**Task: Examining the Change in World Population (in millions) Over Time**

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| **Expectation** | **R-** | **R+** | **1** | **2** | **3** | **4** |
| demonstrate an understanding of average and instantaneous rate of change, and determine, numerically and graphically, and interpret the average rate of change of a function over a given interval and the instantaneous rate of change of a function at a given point; |  |  |  |  |  |  |
| **Communication** |  |  |  |  |  |  |

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| --- | --- |
| Year | Population (in millions) |
| 10000 BC | 1 |
| 8000 BC | 5 |
| 6500 BC | 5 |
| 5000 BC | 5 |
| 4000 BC | 7 |
| 3000 BC | 14 |
| 2000 BC | 27 |
| 1000 BC | 50 |
| 500 BC | 100 |
| 400 BC | 162 |
| 200 BC | 150 |
| 1 AD | 170 |
| 200 AD | 190 |
| 400 AD | 190 |
| 500 AD | 190 |
| 600 AD | 200 |
| 700 AD | 207 |
| 800 AD | 220 |
| 900 AD | 226 |
| 1000 AD | 254 |
| 1100 AD | 301 |
| 1200 AD | 360 |
| 1250 AD | 400 |
| 1300 AD | 360 |
| 1340 AD | 443 |
| 1400 AD | 350 |
| 1500 AD | 425 |
| 1600 AD | 545 |
| 1650 AD | 470 |
| 1700 AD | 600 |
| 1750 AD | 629 |
| 1800 AD | 813 |
| 1850 AD | 1,128 |
| 1900 AD | 1,550 |
| 1910 AD | 1,750 |
| 1920 AD | 1,860 |
| 1930 AD | 2,070 |
| 1940 AD | 2,300 |
| 1950 AD | 2,558 |

1. Enter the data into a spreadsheet (Excel/Open Office).

2. Create a scatterplot comparing years and world population.

3. Describe in words what is happening to the growth rate of population over time.

4. Calculate the average rate of change between 10 000BC and 8000BC.

5. Calculate the average rate of change between 1930AD and 1950AD.

6. Compare your answers to #4 and #5. What do these answers tell you about how the world’s population is changing at these points in history?

7. Calculate the average rate of change between 1940AD and 1950AD. How does it compare to your answer in #5. Explain why there might be a difference between the two.

8. Predict what the instantaneous rate of change would be in 2000AD if the trend continued.

9. Pick your favourite point in world history between 10 000 BC and 1950AD. Explain what was happening at that point in history and calculate the instantaneous rate of change in population at that point.

10. Pick one country in the world. Find a table for its population over time. Make a scatterplot for this country and compare the population growth rate of this country with that of the entire world.