ACTIVITY 39: Cells Alive! | Date 11/4 | Page 19

WRU Thinking?

Have you ever used yeast? Where & Why? If not, what is yeast used for?

Vocabulary: Indicator

A chemical that usually changes color to indicate (or show) the presence of another substance. Example: BTB turns from blue to yellow in the presence of CO_2 (which makes a weak acid in water).

Liliana owen blowing

Manipulated Variable: (MV)

What you are changing on purpose to see if it makes a difference.

Responding Variable: (RV)

What happens when you change the MV. Can be observed or measured.

Controlled Variables (CV)

What you keep the same in an experiment to make it a fair test.

Vocabulary, cont

Control (noun): / (standard)
one part of a setup where nothing is changed. This is used as a means of comparison.

Cellular Respiration

- Process that uses oxygen and sugar to provide energy that living organisms need.
- Releases carbon dioxide and water as waste.
- Happens in mitochondria!

Photosynthesis

- Almost the opposite of respiration
- Organisms with chloroplasts (plants, algae, phytoplankton) do both photosynthesis to make their own food **AND** respiration to use that food for energy.
- When sun is out, photosynthesis happens faster, so more oxygen is made.
- Equation for (P)

$$6CO_2 + 6H_2O \xrightarrow{\text{sun}} C_6H_{12}O_6 + 6O_2$$

NAME: Activity 39: Cells Alive Introduction Information

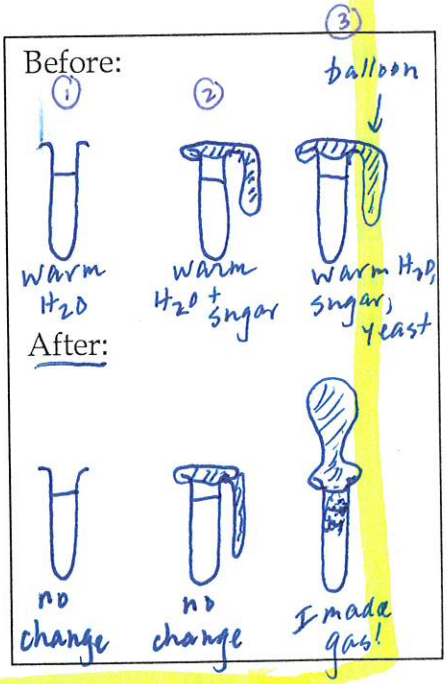
uni = one multi = many

Now you know that all living organisms are made up of cells. Unicellular organisms are made of only a single cell. Other organisms, such as people, onions, and elephants, are made of many cells and are called multi-cellular organisms. Both unicellular organisms, such as some microbes, and multicellular organisms need food, water, a way to dispose of waste, and an environment in which they can live. What do all these cells do?

Many organisms, including humans, take in oxygen (O_2). You use the oxygen to break down nutrients. This breakdown happens in the cells in organs all over your body. When your cells break down nutrients, wastes such as carbon dioxide (CO_2) are produced. When you take in a breath, you take in air, and 21% of the air is oxygen. This oxygen is used to break down sugar from food in a process called cellular respiration. This process provides energy your body needs and releases carbon dioxide and water vapor as waste. Specifically, this process happens in the mitochondria (in cytoplasm)

How do we know that all these things happen in cells? In this activity, you will investigate yeast, a type of microorganism. Yeast is a single-celled organism.

Draw what we did with the yeast and test tube. Draw the 'before' when we first put on the balloon, and the 'after' after the balloon had been on the test tube for a while.



Write the 'equation' for **respiration** below:

glucose + oxygen → carbon dioxide + water + Energy
(sugar)
wastes

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O +$ ATP
(glucose)

Adenosine Tri-Phosphate

Information from Activity 41 about:
Cellular Respiration: A Function of Every Cell

All organisms use some form of cellular respiration to release the energy stored in food. Cellular respiration is a series of chemical reactions that take place within cells. This process breaks down food into smaller substances. Every cell in an organism must be able to absorb nutrients and release wastes produced by cellular respiration and other reactions that take place in the cell. Absorbing nutrients and releasing wastes take place through the cell membrane.

