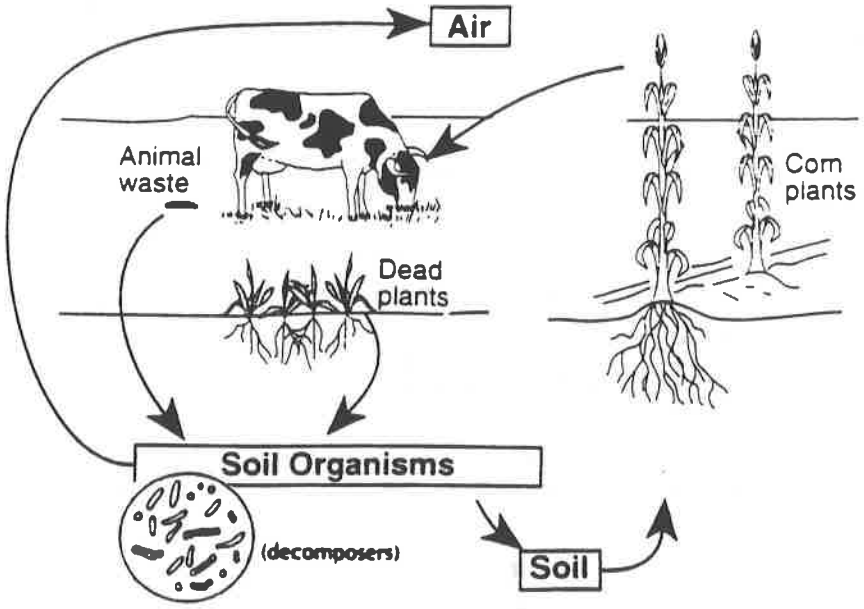
Name _____ **Period** _____
Due date _____

DIRTY DECOMPOSERS



What happens to the litter so often found along our roadsides? How would an apple core or a Styrofoam™ hamburger carton change in appearance over time?

Many of the visible changes in an apple core lying on a roadside are the result of insects, birds, or other animals feeding on it. Other changes are the result of physical features of the environment. For example, sunlight will dry the apple and cause it to shrink.

Styrofoam™, on the other hand, will likely remain intact for a long time. Only physical events will have much effect on its appearance. It may get squashed flat and break into smaller pieces if a car runs over it, and eventually the ultraviolet light from the sun (the same form of light that gives people sunburns) will loosen some of the strong chemical bonds that make plastic so durable. This process takes years, however.

Meanwhile, the apple core, or what's left after the insects are through with it, is exposed to the air and is also in contact with soil. Both the air and the soil contain bacteria and fungi that feed on dead tissues. This is not surprising, because the bacteria and fungi are essential to preserving life on earth. One of their main jobs is to decompose dead or discarded biological materials, breaking them down into simple chemicals that can be used as plant nutrients.

The bacteria and fungi don't exactly *eat* dead plants or animals, but they do *digest* them, at least partly. Bacteria are one-celled organisms, and they can produce special proteins that will pass through their cell membranes. These proteins, called *enzymes*, come into contact with the dead materials and break them down into simpler, liquid components. Then the bacteria cells can take the liquid back into themselves, through the cell membrane, as a source of food.

The fungi do basically the same thing, although some of the details are a little different. Both the bacteria and the fungi get food from the dead material, which we describe as "rotting" once they have gone to work on it. (That's when the material gets slimy, smelly, and/or has fuzzy stuff growing on it.) What is especially useful, though, is that while the bacteria and fungi are getting their nutrition, some of the chemical parts of the rotting material are left behind in the soil. The parts left behind contain minerals that living plants can use to help them grow. So the decomposers are important ecologically because they cause natural recycling to occur. The minerals that were once in a living plant or animal get returned to the soil by decomposers when the plant or animal dies.

In this laboratory activity, you will design an experiment to test a factor that could impact the rate of decomposition of a carrot. Possible factors could be (but are not limited to):

Soil type	Amount of water
Temperature	Fertilizer
Light & dark	Surface area of carrot

MATERIALS:

2 ziplock bags	Top soil	Permanent marker
2 baby carrots	Water	Toothbrush
		Gram scale

PROCEDURE:

(1) Mass out both carrots. "Nibble down" the heavier carrot to equal the mass of the lighter carrot. Record both original masses in the data table.

