____/_____/_____

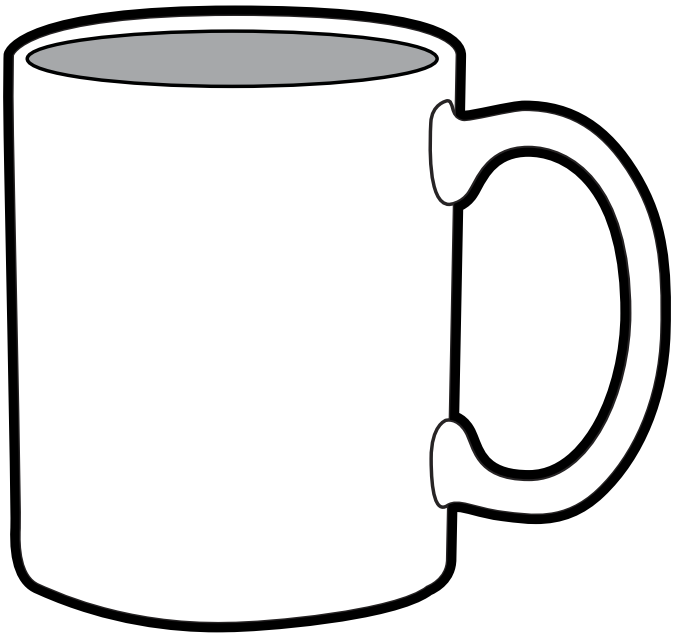


CREATE YOUR OWN OUTREACH CAMPAIGN REUSEABLE BOTTLE AND MUG

Name: _____ *Class:* _____ *Date:* _____/_____/_____





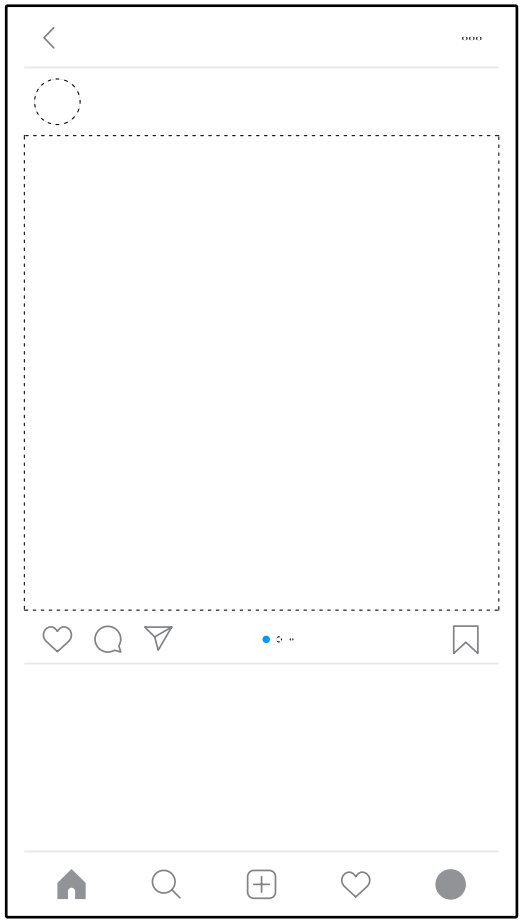


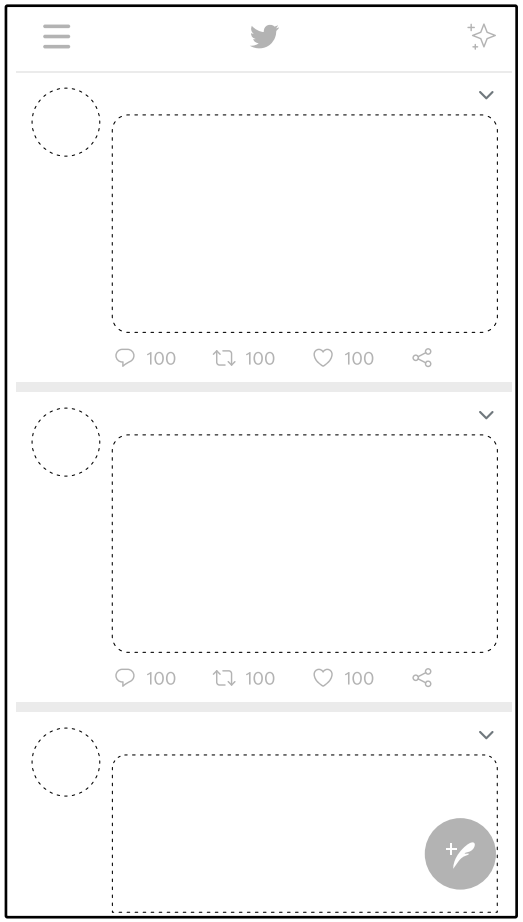
Plastic Pollution and You

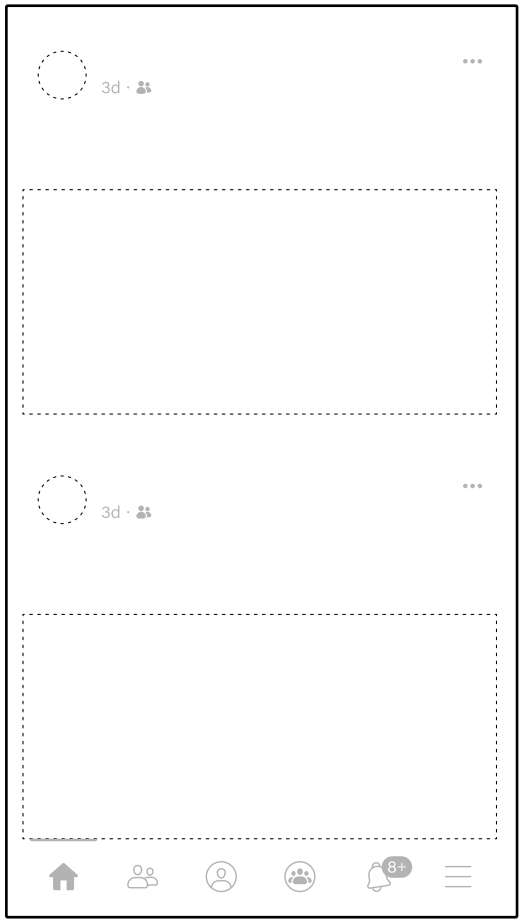
CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE SOCIAL MEDIA