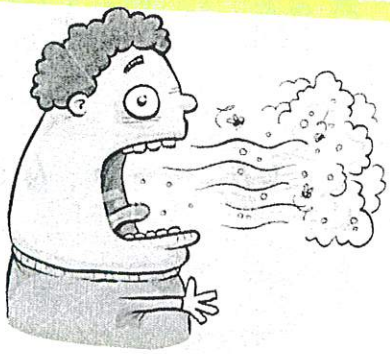
In animals, plants, and many microbes, cellular respiration requires oxygen. This type of cellular respiration is called aerobic respiration, and always produces carbon dioxide waste.

an = without

Another type of cellular respiration is anaerobic respiration. This does *not* require oxygen. Your muscles rely on anaerobic respiration for a short time when they can't take in oxygen fast enough to meet their energy needs. This often leads to cramping from the buildup of wastes, one of which is lactic acid. Some microbes, like the yeast you studied in Activity 39, "Cells Alive!" can use either aerobic or anaerobic respiration, depending on whether oxygen is present.

Anaerobic respiration happens in the cytoplasm.

Some organisms, including certain bacteria, use only anaerobic respiration. A number of anaerobic bacteria cause diseases, while others are helpful. Anaerobic bacteria are found in the human digestive system where they help break down some nutrients. Anaerobic bacteria in the mouth release waste products that cause bad breath.



ACTIVITY	Date	Page 23
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Data Table

cup	Initial	After
2 yeast		
3 yeast & sugar		
4 yeast & sugar & cup		
Oval cup BTB & tube		
8 BTB & water		

ANALYZING AND INTERPRETING RESULTS RUBRIC

4 Above and Beyond EXCEEDING	• Student carefully looks at *data*, and explains it in a very detailed and thoughtful way, including any trends or patterns noticed. Relates results to other scientific information. • Student makes a detailed *conclusion* fully based on the data, and compares to the problem statement. • Student makes a detailed explanation of possible *sources of error*, including where the errors might come from, how big the errors are, and how those errors would affect the results. • Student suggests and explains other ways to gather more data to more accurately answer question,

Name: _____ Activity 39: Cells Alive!

Per. ____ Date: _____ Analyzing and Interpreting Results

This is a written report summarizing your yeast experiment.

1. A problem statement of what you were trying to figure out by doing the lab. Explain what the purpose of the lab was. The title of the Activity gives a clue.

The purpose of this lab is. Show that yeast are alive by showing that yeast make CO_2. The CO_2 will make (BTB) turn yellow.

2. Provide an **analysis** of the results.
   a. Include a summary of the results shown by the data in your data table.
      (include what happened in each of the cups and comparisons between them)

Cup # and Contents	**Observations** and **explanations** of what happened (as much detail as you can!)	Diagrams
Cup 2 (yeast)	light in color (white/tanfete) yeast slunk liquidy	no sugar so yeast couldnt do respiration.
Cup 3 (yeast + sugar)	puffy / bubbly might have been a little darker looked like larger amount	yeast were producing a gas yeast used sugar and made waste

ACTIVITY 39, continued Date 11/5 Page 23

b. Include an explanation of the purpose of sugar for the yeast. Why did we add sugar? Explain by comparing what happened in Cups 2 and 3.

Conclusion, continued

Name:_____

Ines 4. **Error Analysis:** (Explain things that did or could have gone wrong, how they would affect your data, and how you would improve upon them. Also, suggest relevant revisions to your experiment or further investigations based on your analysis.)

Source of Error	Effect on data	Next time I would . . .

LaB-LOG

ACTIVITY 39, continued

Date 11/5

Page 23

ACTIVITY 40: A Cell Model | Date 11/14 | Page 24

LaB-LOG

WRU Thinking?

What must move across a cell membrane for the cell to survive?

Eggsperiment!