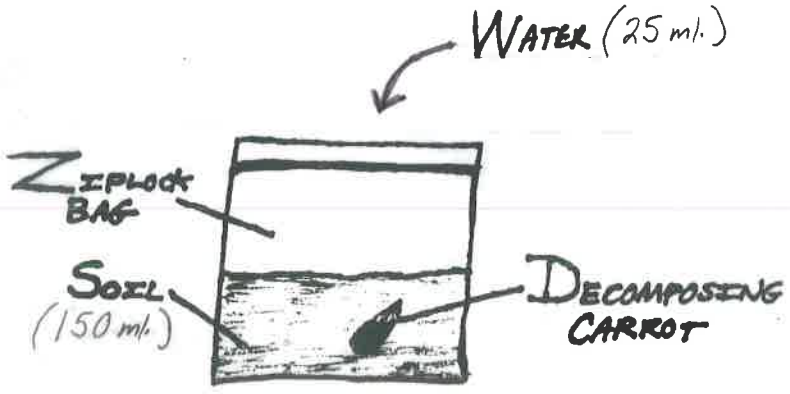
(2) Decide what one way you will treat the 2 bags differently. Will you add a factor to one? Will you put them in different locations? After you have decided, state a hypothesis about the outcome of your experiment below:

STATE A HYPOTHESIS: _____

Ex. The carrot with shampoo will decompose faster than the one without shampoo

Ex. The carrot in the dark will decompose slower than the one in the light

(3) Set up both bags as shown below (unless the amount of water or soil is your test factor):



Squeeze the bags to make mud, then submerge the carrots. Label the 1st bag "Control Bag," and the 2nd bag "Test Bag." Be sure to put your names on both bags.

(4) Each lab period (for the next 3 labs), you will remove the carrots from both bags and record their masses in the data table. You should also observe the aroma of the bags each time. Before weighing each carrot, remove it from the bag and brush off as much soil as possible back into the bag using the toothbrush. When finished, put each carrot back into its correct bag.

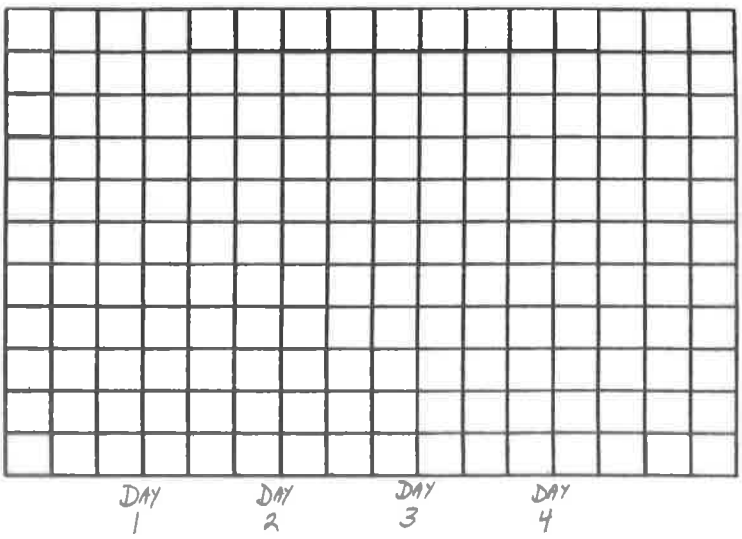
DATA TABLE

CONTROL BAG	TEST BAG
Date _____ **Original mass (g)** _____ Aroma _____	**Original mass (g)** _____ Aroma _____
Date _____ **2nd mass (g)** _____ Aroma _____	**2nd mass (g)** _____ Aroma _____
Date _____ **3rd mass (g)** _____ Aroma _____	**3rd mass (g)** _____ Aroma _____
Date _____ **4th mass (g)** _____ Aroma _____	**4th mass (g)** _____ Aroma _____

ANALYSIS AND CONCLUSIONS:

1. Using the data from the table above, make a line graph below.

- You will have 2 lines: Label the lines "CONTROL BAG" and "TEST BAG."
- REMEMBER TO: Give your graph a title
- PUT UNITS ON THE Y AXIS



2. How did your experiment work out? Was your hypothesis true? Describe.

_____

_____

3. Over time your carrots decreased in mass. Where did that mass go?

_____

4. Who did the actual work of decomposition? YOU BACTERIA & FUNGI
(circle one)

QUESTIONS ON OPENING READING PASSAGE:

_____ 5. Where are bacteria and fungi located?

A. Rain & snow
B. Oceans & rivers
C. Rocks & minerals
D. Air & soil

_____ 6. Which chemical, given off by the bacteria and fungi, actually decomposes the dead materials?

A. Enzymes
B. Chlorophyll
C. Urushiol
D. Sugar

7. Why is compost created by decomposers so helpful to plant life?

_____

_____