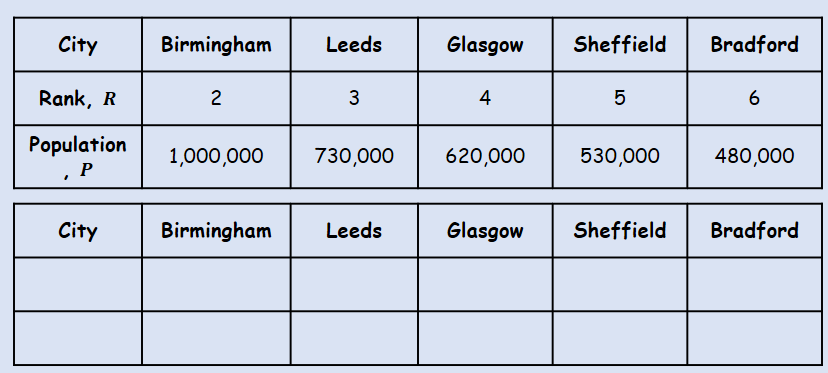
**14H Exponentials in Data**

1. The data shows the rank (by size) and population of some UK cities.

The relationship between and can be modelled by the formula:

Where and are constants.

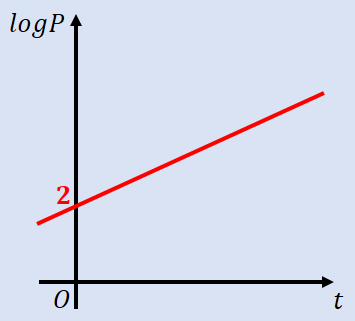
1. Draw a table giving values of and to 2 decimal places



1. Plot a graph of against using the values from your table, and draw a line of best fit
2. Use your graph to estimate the values of and to two significant figures
3. The graph shown represents the growth of a population of bacteria, over a period of hours. The graph has a gradient of 0.6 and meets the vertical axis at (0,2) as shown.

A scientist suggests that this growth can be modelled by the equation , where a and b are constants to be found.

1. Write down an equation for the line



1. Using your answer to part a or otherwise, find the values of and , giving them to 3sf where necessary
2. Interpret the meaning of the constant in this model