Egg into Vinegar

Day 0 11/14/19

Observations	Diagrams

ACTIVITY 40, cont | Date 11/15 | Page 25

Eggsperiment, cont.

Replace vinegar - keep egg in vinegar

Day 1 11/15/19

Observations	Diagrams
Egg in vinegar	
Egg by itself	
Liquid by itself	
Egg in new vinegar	

Look for changes!

Hypothesis

Warm up: Imagine that you are a yeast cell and you eat some sugar. What will you produce?

If I was a yeast cell and I ate sugar I would...

Classroom expectations

•

•

•

Warm up

Draw your egg and label which part represents the cell membrane and which part represents the cytoplasm.

ACTIVITY	Date	Page
40, continued	11/18	27

Egg experiment, continued

Egg out of vinegar & into corn syrup
Day 4 11/18/19

Observations	Diagrams
Egg in vinegar	
Egg by itself	
Liquid by itself	
Egg in corn syrup	

Hypothesis of Egg & Liquid

Day 5 Eggsperiment

Eggs out of corn syrup & into colorful liquid

Observations	Diagrams
Egg in corn syrup	
Egg by itself	
Liquid by itself	
Egg in colorful liquid	

prediction in corn syrup

Warm up

How does the bean & rice demonstration relate to your egg?

Particle size

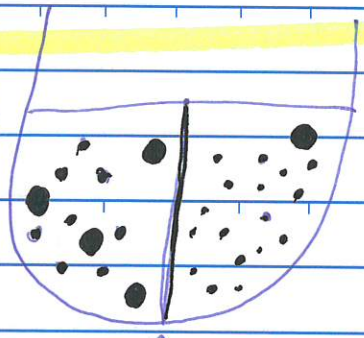
Semi-permeable membrane

Vocabulary

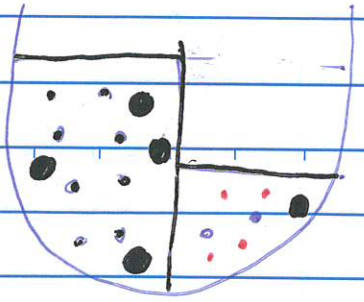
Diffusion: movement of a substance from an area of high concentration to low concentration until evenly distributed.

Osmosis: movement of water as it diffuses from an area of high water concentration to low water concentration across a semi-permeable membrane.
(colander)

allows some things to get through, but not everything.



semi-permeable membrane
allows only some things through



Day 6

Eggs out of color solution and into water

Observations	Dragrams
Egg in colored liquid	
Egg by itself	
Liquid by itself	

New liquid → water

Hypothesis

Last day w/ our eggs RIP Day 7

Observations	Diagrams
Egg in water	
Egg by itself	
Liquid by itself	
Inside Egg	

Name: _____

Per: 1 Date: 11/21

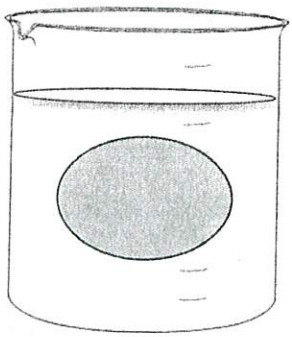
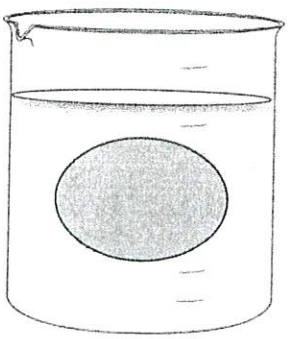
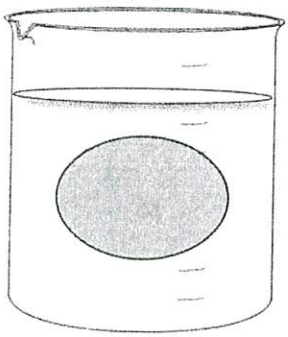
Activity 40: A Cell Model
Eggsperiment Analysis Outline

The egg is representing a cell and this lab was designed to model the functioning of the semipermeable membrane / cell membrane.

