

# Teaching Guide to



## Science, Standards, and Inspiring Students' Lives

Very often schools host guest speakers at assemblies with the idea of inspiring students both academically and in the world beyond academics. Ideally, in fact, such speakers make a vital connection between these two worlds, showing, ultimately, that there need not be a hard and fast division between them. *Getting Drastic with Plastic!* is, narratively, a story of a student who accomplishes this same feat by applying scientific data, creative thinking, and community engagement around an important environmental issue. But this succinct eight-page comic is also a vehicle, especially when read in conjunction with this guide and integrated into existing curriculum, for your students to be similarly inspired—not simply to make changes to their lives, but to apply critical thinking skills before, during, and after the process of turning scientific knowledge into human values and meaningful action.



To these ends, this guide contains critical thinking questions keyed to the Next Generation Science Standards (NGSS), as well as activities that empower students at a range of grade levels to make a personal connection to the issues.

## Take a "Plastics Inventory"

Prior to reading, challenge students to take a moment to observe the classroom or library closely. What objects in this setting are made of plastic? The group can spend one or two minutes jotting down these items before sharing their lists aloud while you capture the responses on the board. Allow students to brainstorm for additional items that occur to them as a result of hearing other responses.

Then be sure to follow up by "digging deeper." Does each item "need" to be made of plastic? By drawing upon their knowledge of physical science, students can evaluate alternative materials. Would they be too heavy? Too costly to mass-produce? How might other factors such as temperature or reflectivity affect the functionality, appearance, or safety of each object, were it not plastic?

## Content and Vocabulary Preview

The following content area terms all appear in context in *Getting Drastic with Plastic!* Consider teaching, re-teaching, or reviewing them prior to reading the story.

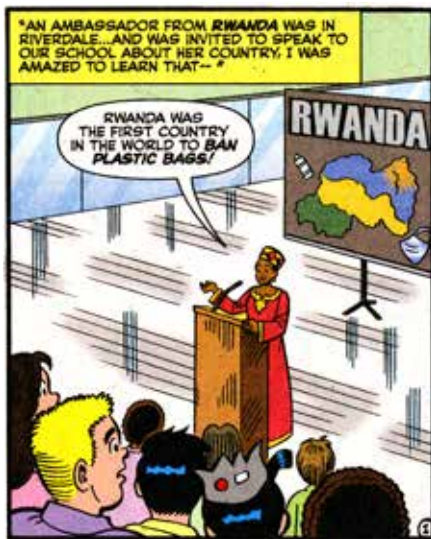
- agricultural productivity (p. 2)
- biodegradable/non-biodegradable materials (p. 7; p. 2)
- carcinogen (p. 3)
- compostable (p. 3)
- decompose (p. 2)
- organic matter (p. 2)
- polyethylene (p. 2)
- prosthesis (p. 7)
- renewable energy (p. 7)
- surgical procedures (p. 7)
- toxins (p. 2)




# Critical Thinking Questions

Since they're designed for flexibility, you can adapt these questions for various grade levels (sample correlations are provided) and for multiple purposes: as discussion starters, as writing prompts and/or topics, as an informal comprehension diagnostic, or in formal assessment.

- 1. Science and Policy** What policies around the environmental impact of human activity do other communities have that you think it would be good to adopt, either nationally or locally? Conversely, what environmental protection laws and regulations does the U.S. have that are not in place in other nations? Should the entire world follow the same guidelines? Why or why not?



 \* 5-ESS3-1

- 2. The Evidence Base** When Veronica presents dire scenarios and uses language such as “poisoned planet,” what supporting empirical evidence, if any, is presented in the comic? Under what conditions could such descriptions be accurate and/or helpful? Why might such descriptions be considered “unscientific” in a basic sense?




 MS-ESS3-4

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- 3. Renewable vs. Non-renewable Resources** The story cites the amount of oil needed to produce plastic bottles annually. What are the potential environmental drawbacks of extracting and processing this oil? What are the social and geopolitical costs if using oil for this purpose helps deplete reserves faster? Can the challenge of making the future more reliant on renewable energy (as opposed to fossil fuels) ever be truly separated from other environmental issues? Why or why not?



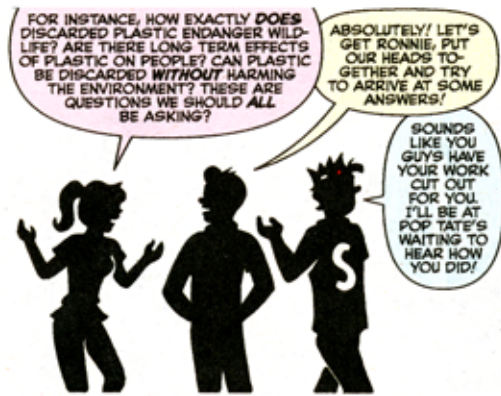
 5-ESS3-1, HS-ESS3-4

- 4. Alternative Materials and Sustainability** What might be the environmental impact of an increased usage of paper packaging as a replacement for plastic? Would the banning of plastic bags, as Veronica seems to advocate, necessarily create a “net positive” in terms of the environment? How might issues of sustainability, land use, and pollution play out? For example, new mineral deposits would have to be extracted to create metal spoons if we assume that recycling and re-use would not adequately cover the increased demand caused by doing away with plastic stirrers.



