Q1] The steps are as follows:

- Review the regulatory guidance.
- Define the scope of the model, for example which factors need to be modelled stochastically.
- Plan the development of the model, including how the model will be tested and validated.
- Consider alternative forms of model, and decide and document the chosen approach. Where appropriate, this may involve discussion with experts on the underlying stochastic processes.
- Decide on the software to be used for the model.
- Write the computer programs.
- Test the sensitivity of the model to small changes in parameters.
- Calculate the capital requirement.
- Communicate findings to management. Document.
- Validate data.
- Review parameters that have greatest effect on outputs.
- Present range of capital requirements for differing parameter input.

Q2] Factors which could cause this probability to be inaccurate:

•Model development requires a considerable investment of time, and expertise.
•To study the outputs for any given set of inputs, several independent runs of the model are needed. If this is not done, the model could be inaccurate.
•It is important to check the validity of the model's assumptions, the computer code, the reasonableness of results and the way in which results can be interpreted in plain language by the target audience. If this isn't done, model's probability could be inaccurate.
•Models rely heavily on the data input. If the data quality is poor or lacks credibility, then the output from the model is likely to be flawed and thus inaccurate.

Q3]
1.Develop a well-defined set of objectives that need to be met by the modelling process, i.e. state the point of the exercise. In this case we should think about what aspects of mortality are to be analyzed, e g. average mortality rates, split of males/females, trends in mortality over the last 50 years.

2.Plan the modelling process and how the model will be validated.

3.Collect and analyze the necessary data for the model. In this case we would need the numbers of deaths over the last 50 years and any available census data. Problems may arise as some of the data may be missing or inaccurate, and recording practices may have changed over the last 50 years.

4.Define the parameters for the model and consider appropriate parameter values.

5.Define the model firstly by capturing the essence of the real-world system. Refining the level of detail in the model can come at a later stage. For this model, this means we should identify the main features of mortality.

6.Involve people with expert knowledge of the real-world system you are trying to imitate so as to get feedback on the validity of the conceptual model. For example,
there may be a national census office or government department that can help.

7.Decide on whether a simulation package or a general-purpose language is appropriate for the implementation of the model.

8.Write the computer program for the model.

9.Debug the program to make sure it performs the intended operations defined in the initial modelling process.

10.Test the reasonableness of the output from the model. For example, we could check that it is a good fit to the actual mortality experience of the island over subsets of the last 50 years.

11.Review and carefully consider the appropriateness of the model in the light of small changes in input parameters.

12. Analyze the output from the model.

13. Ensure that any relevant professional guidance has been complied with. This may include standards on data, modelling and reporting.

14. Document the results of the model and communicate these to the government.

Q4]The key items to include in the documentation on the model are as follows:

1. Tests performed to validate the output of the model.
2. Definition of input data.
3. Any limitations of the model identified (e g. potential unreliability).
4. Basis on which the form of the model chosen (e g. deterministic or stochastic)
5. References to any research papers or discussions with appropriate experts.
6. Summary of model results.
7. Name and professional qualification.
8. Purpose or objectives of the model.
9. Assumptions underlying the model.
10. How the model might be adapted or extended.

Q5] Advantages :

- The model is simple to understand and to communicate.
- The model takes account of one major source of variation in consumption rates, specifically age.
- The model is easy and cheap to implement.
- The past data on consumption rates by age are likely to be fairly accurate.
- The model can be adapted easily to different projected populations OR takes into account future changes in the population.

Disadvantages :

- Past trends in consumption by age may not be a good guide to future trends.
- Extrapolation of past age-specific consumption rates may be complex or difficult and can be done in different ways.
- Consumption of chocolate may be affected by the state of the economy, e.g. whether there is a recession.
- Factors other than age may be important in determining consumption, e.g. expenditure on advertising.
- Consumption may be sensitive to pricing, which may change in the future.
- A rapid increase in consumption rates is unlikely to be sustained for a long period as there is likely to be an upper limit to the amount of Scrummy Bars a person can eat.
- The projections of the future population by age may not be accurate, as they depend on future fertility, mortality and migration rates.
- The proposed strategy does not include any testing of the sensitivity of total demand to changes in the projected population, or variations in future consumption trends from that used in the model.
- Unforeseen events such as competitors launching new products, or the nation becoming increasingly health-aware, may affect future consumption.
- The consumption of Scrummy Bars may vary with cohort rather than age, and the model does not capture cohort effects.

Q6] One or both of the runs (the original or the new) may have been incorrect as, for example, the second trainee may not have been fully aware of the set-up (for example he or she may not have followed the procedure correctly, or may have used different assumptions)

The difference between the two runs may not have only been the parameter change, for example the two runs may have used different random seeds, or the second run may have had fewer simulations. The expectation that the model was not sensitive to this parameter could have been incorrect.

Q8) Factors the company should take into consideration when developing the model is:

1.The nature of the existing sickness data the company possesses. The model can only be as complex as the data will allow it to be.

2.Whether the company has made any previous attempts to model sickness rates among its employees, and how successful they were.

3.The complexity of the model – e.g., whether it should be stochastic or deterministic. More complex models will be costlier to prepare and run, but eventually there may be diminishing returns to additional complexity.

4.General trends in sickness at the national level may need to be built in.

5.The definition of sickness and level of benefits payable under the scheme.

6.Does the company plan to change the characteristics of the employees? For example, does it plan to recruit more mature persons?

7.The ease of communication of the model.

8.The budget and resources available for the construction of the model.

9.Capability of staff. Will outside consultants be required?

10.By whom will the model be used? Will they be capable of understanding and using it?

Q7] 1. The model should be simple to apply. The data specified are likely to be available from reliable sources.

2.The model is relatively straightforward to explain to the planners/developers. It should consider whether there are trends in fertility rates, rather than simply using current rates.

3.Mortality rates are unlikely to be significant relative to the uncertainty in the projection, because rates at ages with non-zero fertility rates should be small and child mortality rates should be low.

4.Current age distribution for the area may not be representative of that for the new town as, for example, rural areas may have different distributions to urban areas.

5.If the rural area is in a developed country, mortality will probably have little effect (since the mortality of children and those of child-bearing age will be relatively low) and so the model could be simplified by ignoring this factor.

6.The results will probably be accurate over the short term, but may become less reliable if applied over longer periods.

7.The model makes no allowance for migration, ie people moving in or out of the town. This could be an important factor that could increase or reduce the size of the population.

8.It should be possible to obtain sufficiently accurate data about the current age distribution.

9.However, the model assumes that the initial population profile of the town will be the same as for the rural area in which it is located, which may not be true for a new town.

10.It should be possible to obtain reliable estimates for fertility rates and mortality rates, but these may change in the future, eg people may have fewer children during an economic recession. Also the fertility rates may be different in different areas, so that the national rates would not be appropriate.

11.There could be changes to government education policy that would affect the number of school places required. For example, the ages when school attendance is compulsory could be changed or new types of school could be introduced (e g. boarding schools, where children are schooled outside the area).

Q8] Some of the factors that the company should take into consideration when developing the model are as follows:

1.The age group of employees falling sick.
2.The location of residence.
3.The duration of sickness.
4.The morbidity rates.
5.The past few years data associated with such pay scheme.
6.Reason for sickness.
7.The compensation paid under the scheme as well as the inflows into the scheme.
8.The frequency of paying employees from the scheme.