Describe briefly what happened after you put the egg into the following liquids.

Vinegar	Corn Syrup	Colored Liquid
Size:	Size:	Size:
Color:	Color:	Color:
Other observations:	Other observations:	Other observations:
What happened to liquid?	What happened to liquid?	What happened to liquid?

Label and draw, with arrows, the direction of movement of different things in and out of the egg after it had been in the liquids shown.

Vinegar	Corn Syrup	Colored Liquid
		

ACTIVITY 5| Antibiotics | Date 12/3 | Page 33

"The Full Course"

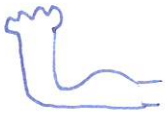
Warm up: Have you or anyone you know ever taken antibiotics? why?

I have never taken an antibiotic and...

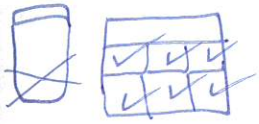
One time I took....

Vocabulary

Antibiotic: a medicine that kills bacteria
(against) (life/living)



Resistant: ability to withstand the effects



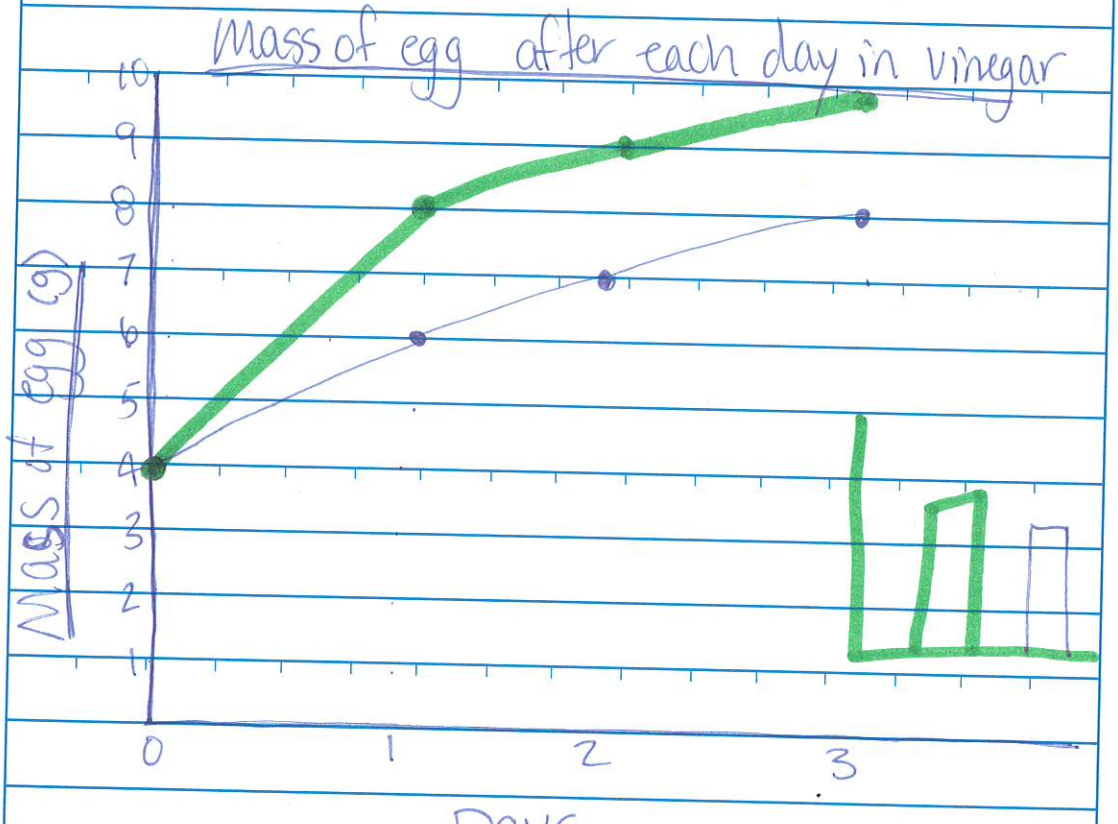
Full course: taking the total recommended amount.