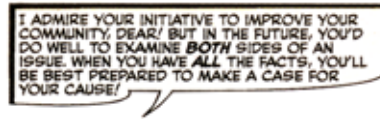
 HS-ESS3-4


5. **Research Topics and Design** As topics for research, which of those that Betty mentions on p. 6 would be your priority? If you were a scientist with the necessary resources, how would you design data collection and monitoring processes to conduct each type of research? How would you narrow Betty's questions to more practical and specific ones that could be studied directly in a timely way?



 MS-ESS3-3

6. **Fact vs. Opinion/Engineering and Human Needs** Evaluate the logic in Mr. Lodge's argument on p. 7. What reasons do you agree or disagree with, and why? In which areas might you want to see more quantifiable data before committing to a stand one way or the other?



 4-ESS3-1, 4-ESS3-2, MS-ESS3-4

**Using the Reproducible to Enrich Reflection/Discussion**

Copy and distribute the worksheet on the next page as a way to personalize some of the issues in *Getting Drastic with Plastic!* When students are done, you can ask them to rank the items they marked with checkmarks: first according to their own willingness to take the actions, and then perhaps according to the degree to which they would try to convince peers to do likewise. If you choose to discuss worksheet responses as a group, invite students to comment on whether their choices make them reconsider some of their positions regarding the above questions.

Name \_\_\_\_\_

Date \_\_\_\_\_ Class \_\_\_\_\_

## Plastics and You

What actions would you be willing to take to limit the consumption and production of plastics?

Place an X or a checkmark next to each item.

- 1. Use metal spoons instead of plastic stirrers.



- 5. Drink from a steel water bottle rather than a plastic one.



- 2. Accept paper packaging for food, and use fabric bags to carry it.



- 6. Find alternatives to plastic in school or art supplies.



- 3. Find ways to protect comics or other collectibles without plastic.



- 7. Avoid the purchase of a new hair dryer, laptop, video game controller, tablet, or phone until plastic is reduced or eliminated in its manufacture.



- 4. Ask a dry cleaner not to wrap your clothes in plastic.



- 8. Reduce the amount of plastic you carry with you in the form of a library card, bank or debit card, or (eventually) a credit card.



## Differentiated Instruction

### You Can Support Below-Level Readers To...

- appreciate more fully the story's characterization and humor by first soliciting peer summaries of the personalities of the core characters: Archie, Betty, Jughead, Reggie, and, of course, Veronica Lodge and her father.

### You Can Guide English Language Learners To...

- practice their oral language skills by reading passages from the story aloud (using the artwork as context clues) after first pointing out that there are many grammatical devices that, as in stage plays, reflect the sound of spoken dialogue but are not conventional English (e.g., comma splices that reflect a character's excitement).
- benefit from explicitly reviewing cultural items that may be unfamiliar or unclear (e.g., the final pun that plays on the slang use of the word "plastic" to refer to credit and charge cards).

### You Can Challenge Advanced Students To...

- sharpen their critical thinking skills by playing "devil's advocate." For each confrontation with a local merchant, have them argue both sides, explaining why Veronica's stance as well as the opposing one makes sense.
- reflect on the story and "think on their feet" by describing what the outcomes of the story would be one year later. How might the businesses in Riverdale conduct themselves differently? What might be the impact on the local economy? How might the positions of the different characters shift or become more nuanced?

## Further Resources

1. For a free and fun comic, download "Bottle Battle," which features Archie and his friends coming to terms with plastic pollution: <http://comicbookfairs.com/pdf/BottleBattle.pdf>
2. As an engaging follow-up, consider sharing clips from Suzan Beraza's *Bag It!*, a documentary on the same topic as *Getting Drastic with Plastic!* Note: as with all audio-visual media, remember to preview the film in its entirety before screening any portion of it.
3. For an in-depth, non-fiction resource that looks at the complex relationship between human activity and Earth's environment, is geared toward older science students, but is also in graphic form, add *Climate Changed* by Philippe Squarzoni to your class or independent reading list.
4. To follow up on Critical Thinking Question #3, about renewable energy, you may want to draw attention to how Mr. Lodge references solar panels (p. 7) made of plastic. To make the issue more concrete and "real-world," you can also consider introducing students to Little Sun (<http://www.LittleSun.com>), an interesting company that produces solar-powered light sources... that nonetheless have plastic parts.
5. To continue with the social-issues-in-comics approach, check out other comics from the Rise Above Social Issues Foundation, or consider booking a presentation by founder Nancy Silberkleit. For more information, visit our web site at [RiseAboveSocialIssues.com](http://RiseAboveSocialIssues.com).
6. As students work toward a world free of plastic pollution, intriguing information/ideas can be found here: <http://plasticpollutioncoalition.org>

This Teaching Guide was developed by Peter Gutiérrez, a former middle school teacher and an Eisner-nominated comics creator. His most recent book, *The Power of Scriptwriting*, is available from Teachers College Press.

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