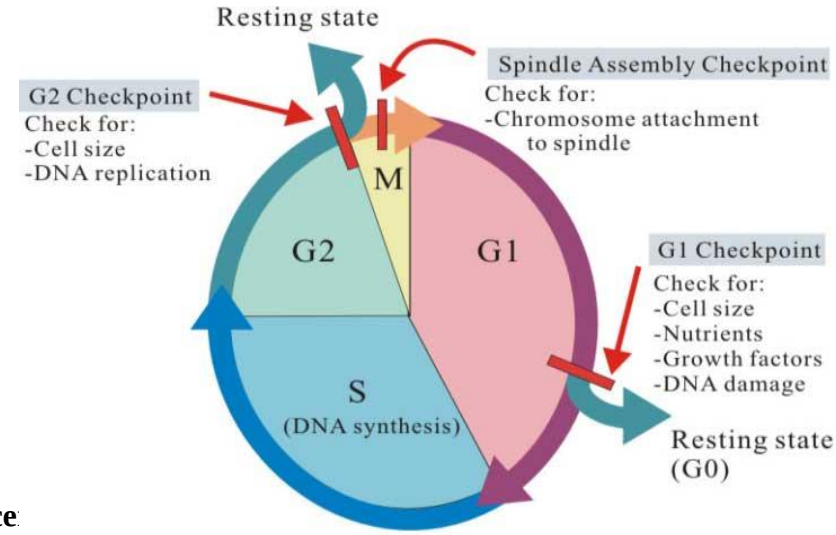
Name:_____ Date:_____Period:_____

Cancer Case Study

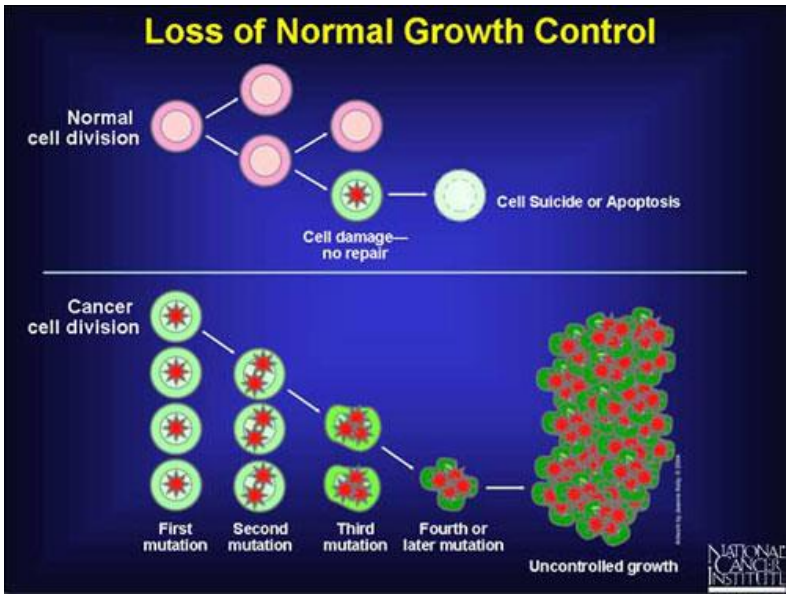
Phases of the Cell Cycle:

The cell cycle consists of several phases. In the first phase (G_1), the cell grows and becomes larger. When it has reached a certain size it enters the next phase (S), in which DNA synthesis takes place. The cell replicates its DNA, and a copy of each chromosome is formed. During the next phase (G_2), the cell checks that DNA replication is completed and prepares for cell division. In the following phase (mitosis), the cell divides into two daughter cells. Several checkpoints are positioned throughout the cell cycle to make sure that the cell is healthy and ready to proceed to the next phase. The phases must happen in the correct order, and one phase must be completed before the next phase can begin. A diagram of the phases of the cell cycle is pictured below.