Name: _____

Class: _____ *Date:* _____/_____/_____





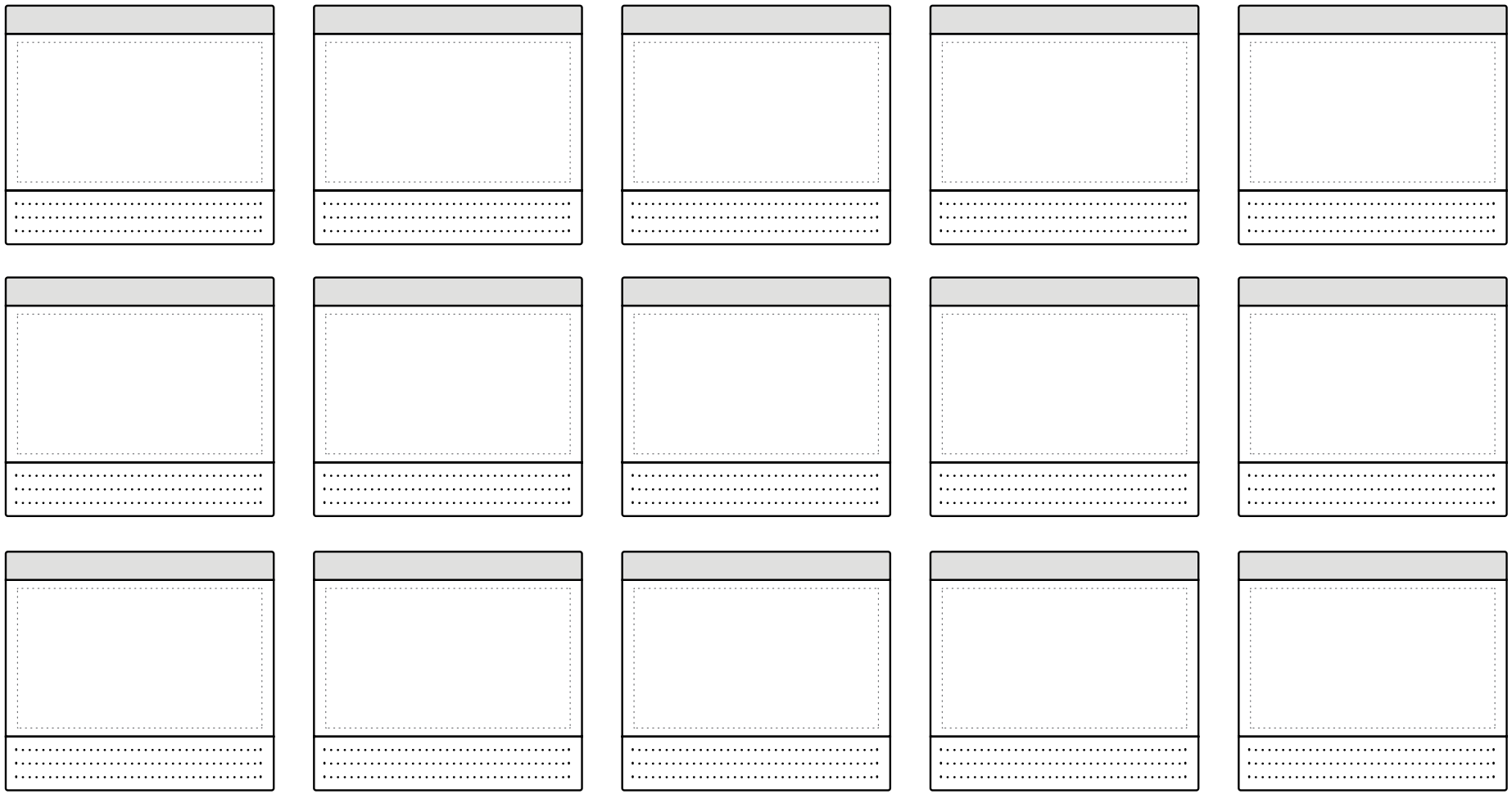


Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE STORYBOARD

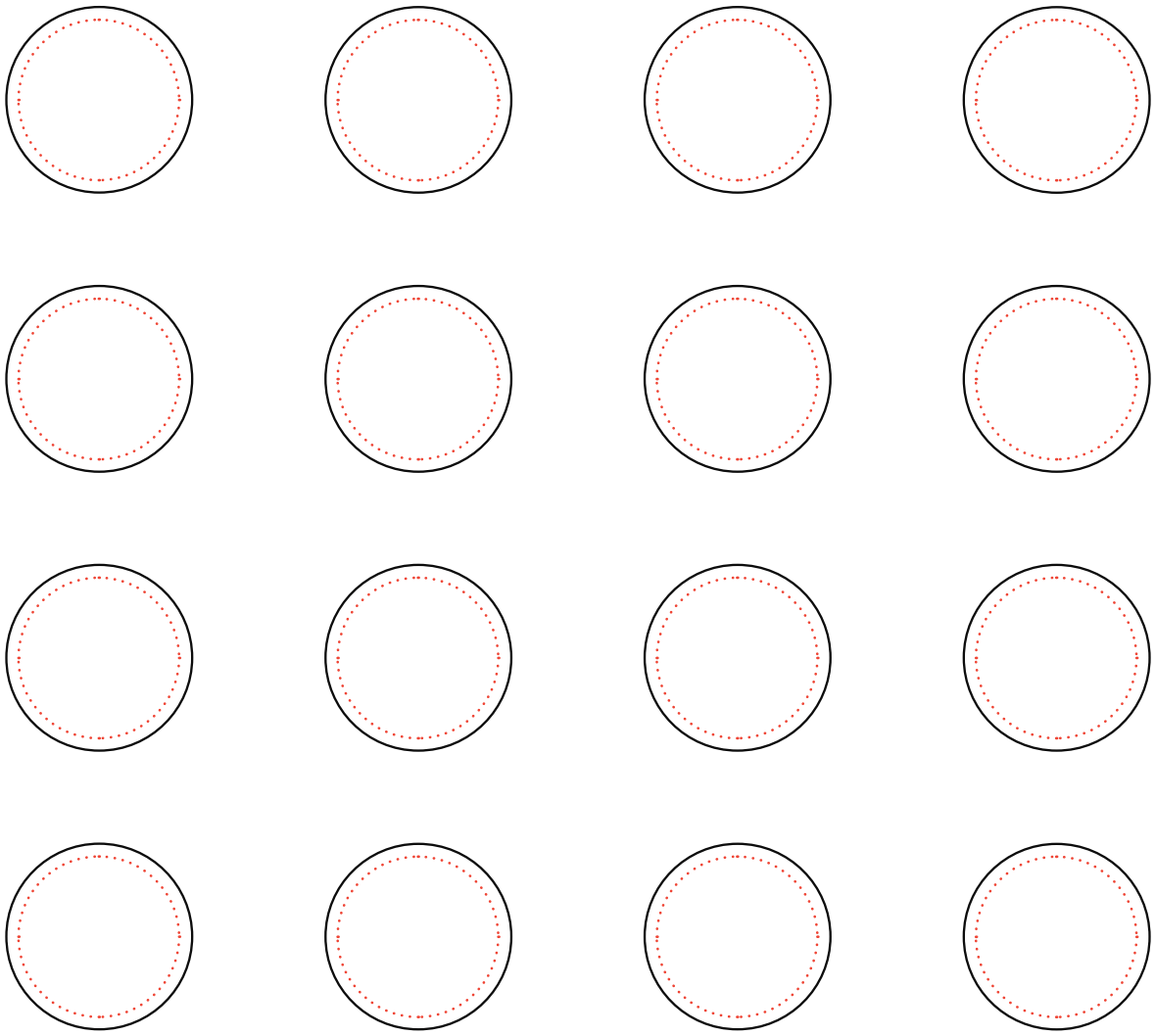
Name: _____ *Class:* _____ *Date:* _____/_____/_____

Storyboard: a sequence of drawings, typically with some directions and dialogue, representing the shots planned for an animation, movie, or video production.



