Name: _____ Date: _____

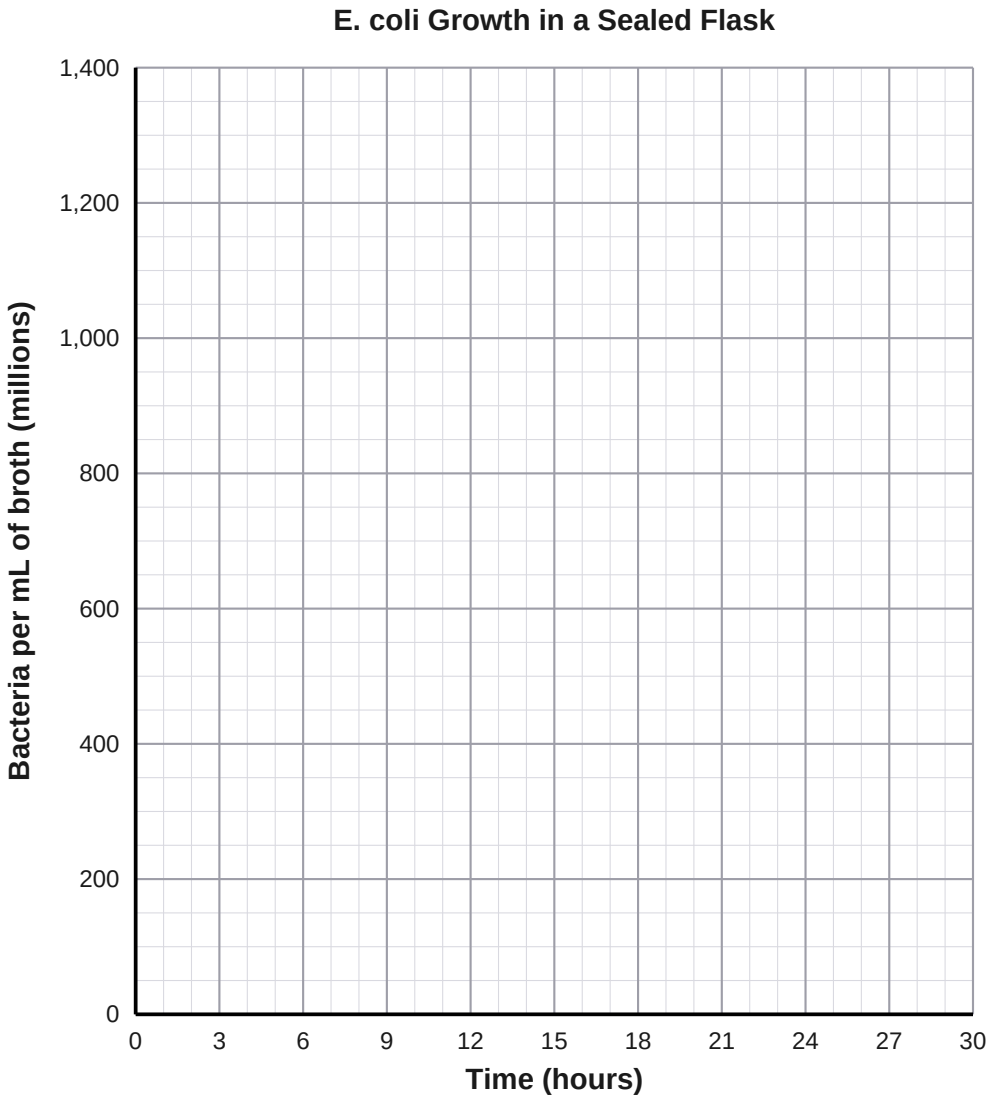
# Plotting a Bacterial Growth Curve

E. coli growing in a closed flask of nutrient broth at 37°C, observed for 30 hours

A small group of E. coli bacteria was placed in a sealed flask of nutrient broth and kept at 37°C. Scientists counted the bacteria in the broth every 3 hours for 30 hours. The data is in the table on the left. Your job is to plot the data on the graph and then label the four phases of growth.

## Step 1: Plot the data, then connect the points with a smooth line.

| Time (hours) | Bacteria per mL of broth (millions) (rounded to nearest 25) |
|---|---|
| 0 | 25 |
| 3 | 75 |
| 6 | 175 |
| 9 | 525 |
| 12 | 1,025 |
| 15 | 1,200 |
| 18 | 1,125 |
| 21 | 925 |
| 24 | 675 |
| 27 | 475 |
| 30 | 325 |



## Step 2: Label the four phases of bacterial growth on your graph.

Bacterial growth happens in four phases. Use the descriptions below to find each phase on your graph. Then write the phase name above that section of your line.

**Lag phase:** The bacteria are getting used to their new home. They are not dividing yet. Look for the section of your line that is FLAT and LOW.

**Log phase:** Conditions are perfect, so the bacteria divide quickly (about every 30 minutes). Look for the section of your line that is RISING STEEPLY.

**Stationary phase:** Food is running low and waste is building up. New bacteria are produced about as fast as old ones die. Look for the section of your line that is FLAT and HIGH.

**Death phase:** The bacteria run out of food and are poisoned by their own waste. More die than are born. Look for the section of your line that is GOING DOWN.

## Step 3: Reflection questions

1. About how many bacteria per mL are in the flask at the highest point on your graph? About what time (in hours) does this happen?

2. Look at the steepest part of your line. About how many bacteria appear in just 3 hours during this part? Why do you think the bacteria can grow so fast here?

3. The line goes DOWN at the end of the graph. What does this tell you is happening to the bacteria? Use the background information about the closed flask in your answer.

4. Imagine the scientists kept adding fresh broth and removing waste throughout the experiment. How would the shape of your graph change? Explain your thinking.