Activity

Subject Area(s):	**Biology/Heredity/Cells**
Associated Unit:	*Cells and Heredity*
Associated Lesson:	*Human Genetics*
Activity Title:	<u>*Cells Alive and Growing!*</u>

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Grade Level:	(6-8)
Time Required:	**60-90 minutes**
Group Size:	**Classroom**
Summary:	*This activity was meant to be part of a cool way to show how math could be applied to subject matter 7th graders were learning in their cells and biology classes. They really enjoy watching the cell cams online and seeing all the bacteria cultivate.*

Engineering Connections: It is important that the students realize that rates of physical phenomena are extremely valuable tools in predicting outcomes of experiments. In this instance understanding the evolution of bacteria can aid experimental design of a biologist or chemist.

Keywords: **Cell Biology, Rates, Operations, Predictions**

Educational Standards: [PA] *2.1.8ADG, 2.2.8AB, 2.3.8B, 3.1.7A, 3.7.7CD*

Learning Objectives
Students use the excellent bio-cams from www.cellsalive.com to calculate how fast cells grow and predict the amounts of cells found after a given time.
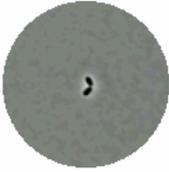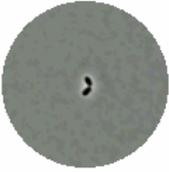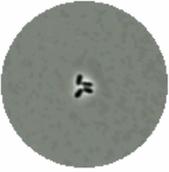

Materials List
- Internet Access (www.cellsalive.com), cells alive worksheet

Introduction/Motivation: *The attached worksheet is meant to pique their interest in cells and mathematical rates. Obviously these cells are growing at a nonlinear rate. Question number 2 actually addresses this briefly, and a good oral follow-up question would be to ask why the kids think the cells begin growing at a faster rate as time increases?*

Procedures:
1. Once online, go to www.cellsalive.com. You will see a toolbar on the left side of the page that states cell cams. Once on that link, go to "Bacteria Cell Cam". It should look something like this:

Local Time	Next Frame
12:33:10 P.M.	12:34:00 P.M.

First Frame	Intermediate Frame	Current Frame
12:00:00 P.M.	12:00:00 P.M.	12:33:00 P.M.
1	1	34

- 20	- 5	- 1		+ 1	+ 5	+ 20

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You see these buttons on the bottom here. They represent the amount of frames you may skip either forwards or backwards. The most important viewing area is in the middle, called "intermediate frame". This is where the kids will need to skip frames to the times asked on the worksheet. They are then asked to count the cells and perform the necessary math.

NOTE: As the times increase, the kids will have a harder time counting the amounts of cells. Chances are they will be off by 1 or 2, which is fine for this exercise.

Assessment: Within the attached cells alive worksheet there are 4 problems to evaluate the students' understanding of the concepts of rate and change.

Attachments: **Cells Alive Worksheet**

References: **www.cellsalive.com**

Redirect URL: **www.cellsalive.com**

Owner
Drexel University GK-12 Program

Contributors: **Stephen Nonnenmann**

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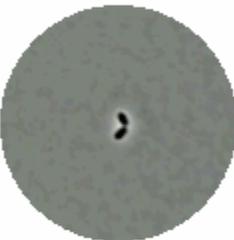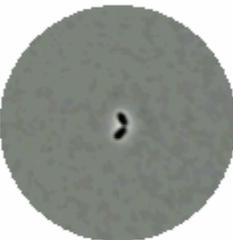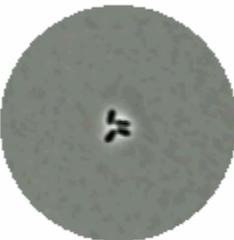
Version: Mar 2007

This exercise is meant to develop your ability to predict future events as a young scientist. Cells alive is a website dedicated to providing information about cell biology using many interactive tools such as cell cams, cell animations as well as videos.

To get acquainted with the website (www.cellsalive.com) first click on the link on the left side of the homepage called *Cell Cams*. If you select the "Bacteria Cell Cam", you should get to a page that looks like this:

Now count the number of bacteria cells for every 30 minutes on the timer, up until the current frame, then write it in your notebooks. Next we will work on predicting how fast the bacteria grow by comparing the number of cells over a given time. An example:

In the beginning, there are 2 cells. After 30 minutes there are 4 cells. We can then see that we grew by two cells in 30 minutes, or...

$$\frac{2cells}{30\min} = .0667 cell/\min$$

This is important information; it can help tell how many cells we will have in the future. Now it is your turn to determine what will happen to the cells in the future.

Problems

1. How many cells exist 30 minutes after the start? 1 hour after the start? 2 hours after the start? 3 hours after the start?

_____

_____

2. How many cells grow by the minute between the start and 30 min? How many cells grow between the start and 2 hours? Do cells grow faster after 30 min or 2 hours?

_____

_____

_____

3. Now that you know how fast cells grow, how many cells do you think would be in the dish after 16 hours?

_____

_____

4. How much time would it take for 1000 cells to be in the dish?

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