CREATE YOUR OWN OUTREACH CAMPAIGN STICKERS, BUTTONS & KEYCHAINS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

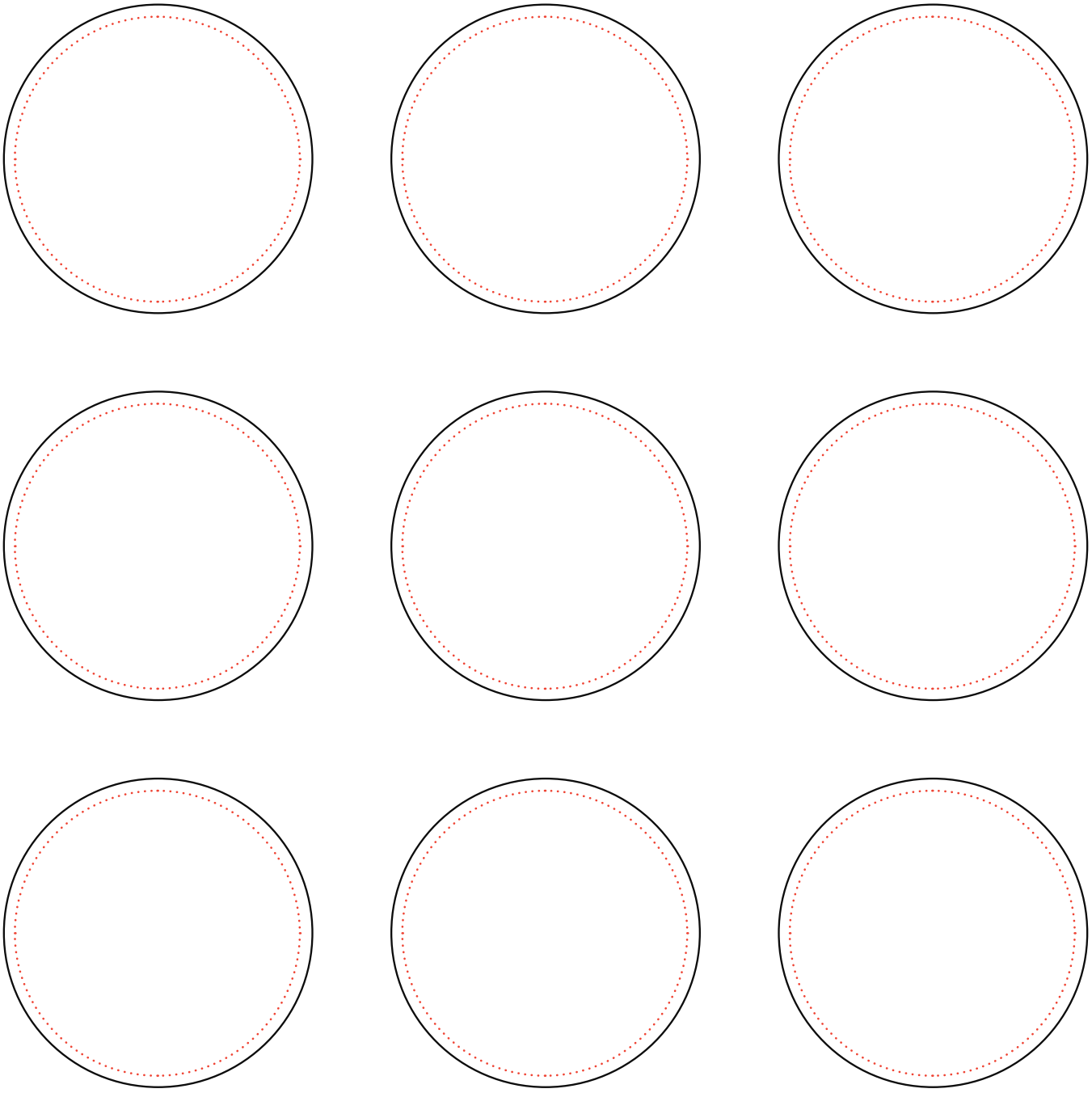


(1" Circle)

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN STICKERS, BUTTONS & KEYCHAINS

