Is it Safe to Eat?

Part I Directions: For each of the scenarios, using the information provided, complete the table and determine if the food is safe to eat.

Example: *Shigella* has a generation time of 40 minutes and an infectious dose of 10 cells. Mom's tuna salad was infected with 4 cells of *Shigella* and has been sitting on the dining room table for 2 hours. Is it safe to eat?

Important Information		Bacteria type:	Shigella
Total Time:	2 hours	Infectious dose:	10 cells
Generation Time:	40 minutes	# of cells at start:	4 cells

# of Times Cells Divide	Time Elapsed in Minutes	Number of Cells
0	0	4
1	40	8
2	80	16
3	120	32



No, the tuna salad is not safe to eat after 2 hours of sitting on the table.

1. *E. coli* O157:H7 has a generation time of 20 minutes and can make you sick with as few as 10 cells. Judy likes to eat her hamburgers medium rare. If her hamburger was contaminated with 2 *E. coli* O157:H7 cells that were not killed during cooking and she waited 20 minutes to eat the hamburger, is it safe to eat?

Important Information	Bacteria type:	
Total Time:	Infectious dose:	
Generation Time:	# of cells at start:	

# of Times Cells Divide	Time Elapsed in Minutes	Number of Cells

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2. Under ideal conditions, *Salmonella* has a generation time of 30 minutes and an infectious dose of 15-20 cells. Aunt Susie's homemade Ranch salad dressing has been sitting on the picnic table for 2.5 hours. If the dressing started out infected with 3 *Salmonella* cells, is it safe to eat now?

Important Information	Bacteria type:	
Total Time:	Infectious dose:	
Generation Time:	# of cells at start:	

# of Times Cells Divide	Time Elapsed in Minutes	Number of Cells

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3. Using the information provided, write your own food safety scenario. Then, complete the table and to

determine if the food is safe to eat.

Important Information		Bacteria type:	Campylobacter jejuni
Total Time:	3 hours	Infectious dose:	400-500 cells
Generation Time:	90 minutes	# of cells at start:	150 cells

Scenario:

Is it safe to eat?

Part II Directions: Now, rather than using a table, use the formula for exponential growth to determine if the food is safe to eat. Show your work. Then create a line graph for each scenario illustrating the exponential growth curve.

4. *E. coli* O157:H7 has a generation time of 20 minutes and can make you sick with as few as 10 cells. If Judy's hamburger was contaminated with 2 *E. coli* O157:H7 cells that were not killed during cooking, determine if it is safe to eat in each of the following situations.

Important Information		Formula:	<i>y</i> =	$y = a(1 + b)^x$	
Total Time:		# of cells at start	а		
Generation Time:		Growth Rate	b		
Infectious dose:		# of times cells divide	x		

- a. How many *E. coli* cells would be present (*y*) if she waited 40 minutes to eat the hamburger? Is it safe to eat?
- b. How many *E. coli* cells would be present (*y*) if she waited 1 hour to eat the hamburger? Is it safe to eat?
- c. Create a graph of the exponential growth curve where the number of times the cells divide is along the *x*-axis and the total number of bacterial cells is along the *y*-axis.

Challenge: How many *E. coli* cells would be presented (*y*) if she waited 3 hours to eat the hamburger?

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5. Under ideal conditions, *Salmonella* has a generation time of 30 minutes and an infectious dose of 15-20 cells. If the dressing started out infected with 3 *Salmonella* cells, determine if it is safe to eat in each of the following situations.

Important Information		Formula:	$y = a(l + b)^x$	
Total Time:		# of cells at start	а	
Generation Time:		Growth Rate	b	
Infectious dose:		# of times cells divide	x	

- a. How many *Salmonella* cells would be present (*y*) if the homemade salad dressing had been sitting on the picnic table for 1 hour? Is it safe to eat?
- b. How many *Salmonella* cells would be present (*y*) if the homemade salad dressing had been sitting on the picnic table for 3 hours? Is it safe to eat?
- c. Create a graph of the exponential growth curve where the number of times the cells divide is along the *x*-axis and the total number of bacterial cells is along the *y*-axis.

CHALLENGE: How many *Salmonella* cells would be present (*y*) if the homemade salad dressing had been sitting on the picnic table for 6.5 hours?