(IQRA) Analysis Questions 1 & 2

Warm up:

What happened to your bacteria population during the game? Explain.

By the end of the game my bacteria...

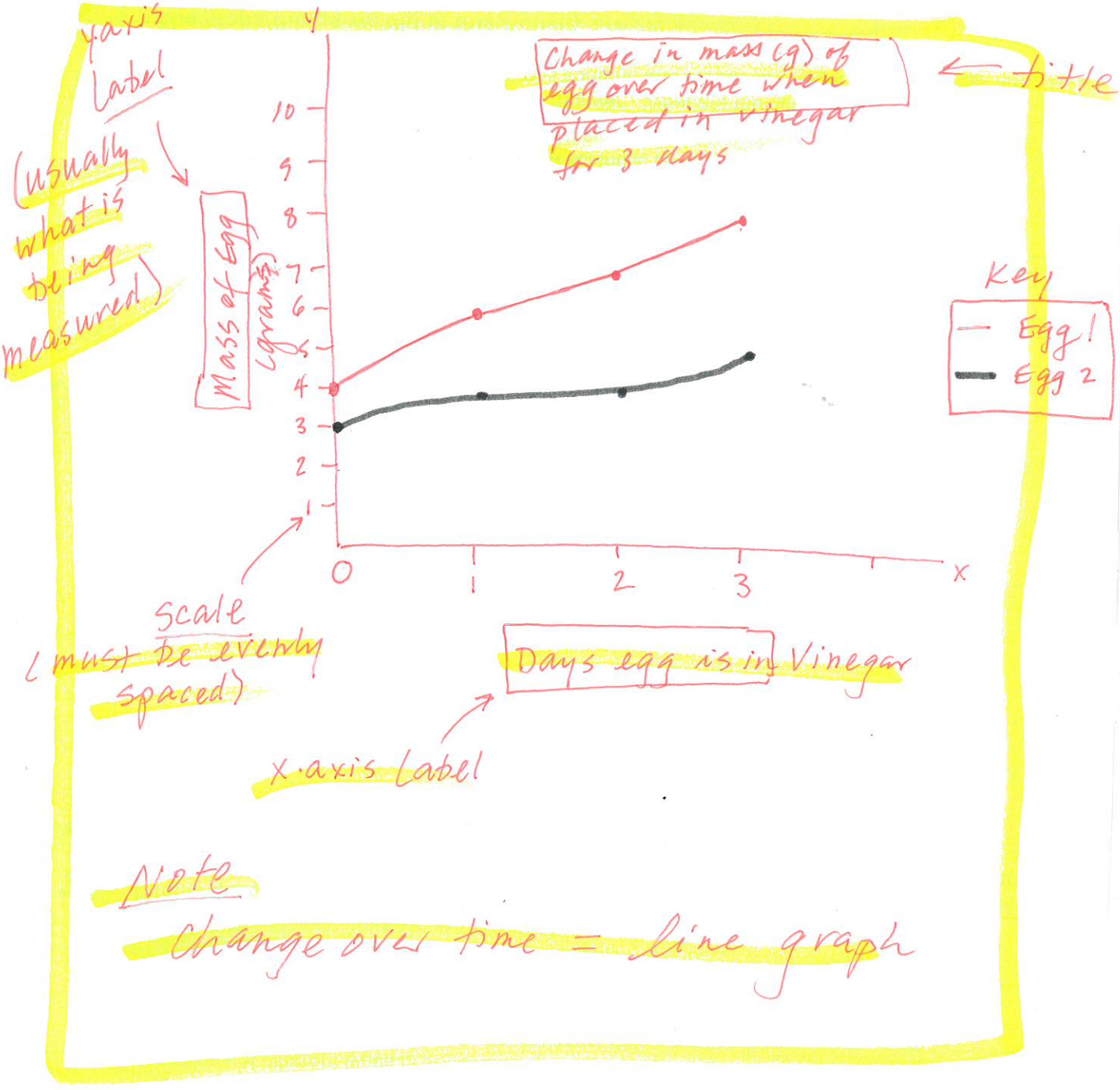


blue = blue egg

green = green egg

Warm up:

What happened to your bacteria



Note

change over time = line graph

Name _____ Date _____

Act 51 Population Data

Table 1: Number of Harmful Bacteria in Your Body

Toss Number	Least Resistant Bacteria (green)	Resistant Bacteria (blue)	Extremely Resistant Bacteria (orange)	Total
Initial	13	6	1	20
1				
2				
3				
4				
5				
6				
7				
8				

Step 1	Roll the number cube
Step 2	1,3,5,6—take an antibiotic, 2,4—don't take an antibiotic
Step 3	Bacteria reproduce (add 1 to each color that you have)
Step 4	Record the number of each type of bacteria

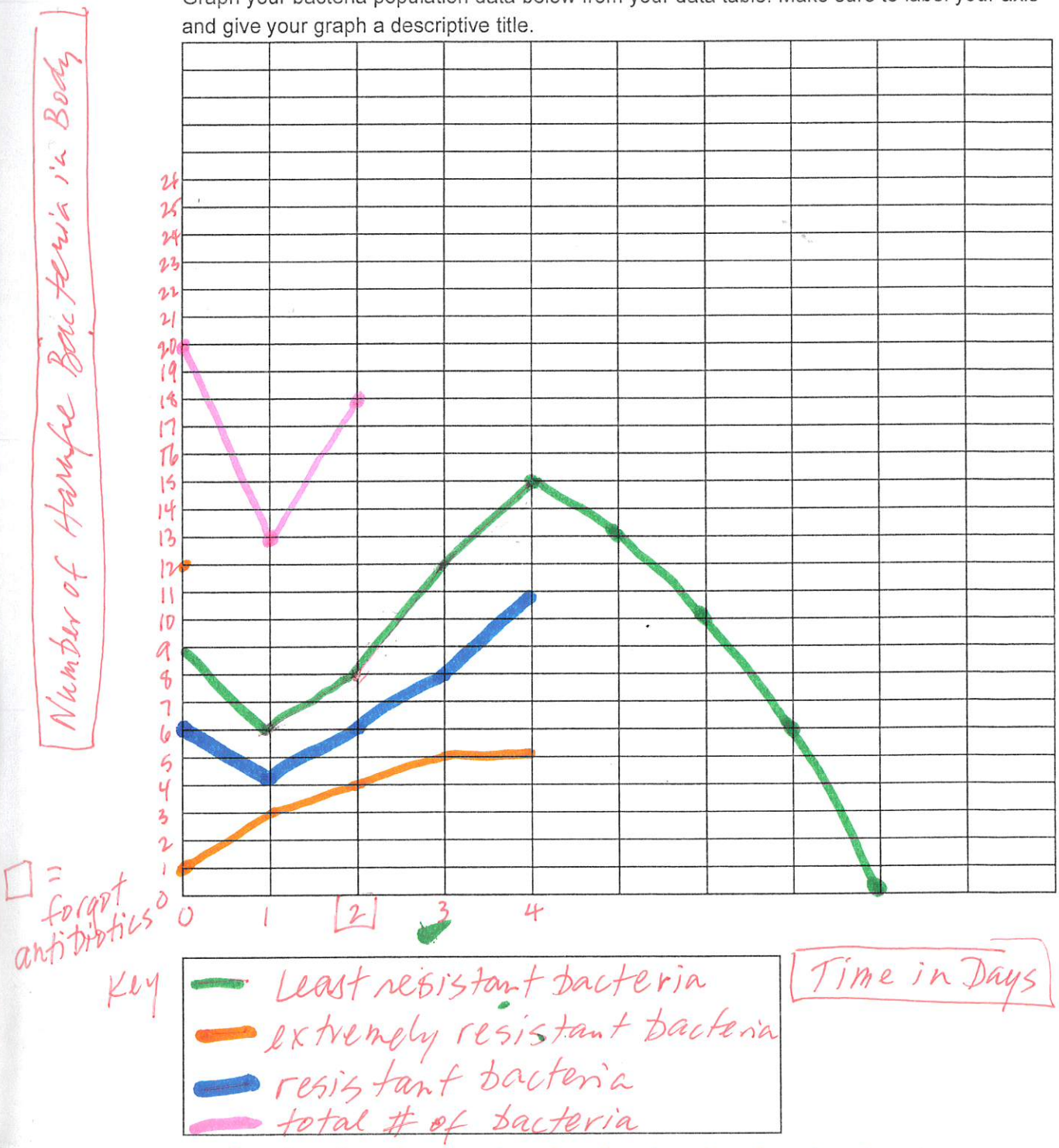
r axis

Days

Name _____ Date _____

Bacteria Graph

Graph your bacteria population data below from your data table. Make sure to label your axis and give your graph a descriptive title.



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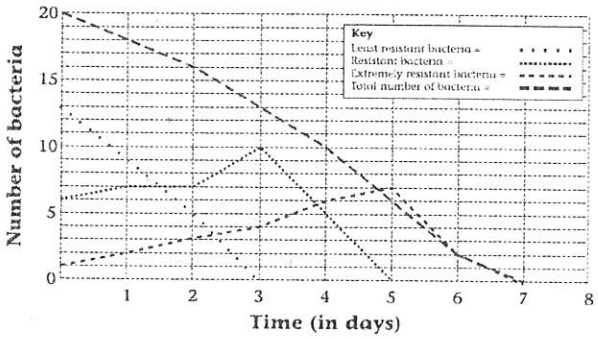
Exit ticket ACT S1

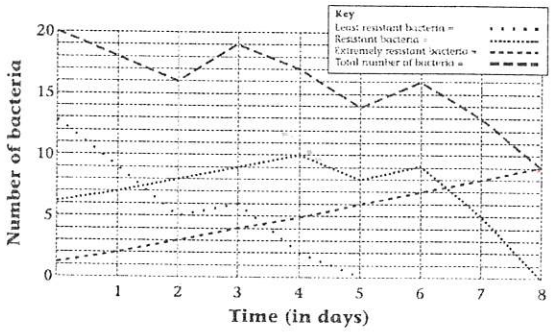
Name: _____

Below each graph, explain what happened to the bacteria population in the two different patients. Use numbers to explain and the words **bacteria, antibiotic,** and **full course.**

