

Design and Build a Compost Column Design Brief

Design Challenge: “How can we build an efficient compost column?”

The citizens of Haiti need your help. Haiti is a country located on the island Hispaniola and is one of the poorest countries in the Americas. Approximately 2/3 of Haitians depend on agriculture as both a source of income and food; however their soil quality is poor. Due to deforestation, drought, and soil erosion caused from hurricanes and flooding catastrophes Haitians are unable to cultivate their land and produce crops. Compost bins are an efficient means of replenishing the soil with nutrients by decomposing organic matter. Haiti would like to hire your design team to develop an efficient compost column to restore the soil and enhance agricultural productivity.

You will work as a member of a small design team to design and construct a compost column. Your team will study what ingredients should be included, how long decomposition takes, and the best conditions for quick decomposition. You will need to observe the color, temperature, smell, and texture of the compost components, measure the mass of your compost, and sketch organisms present each week and record all of these observations in your design notebook. The organic material in your compost column should be organized in such a way to maximize rate of decomposition.

Constraints:

- You may include up to 5 ingredients
- The total mass of your ingredients must be between 20g and 40g
- You must add water, between 200ml and 400ml, every few days

Compost Column Rubric

Criteria (Ability to...)	Description	Performance		
		0	1	2
Design	Individual design Team design Re-design	Designs are incomplete and missing detailed information	Designs are missing one or more labels; Material list is incomplete; Drawings lack dimensions or are not to scale	Designs are clearly labeled; Materials are listed; Drawings are to scale and include appropriate dimensions
Apply science concepts	How students' understanding of science concepts (abiotic and biotic factors; decomposition; role of decomposers) influence and/or are reflected in their designs	Students do not explain how their designs are influenced by the science concepts; Students do not use vocabulary during presentations	Students' attempt to explain their design using science concepts, but they may be incorrect; Students use vocabulary incorrectly during presentations	Students explain how their design is influenced by science concepts Students use science vocabulary during their presentations
Collect and analyze data	How students organize, record, and interpret data	Notebook entries do not include evidence of data from testing	Notebook entries are present but lacking sufficient detail and/or are presented in an unorganized fashion	Notebook entries include tables and/or charts that demonstrate evidence of data

Decomposition Research Resources

www.brainpop.com/science/diversityoflife/fungi/

www.sheppardsoftware.com/content/animals/kidscorner/games/producersconsumersgame.htm

www.watchknowlearn.org/Category.aspx?CategoryID=6730

www.bottlebiology.org/investigations/decomp_main.html

Keeley, P., F. Eberle, and C. Dorsey. 2008. *Uncovering student ideas in science: Another 25 formative assessment probes, volume 3*. Arlington, VA: NSTA Press.
Uncovering Student Ideas in Science: Another 25 Formative Assessment Probes, Volume 3 (Keeley, Eberle, and Dorsey 2008) was used to assess students' prior knowledge.

Timelapse of Fruit and Vegetable Decomposition

www.youtube.com/watch?v=c0En-BVbGc

This YouTube video (www.youtube.com/watch?v=c0En-BVbGc) was used to introduce the process of decomposition. The lesson plan has students conduct their own research as homework and they discuss their findings during class.