

## Comparing Growth Rates in Bacteria Cultures

In an experiment, bacteria were placed in a hostile environment and a bacterial count was made every hour. The results are given in the following table.

Time Interval ( $t$ hours)	1	2	3	4	5	6
Bacterial Count ( $c$ ) for Culture A	560	320	180	100	60	30

In a second experiment conducted simultaneously, more of the same bacteria were placed in an environment that encouraged their growth. A bacterial count was made every hour. The results are given in the table below.

Time Interval ( $t$ hours)	1	2	3	4	5	6
Bacterial Count ( $c$ ) for Culture B	42	68	110	156	212	380

- ?** When did the cultures have the same bacterial count, and at what rate was the population of each culture changing at this time?
- Graph the data for experiment 1.
  - Determine the equation that best models the data. Explain the process you used to determine the equation.
  - Graph the data for experiment 2.
  - Determine the equation that best models these data.
  - Use your models to estimate the bacterial count in both cultures after 10 h.
  - Determine the average rate of change in population for each culture over the first 4 h.
  - When will the cultures have the same bacterial count? Justify your answer in two ways.
  - Estimate the rate at which populations of both cultures are changing when their bacterial counts are the same.

### Task Checklist

- ✓ Did you draw well-labelled graphs, including some values?
- ✓ Did you explain the process that you used to obtain an equation that best models the data?
- ✓ Did you justify your answer for part G in two different ways?
- ✓ Did you calculate the appropriate rate of change for part H?