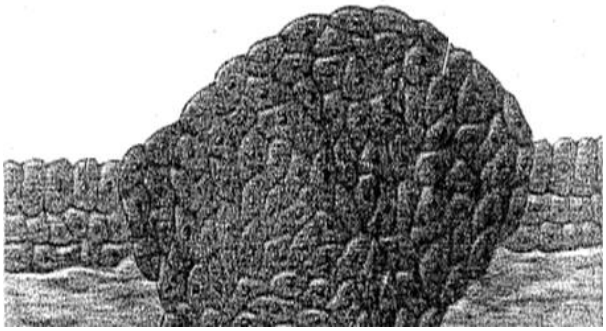
Cell Cycle Control & Cance

Cancers are diseases in which the cell cycle is not regulated properly**.** Usually when cells have abnormalities, they go through **apoptosis**. During apoptosis, defective cells do not continue through the cell cycle and are killed on purpose to keep them from dividing and forming new daughter cells. However when cancer occurs, cancer cells divide rapidly and are no longer are controlled by cell cycle checkpoints or apoptosis. Normal cells will form a one-cell thick layer on a surface and stop dividing once they are crowded. This is called density-dependent inhibition, which means cell division is inhibited (i.e. prevented) once the layer of cells is dense (i.e. crowded). Cancer cells continue dividing after forming a dense layer and will create more layers of cells to form a bump of cells called a tumor. Below is a picture comparing normal cell division and cancer cell division below.



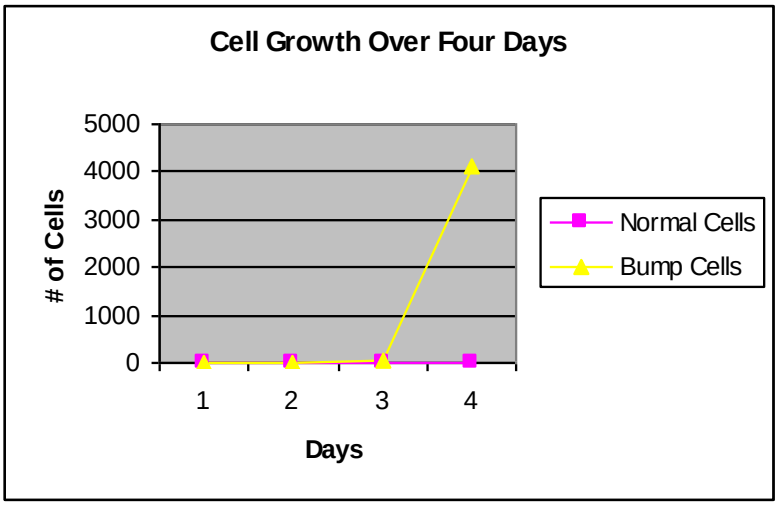
Name:_____ Date:_____Period:_____

Tina goes to the doctor because she is concerned about a bump that has recently formed on the skin on her nose. The doctor removes the bump and inspects it under a microscope. This is what he sees:



Upon removing the bump, the doctor takes cells from the bump AND normal cells from another area on Tina's nose and allows them to grow and divide in separate petri dishes for four days. Each day he counts the number of cells remaining in each dish. His data is shown in the table and graph below.

Day:	# of Normal Cells:	# of Bump Cells:
1	1	1
2	2	4
3	4	64
4	16	4,096



Using advanced microscope and computer technology, the doctor was able to take a video of Tina's normal skin cells and Tina's bump cells multiplying during the four day experiment. This video will be shown in class, but if you would like to view it at home, the link is below:

http://www.youtube.com/watch?v=IeUANxFVXKc'

****Note: The tests mentioned above are NOT how doctors typically make a diagnosis.*

Name:_____ Date:_____Period:_____

Essay Response

Directions: At the bottom of this page, write your OWN response to the following prompt:

1. Create a hypothesis about why Tina has developed a bump on her nose. Your hypothesis does not need to be in "If, then" format.

Describe specific pieces of evidence from the following sources that support your hypothesis. Directly explain how each piece of evidence supports your hypothesis.

2. Describe how the picture of Tina's "bump" supports your hypothesis.
3. Describe how the doctor's cell count of "normal cells" vs. "bump cells" supports your hypothesis.
4. Describe how the video of Tina's "bump cells" supports your hypothesis.

Your response will be graded using the following rubric:

#	**Grading Criteria**	**Points Possible**
1	Your hypothesis is clearly stated and accurate.	/1
2	You have provided specific data to support your hypothesis. You have directly explained why the data supports your hypothesis.	/2
3	You have provided specific data to support your hypothesis. You have directly explained why the data supports your hypothesis.	/2
4	You have provided specific data to support your hypothesis. You have directly explained why the data supports your hypothesis.	/2