Name: _____ *Class:* _____ *Date:* _____/_____/_____



(2" Circle)

Plastic Pollution and You

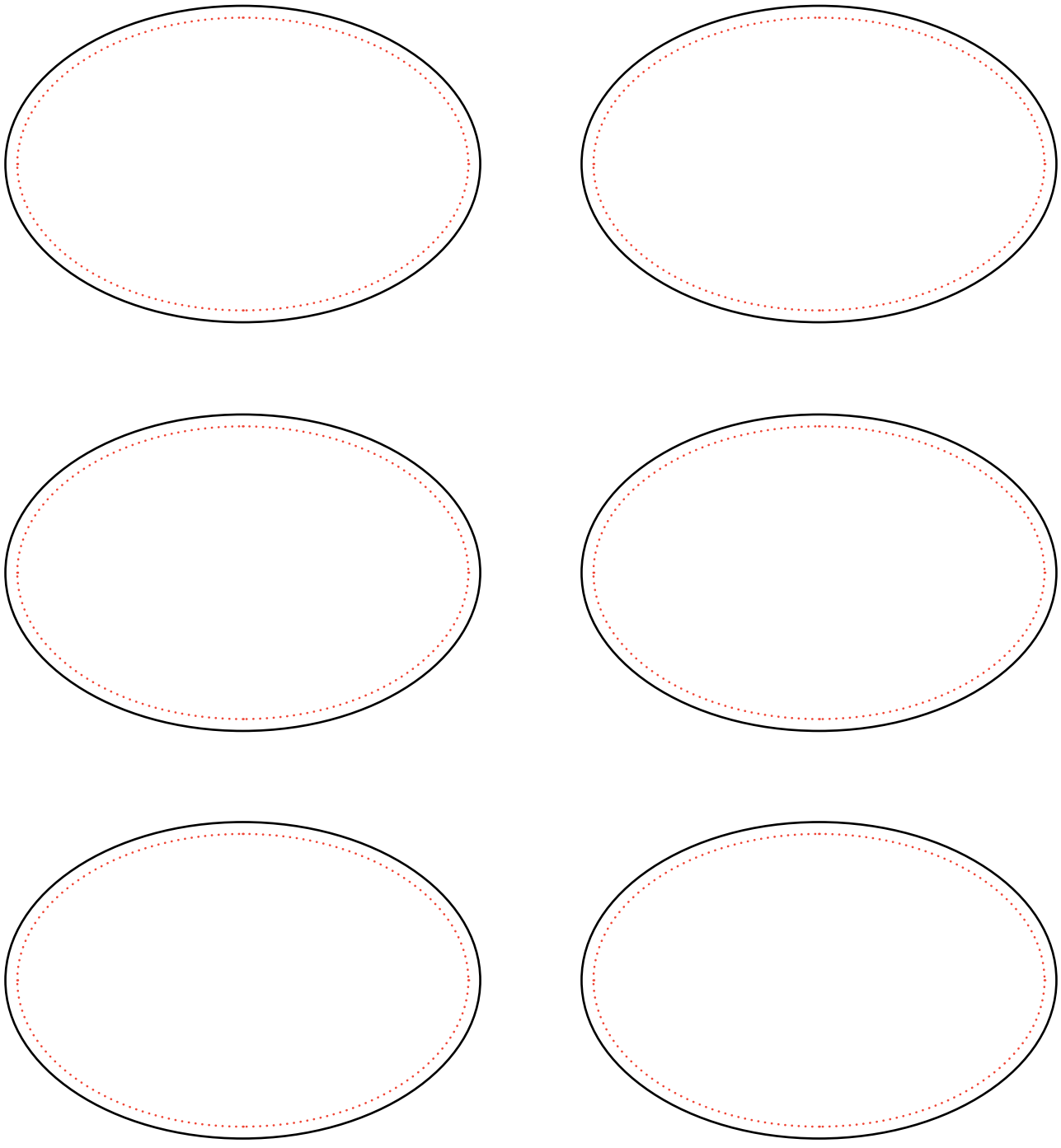
CREATE YOUR OWN OUTREACH CAMPAIGN STICKERS, BUTTONS & KEYCHAINS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

(3.5"×2" Rectangle)

