

Trash Timeline

Overview: In this lesson that is part of the CAMEOS Marine Debris curriculum students work in groups to create a timeline based on how long certain types of trash persist in the environment. Students will draw a model of their timeline to scale given actual data and write a brief reflection on the problem of marine debris. This activity can be used to assess how well students work in groups to accomplish the task and to assess the level of familiarity with making inferences based on data, the use of the metric system and drawing timelines to scale.

Time: 30 minutes

Materials:

One “kit” per group = paper shopping bag* containing

- milk carton
- 1 aluminum can
- monofilament fishing line
- 1 plastic bottle
- 6 – pack ring
- Styrofoam container

(* The shopping bag is part of the items students will align, but it creates curiosity about the activity if students have to unpack their kit. All items have been previously well cleaned.)

Chalk (to draw directly on desk, alternatively use large sheets of paper on desks)

One large ruler (≥ 1 m)

Data table (see handout, at least two per group)

Rulers with metric units (one per student)

At the beginning of the activity the problem of marine debris can be quickly reviewed (see slide 1 and 2 of accompanying powerpoint or these slides can be used as a basis for discussion with students on the effects of marine debris on marine organisms after they have completed the activity. This activity can be combined with other activities in the CAMEOS marine debris curriculum if students are in class for longer time periods.

Group timeline on desk

Each group of students (3-4 students) is handed a “Kit” (paper shopping bag containing 6 common items of trash), one piece of chalk and a large ruler.

Instructions to students: *Today we are going to conduct an investigation on how long marine debris/trash persists in the environment. Use the chalk and ruler to draw a timeline on your desk and order the 7 items of trash in your kit according to what you think decomposes the fastest and what you think persists the longest in the environment. The paper bag is also an item! (approx. 3 minutes).*

Have a brief discussion with students comparing their timelines. Most students will put the paper bag on one end of the timeline and aluminum can, plastic bottle and Styrofoam on the other end.

Comparing timeline and data table

Students are handed a data table and are asked to compare their timeline to the data provided below and rearrange the items according to the data table (approx. 2 minutes). For most student groups this will be the first time that they are associating numbers with the trash items. Ask students what was most surprising to them about the data.

Data table

Source: US EPA and US Forest Service,

Material	Time required to degrade
Milk Carton	6 months
Aluminium Can	200 years
Monofilament Fishing line	500 years
Plastic Bottle	450 years
Styrofoam	80 years
6-pack Ring	400 years
Paper Bag	3 months

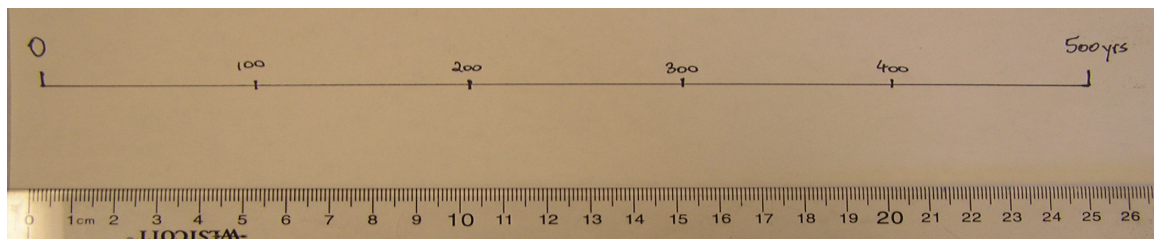
Notes to teachers: Students are often surprised that certain items take a very long time to degrade and also often want to know how we know this. This provides an excellent opportunity to challenge students to briefly discuss in groups how they would design an experiment to find out how long different materials last. Solution from students in the past: Take the material new and weigh it with a very good scale, put it in the ocean/aquarium and wait, say, a year or 5 years and weigh every month if it degrades, it will lose weight, draw a graph and extend the line until the weight goes to zero. That is the time it lasts.

Timeline to scale in Notebook:

Students are guided to draw a timeline to scale in their notebook. Explain the use of metrics in science. Walk students through steps (see powerpoint).

What is the longest time on the data table? 500 years

Draw a line of 25cm* to represent 500 years (see powerpoint slide).



* 25cm was chosen because it makes the math relatively easy and fits standard notebooks used in the classroom in landscape format. This is, however, not always obvious to all students.

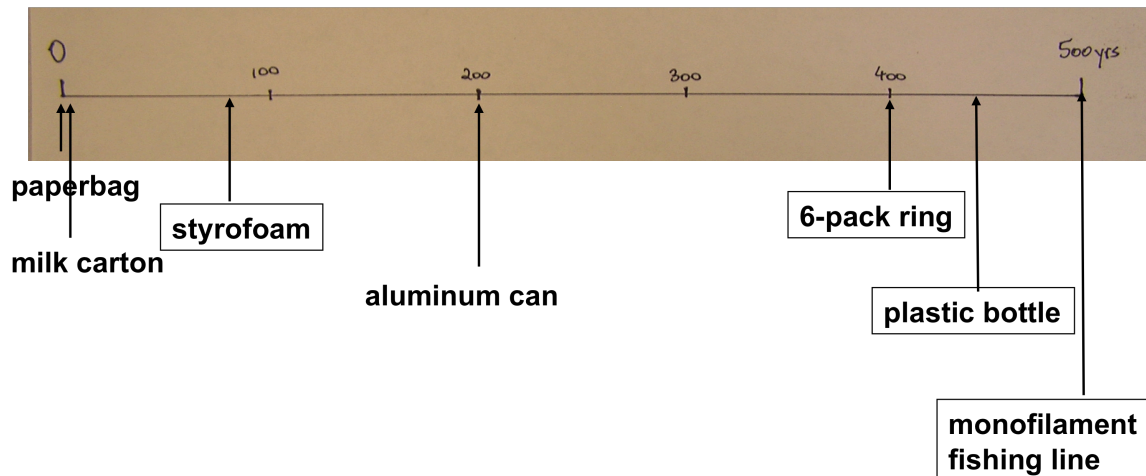
Now we want to divide the timeline into intervals. What would make a good interval?

How many cm would represent 100 years?	5 cm
How many cm would represent 50 years?	2.5 cm
How many cm would represent 10 years?	0.5 cm

Draw the different debris items on the timeline according to scale.

Notes to teachers: This activity can be challenging for many students and individual help may be necessary. Encourage students to help each other.

Circle all the items made from plastic. What do you notice?



In your notebook write a sentence about what you found out about plastic today. Write a brief paragraph on what you can do to avoid creating marine debris.

Note to teachers: Have a brief discussion with students about their written conclusions. Have volunteers read aloud what they wrote and ask for additional contributions.

Resources:

- <http://bml.ucdavis.edu/education/cameos/resources/marine-debris/guided-inquiry/>.
- http://www.epa.gov/gmpo/edresources/debris_t.html
- <http://www.tnswep.ra.utk.edu/activities/pdfs/pdd-h2.pdf>
- http://www.fergusonfoundation.org/btw/teacher_resources/trash_timeline_lesson_plan_10-06.pdf

Footnote:

This lesson plan was modified by CAMEOS fellow Renate Eberl with input from 7th grade Science teacher Debbie Grima-Lowe from a lesson by Rachel Fontana, former CAMEOS fellow.