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:H7has 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:H7cells 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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|  |  |  |
| --- | --- | --- |
| **Important Information** | Bacteria type: |  |
| Total Time: |   | Infectious dose: |   |
| Generation Time: |   | # of cells at start: |   |

1. 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?

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

# Is it safe to eat?

1. 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.**

1. *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: | *y = a*(*1 +* b)*x* |
| Total Time: |   | # of cells at start | *a* |  |
| Generation Time: |  | Growth Rate | *b* |  |
| Infectious dose: |  | # of times cells divide | *x* |   |

1. How many *E. coli* cells would be present (*y*) if she waited 40 minutes to eat the hamburger? Is it safe to eat?
2. How many *E. coli* cells would be present (*y*) if she waited 1 hour to eat the hamburger? Is it safe to eat?
3. 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?

1. 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*(*1 +* b)*x* |
| Total Time: |   | # of cells at start | *a* |  |
| Generation Time: |  | Growth Rate | *b* |  |
| Infectious dose: |  | # of times cells divide | *x* |   |

1. 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?
2. 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?
3. 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?