Bacteria Graph Sample 1



Bacteria Graph Sample 2



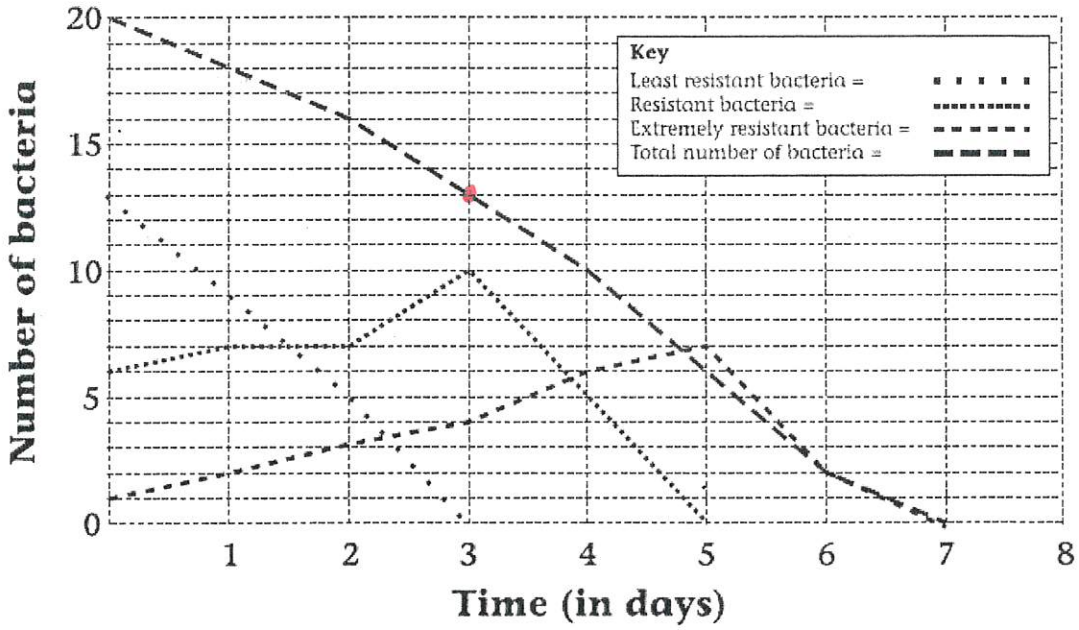
Antibiotics - ACT S1 **Name:**_____

Do antibiotics kill viral infections like the common cold? No

In the graph below, how many total bacteria exist on day 3? 13

On what day of taking the antibiotics, are all of the bacteria killed? 7

Bacteria Graph Sample 1



Creative Response

Choose between the two prompts to show what you have learned:

- Write an after visit summary for a patient with a bacterial infection who is prescribed antibiotics. As the doctor, you must justify your suggested treatment with evidence.

- Write a creative piece from the perspective of a resistant bacteria. Include why the bacteria does not want their human host to take a full course of antibiotics and justify their claim with evidence.

Waksman only

After Visit Summary

Name:_____

Patient:_____ Date Of Birth_____

Instructions from (your doctor name) _____, MD:

Justification for prescription instructions with evidence:

Name: _____ FRIDAY NOTEBOOK REVIEW # 3

Period: _____ Date: _____

Learning Summary of Last Week: Notebook Pages _____ to _____ (Activities _____ to _____)

Something that was interesting from this week, and **why** did you find it interesting:	Draw a diagram that will help you remember something from this week:

Question(s) that I have related to the topics learned: (you must come up with something!)

Name: _____ Unit C: Cell Biology and Disease

Per. _____ Date: _____ Unit Quiz #2 Study Guide

IMPORTANT NOTE: Review all the Learning Targets covered by this quiz in your Notebook! It's the green sheet of paper right after the Cell Biology Title Page.

Note that the activities are listed in order we did them in our Notebooks.

Activity (in NB order)	Topics/Concepts
37: The History of the Germ Theory of Disease	• Read over pages C-31-38 (in textbook) • Contributions of people to the development of the Germ Theory of Disease • Approximate timeframes of discoveries • Background Info about old ideas on infectious diseases and the Germ Theory • Cell Theory and who came up with it • **Handout**: Role Play Guide and Timeline • AQ #1 - 3
42: A Closer Look	• Read over pages C-56 – C60. (in textbook) • Parts of a cell (know difference between plants and animals) • Prokaryotes vs. eukaryotes • What organelles are, and their main functions • Organism – Organ System – Organ – Tissue – Cell – Organelles (see diagram on page C-59) • **Handouts**: Reading Outline, PPT Slides, Song Lyrics • AQ #1, 2, 4
39: Cells Alive! (Yeast Lab)	• Know differences between Manipulated, Responding, and Controlled Variables • Yeast Lab and yeast/balloon demonstration • Cellular respiration – what it is and why it's important, and the 'equation' • Use of controls and indicators in experiments • The 'equation' for photosynthesis • Where photosynthesis and respiration occur in plants • **Handout**: Background Information, Yeast Lab Write-up • AQs from yeast lab
40: A Cell Model (Eggsperiment)	• The function of the cell membrane • Diffusion vs. osmosis – Notes in NB! (*) • **Handout**: Eggsperiment Analysis Outline
51: Full Course	• Vocabulary about antibiotics and the importance of taking the full course • Graphing basics – how to label, title, and make a graph • **Handout:** Population Data, Bacteria Graph • AQ #1, 2, 4, 5
41: A Cell So Small	• Aerobic vs. anaerobic respiration • **Handout**: Back of handout from Act 39

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