

Experiment – Exponential Growth Using Mold

Description

In this experiment you will measure the growth of mold on a piece of bread over several days. When the experiment is complete, you will model the growth using an exponential function.

What to do before you start

Get permission from a parent before you start this experiment. Parents who discover moldy bread often throw it out first and ask questions later. This is almost as bad as having your sport card collection thrown in the garbage.

Additional Information

There is additional information on the McAdams Math web site at <http://McAdamsMath.tripod.com/algebra/moldgrowth.html>.

Materials

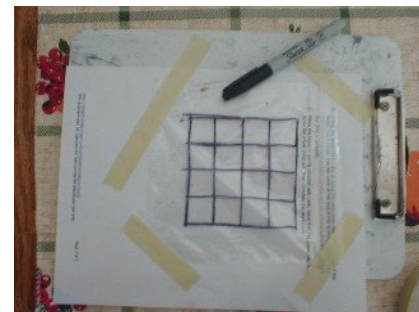
You will need:

- One piece of bread. Bread that is sold as “Country Bread”, “Natural Bread”, or bread from a quality bakery works best, as it has less or no preservatives than the national brands.
- A zipper top plastic bag. The zipper top allows you to do your experiment without spreading mold spores around your house. When you are done, you simply throw the bag and bread in the garbage. No mess, no fuss.
- A pen that will mark on the plastic bag. While most pens will work, a thin pointed permanent marker will work best.
- A few drops of water. The water will be placed in the bag with the bread to speed up the growth of the mold.

Experimental Procedure

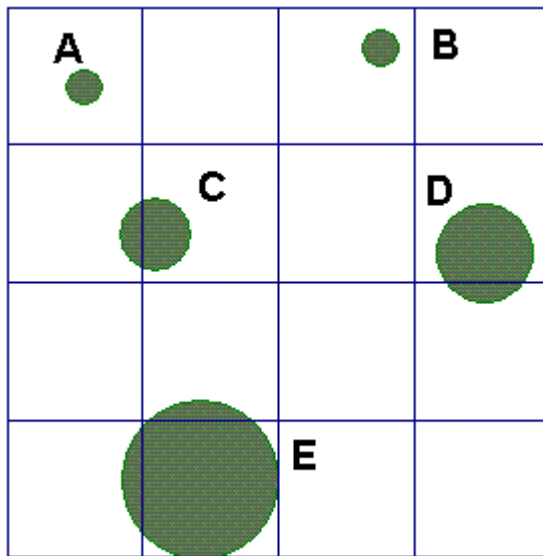
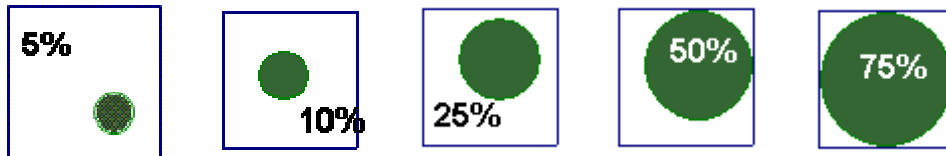
1. Make a grid on the plastic bag. The grid will help you estimate the portion of the bread that is covered with mold.

Place the bag on a flat surface. Place a printed grid or graph paper under the bag as a guide. Tip: make the grid about the same size as the piece of bread. Tape the corners of the bag so it doesn't slip while you are marking it. You can use the grid that is in this document or, if the grid provided is not the right size, there is a grid you can size then print on <http://mcadamsmath.tripod.com/worksheets/moldybread.html>.



If you leave the bread sitting out on a counter for an hour or so, it will pick up some mold spores and speed the growth process.

- Next, place the bread in the bag with 2 or 3 drops of water. Do not put more than 2 or three drops. This water will speed up the growth of the mold.
- Now, seal the bag and put it in a dark, warm place. A drawer or closet is a good place for this, as long as the bread won't get squished.
- Check the bread once a day at about the same time each day. Record the portion of the bread that is moldy. Use the guide at the end of this worksheet to help you estimate. If you have a digital camera, you can photograph the results each day (this is optional). Each of the templates below indicates what percent of the entire square is occupied by mold.



Example

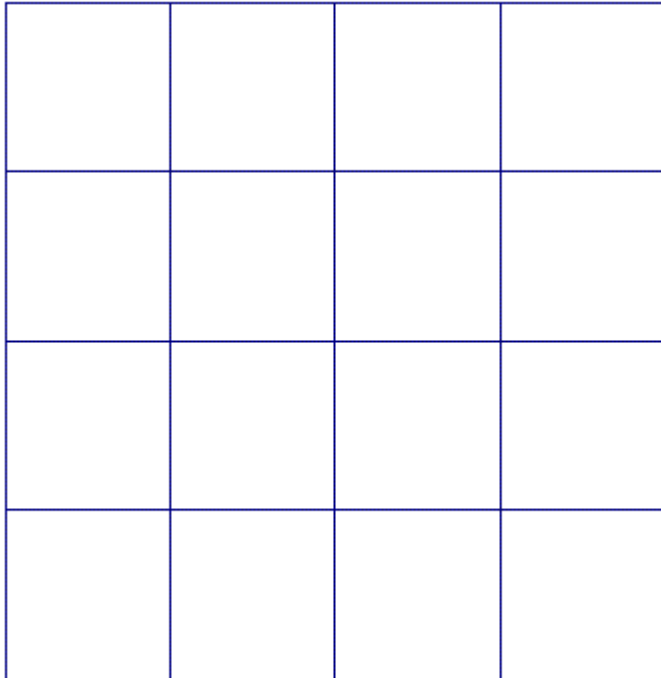
In this example, there are five colonies of mold. Use the templates to estimate the total area of the mold as a percentage of the whole. Colonies A and B are most like the 5% template. Colony C is slightly smaller than the 25% template, say 20%. Colony D is smaller than the 50% template, about 40%. Colony E covers about the same area as one square which is 100%.