CREATE YOUR OWN OUTREACH CAMPAIGN STICKERS, BUTTONS & KEYCHAINS

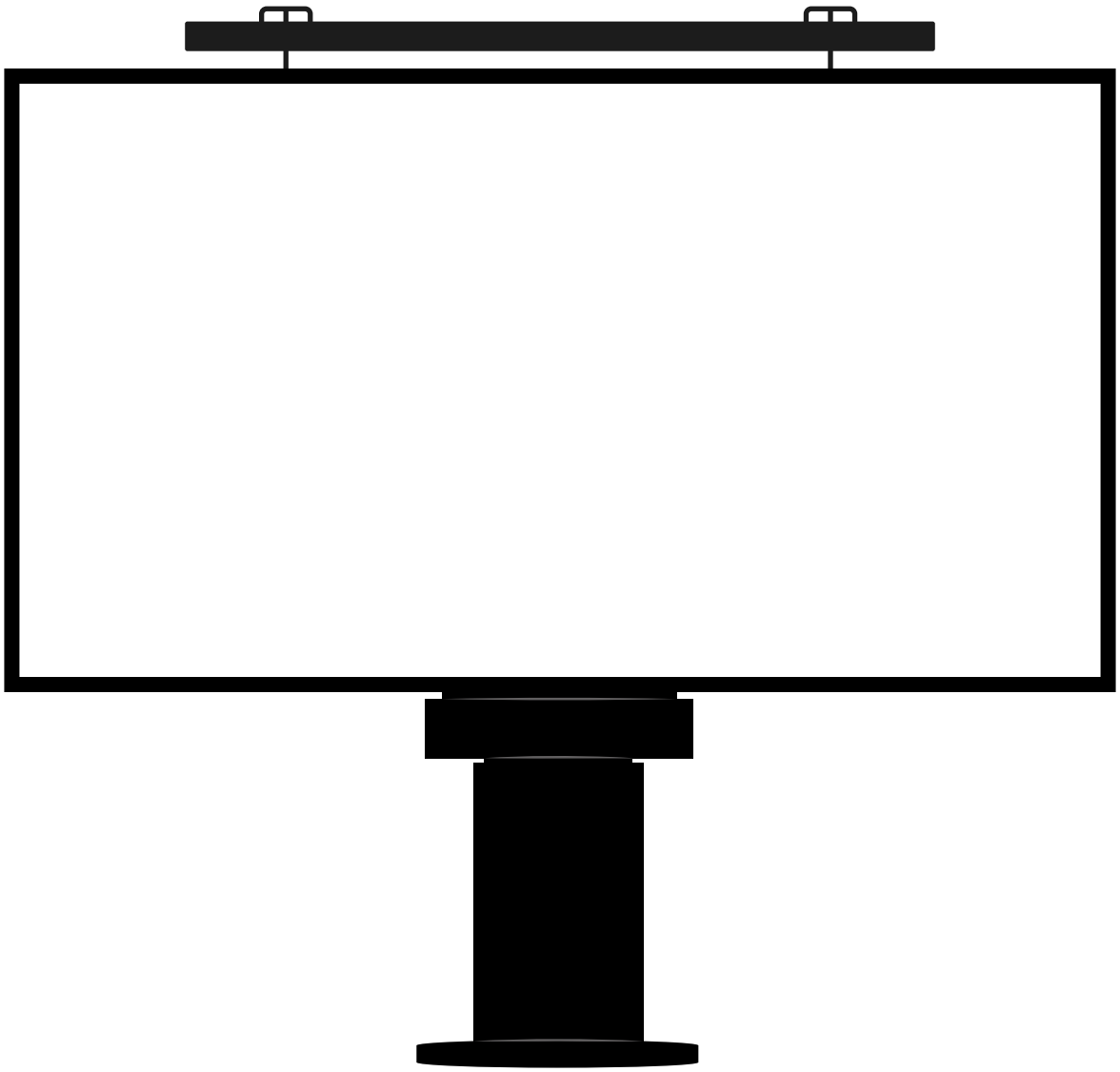
Name: _____ *Class:* _____ *Date:* _____/_____/_____



(3"×2" Oval)

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE BILLBOARDS / SIGNS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

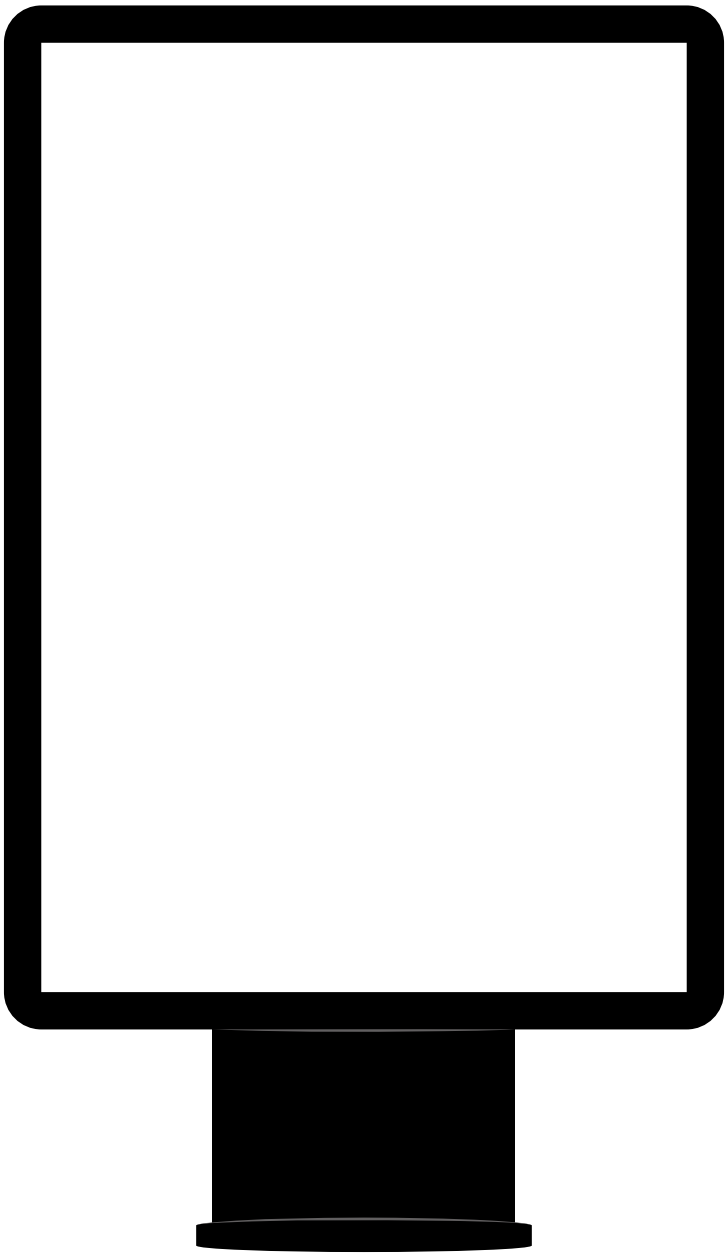


(Billboard A)

