**Year 12 Biology**

**Modelling Disease Outbreak**

**Part B: Validation Test**

1. Represent your data in the form of a graph/s. (8 marks)

Depending on the investigation planned students may produce two graphs or four graphs to represent the data.

* Title relating dependent and independent variables (2)
* Axes labels and units (2)
* Points plotted correctly with straight lines(1)
* Key for sets of data plotted on the same graph (1)

1. In the instructions for this investigation you were asked to plan for reliability. In what way was your data made reliable? (1 mark)

Repetitions of 5 or more

1. Write a conclusion for each of your hypotheses. (2 marks)

Valid conclusion for each hypothesis (1)

1. Explain the scientific basis for each of your conclusions. (2 marks)

Accurate explanation such as

* Death rate decreased with increased vaccination rate
* because less people were able to become infected and thus pass on the disease.

1. Which factor (variable) had a greater effect on the severity of the diseases? Explain why you think this occurred. (2 marks)

Description of differences in factors which cause change in dependant variable such as

* Increased mixing has a greater effect than density
* as it speeds up the rate at which the disease is passed on.

1. For one of the factors you investigated, make a recommendation to the city council to help them reduce the spread of this disease in future. Provide evidence from your investigation. (2 marks)

Valid recommendation relating to the independent variable such as:

* The council should encourage people to stay at home when an outbreak occurs
* as this prevents mixing.

1. Describe any differences in the results of the simulation between the two diseases. Explain why these differences might have occurred. (2 marks)

Explanation of differences such as:

* Increasing transmission rate had a greater effect with red death than influenza
* as the sick days were longer.

1. Describe **two** benefits of using modelling to predict the outcome of epidemics. (4 marks)

* Characteristics of a disease are well known therefore these can be pre-set depending upon a scenario to predict the outcome of a disease
* Don’t need to use real data so preventing deaths occurring
* Allows epidemiologists to put control measures in place such as vaccination programs

1. Describe **two** limitations of using computer simulation models in this way. (4 marks)

* Cannot set population size
* Doesn’t account for susceptibility of particular age groups/sections of society
* Environmental factors such as humidity, temperature (climate not adequate)
* Only 3 settings for high, medium, low mixing
* Doesn’t account for natural immunity of the population at the onset of the outbreak.
* Doesn’t account for natural immunity of the population at the onset of the outbreak.
* Doesn’t account for the pathogen evolving
* Doesn’t account for different vectors