Now we need to add the areas together. $(5+5+20+40+100)$ is 170. Since there are 16 squares, we need to divide 170 by 16, which is 10.6% of the whole.

- When the bread is mostly covered with mold, leave it in the plastic bag and throw it out bag and all. Then complete the worksheet.

Grid Template

A variable sized template is available on <http://McAdamsMath.tripod.com/algebra/moldgrowth.html>.



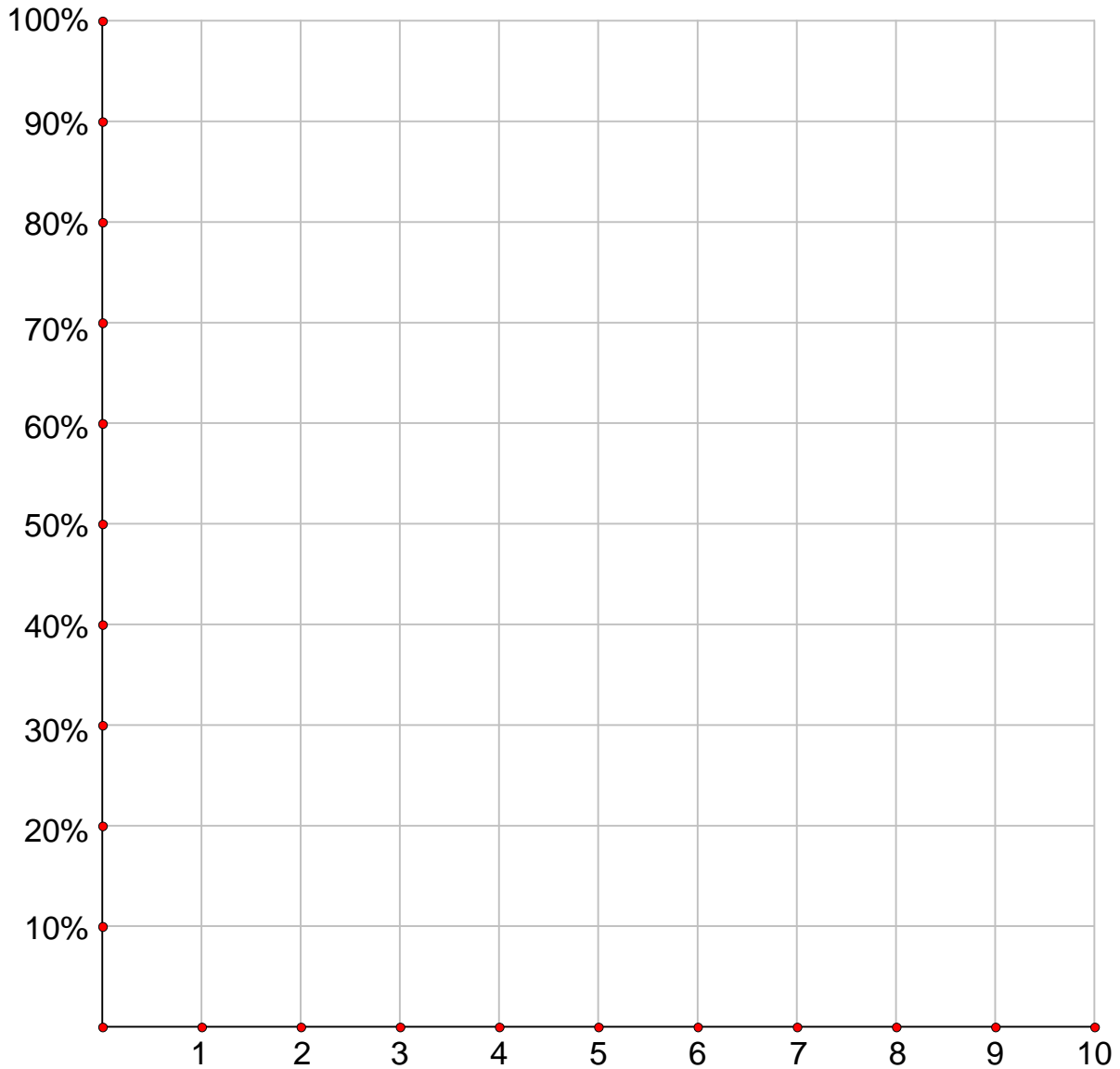
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Worksheet – Exponential Growth Using Mold

1. Record your daily results

Day	1	2	3	4	5	6	7	8	9	10
Date										
% Covered										

2. Graph your data.



Name _____ Period _____

3. Find an exponential function to model the mold growth. Graph the function on the same graph as the data points.

4. Explain why the exponential model fits the growth of mold.