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE BILLBOARDS / SIGNS

Name: _____ *Class:* _____ *Date:* _____/_____/_____



(Billboard B)

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE BILLBOARDS / SIGNS

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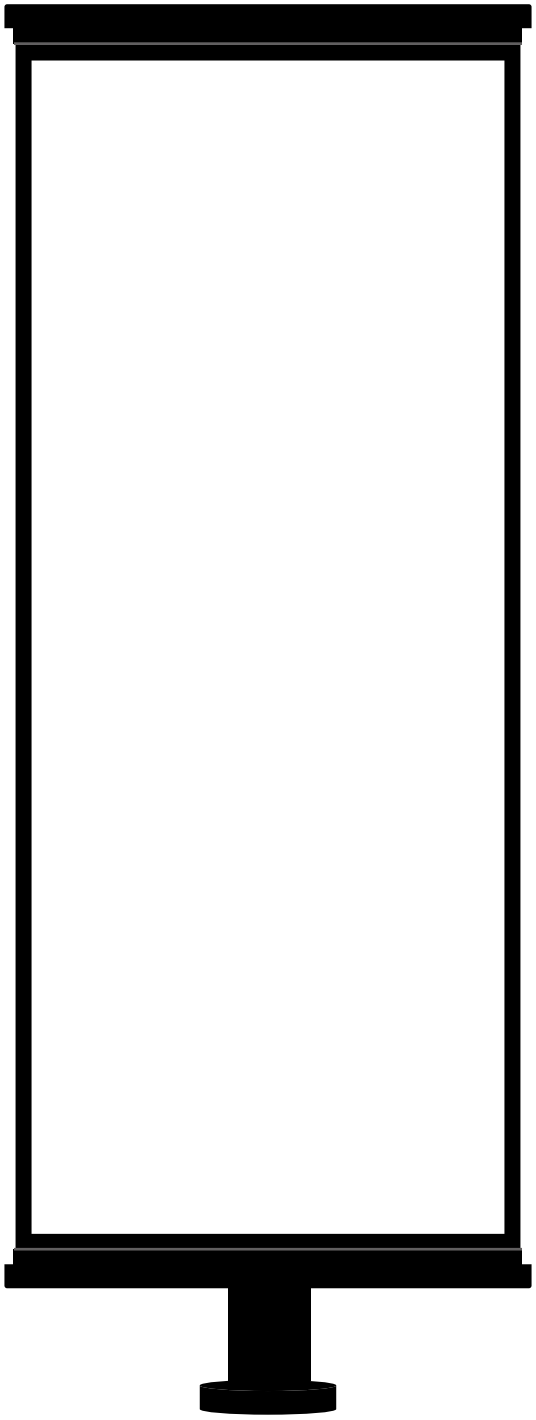

(Billboard C)

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE BILLBOARDS / SIGNS

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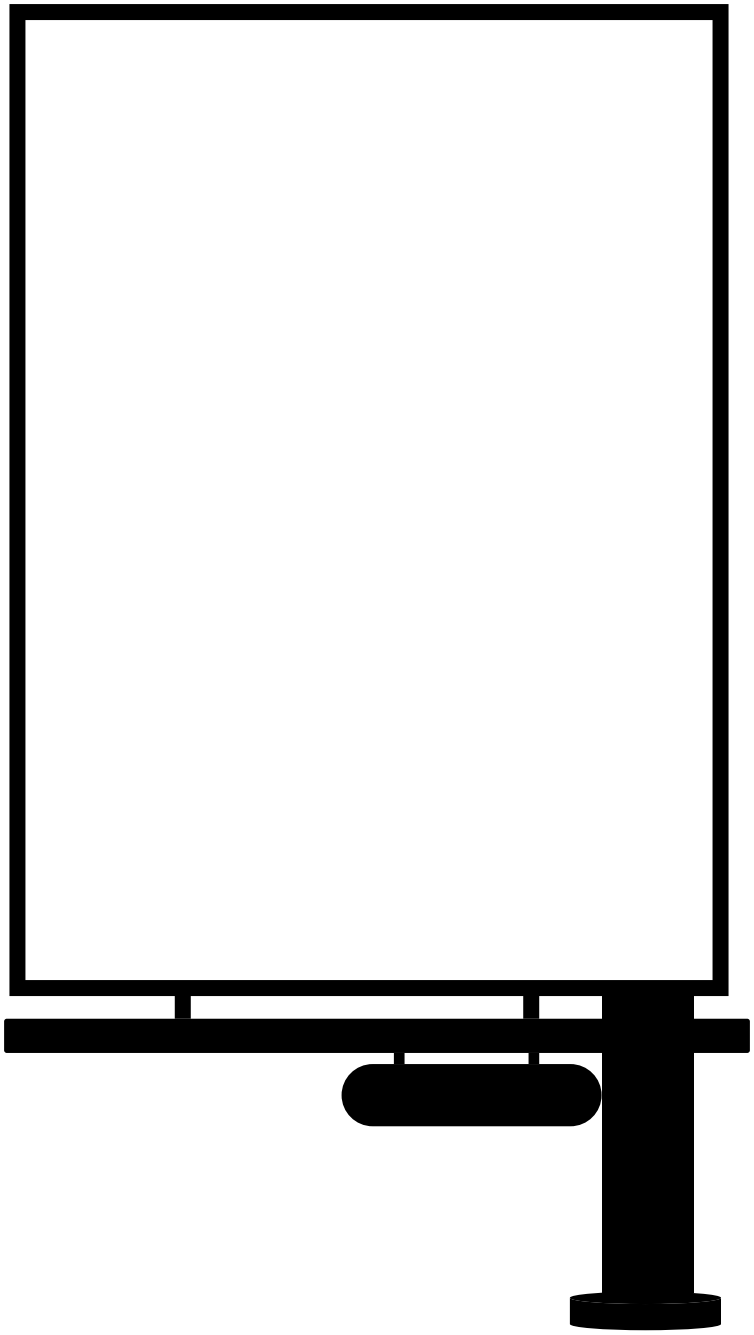
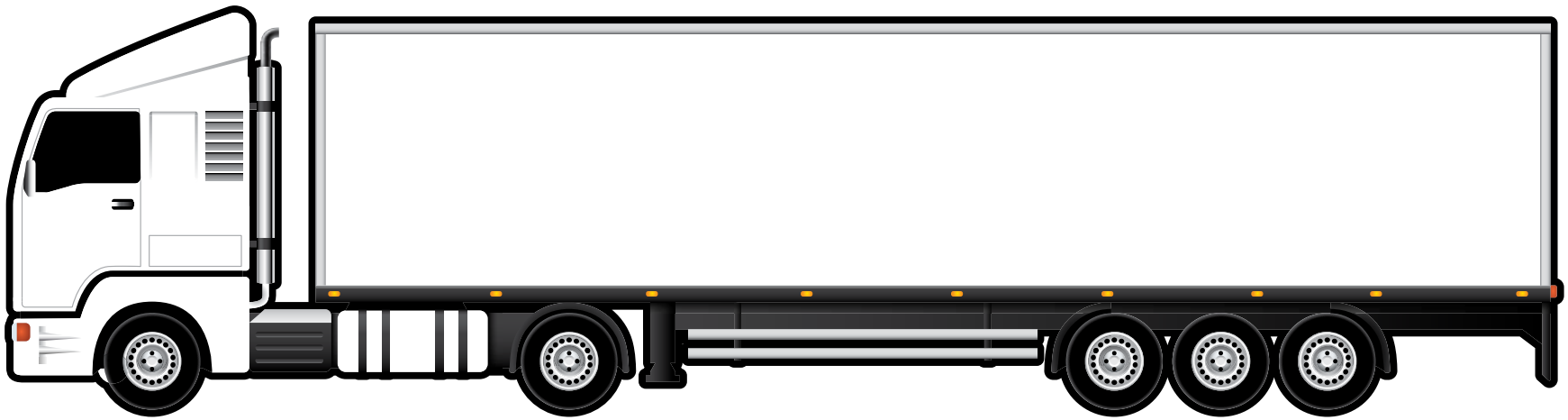


(Billboard D)

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE VEHICLE WRAPS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

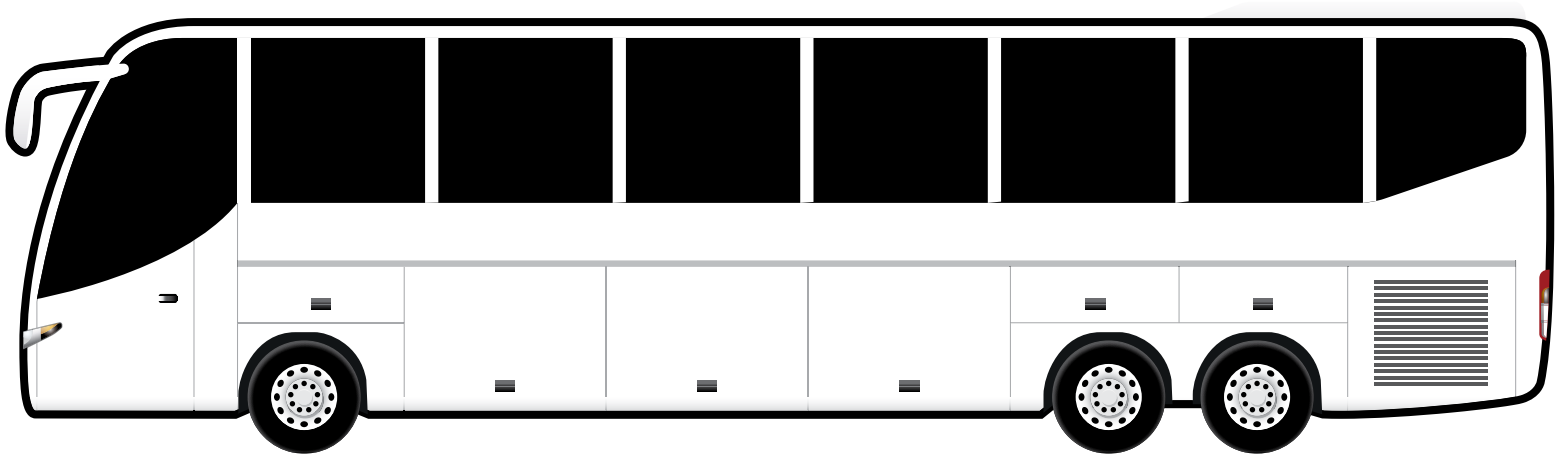


(Vehicle A)

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE VEHICLE WRAPS

Name: _____ *Class:* _____ *Date:* _____/_____/_____



(Vehicle B)

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE VEHICLE WRAPS

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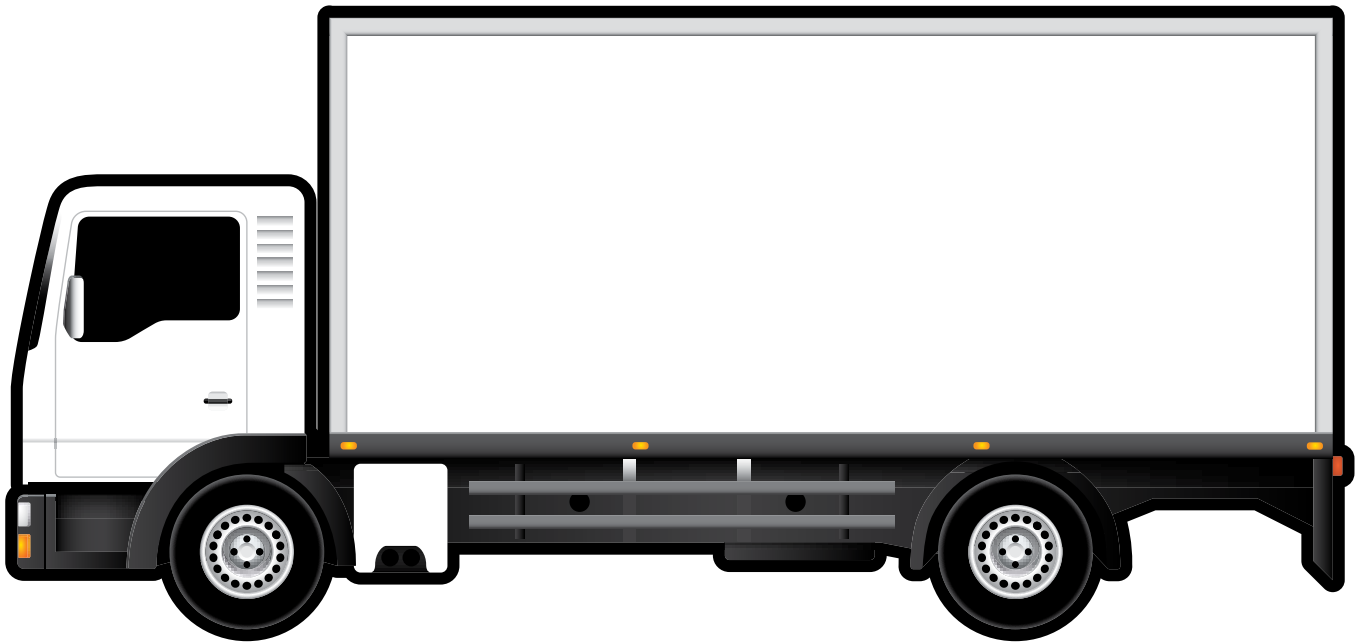
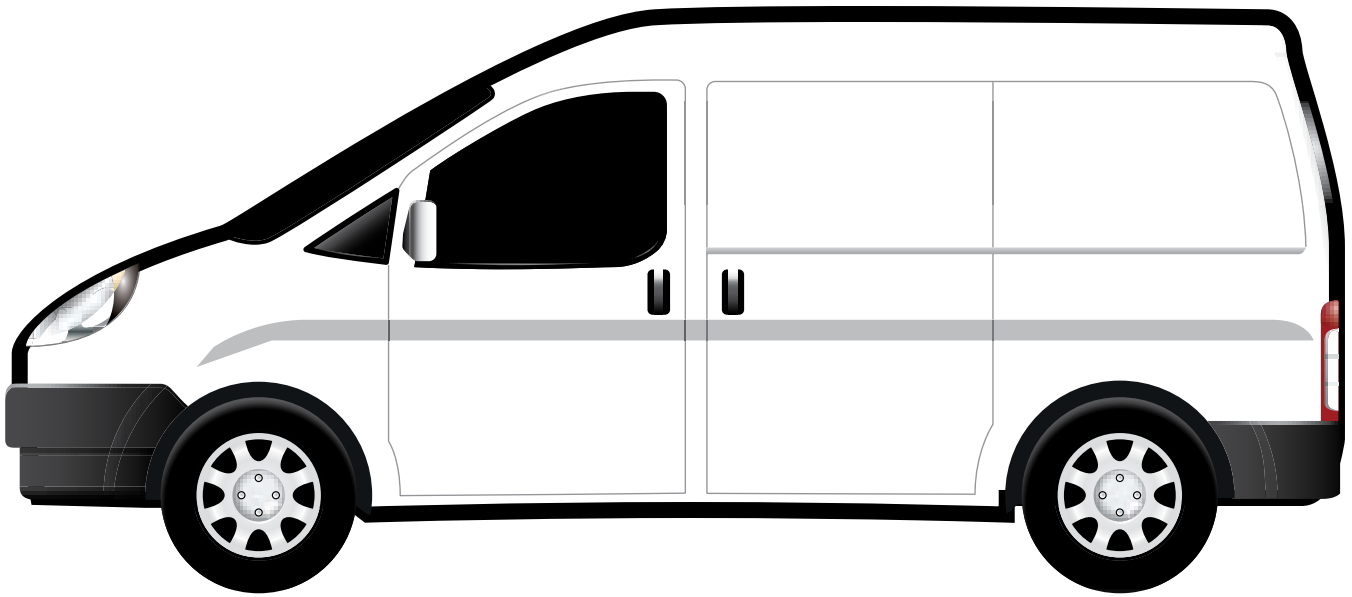


(Vehicle C)

Plastic Pollution and You

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE VEHICLE WRAPS

Name: _____ *Class:* _____ *Date:* _____/_____/_____



(Vehicle D)

CREATE YOUR OWN OUTREACH CAMPAIGN TEMPLATE VEHICLE WRAPS

Name: _____ *Class:* _____ *Date:* _____/_____/_____

(Vehicle E)

CERTIFICATE

OF COMPLETION

This document certifies that

_____

has successfully completed the
Plastic Pollution and You curriculum

Kathleen Fallon
Coastal Processes and Hazards Specialist

Nate Drag
Great Lakes Literacy Specialist

NOAA

Sea Grant
New York