Hello, I'm Trang Pham. Welcome back to the last set of series of videos helping you develop a modelling or problem-solving task for Unit 4. Please note that one of the Unit 4 tasks is to be related to the Mechanics, or Probability and Statistics area of study. The task I'm about to present involves Probability and Statistics.

The PowerPoint has a copyright with VCAA and it cannot be reproduced unless a permission has been granted from the authority. This PowerPoint and the accompanying set of videos will outline the process for developing a modelling for problem-solving task, and also illustrate how I have developed a modelling or a problem-solving task. This video also includes information on the purpose, nature, and structure of the task and indicates how related assessment schemes can be devised.

The purpose of the modelling or problem-solving task is for students to develop or explore a model or a particular scenario, or solve a problem, or set of related problems in some depths that involve the Probability and Statistics area of study in real life contexts. For example, these situations or scenarios could involve: clinical trials to determine whether some new treatment, drug, or procedure might improve outcomes in patients. Advertising expenditure to determine whether some new advertising campaign or marketing technique leads to increase in sales.

Mathematical modelling is a process of using mathematical structures and techniques to represent and describe the real world in a simple and concise way. It also allows us to investigate particular features and characteristics, and to make predictions related to what we have already looked at.

A good framework for modelling and problem-solving is from the International Mathematical Modelling Challenge, and its link is as shown on the PowerPoint. We start the task where we describe the real-world problem. Identify and understand the practical aspects of the situation. We specify, formulate, and solve the maths. Then we interpret, evaluate the model and finally report the solution.

This is a simple scheme for the modelling or problem-solving process. The idea is we start on the top left. We look at either the real world or a theoretical context. We develop a mathematical model, or formulate the problem. We apply the model using problem-solving strategies and techniques. We interpret the results obtained. Then, we look at it and refine the model, and perhaps repeat the process again. Just a reminder that this particular modelling or problem-solving task required by VCAA is to be one of two to three to be one of two to three hours duration over a continuous period of one week.

A structure of the modelling or problem-solving task is that we introduce the context for the situation. We then further develop the model with a generalisation using parameters. We increase the complexity by considering variations or special cases. We use a model for analysis or problem-solving strategies for finding the solutions. Subsequently, we evaluate the model with discussion of limitations. Finally, we refine the problem-solving approach with interpretations for the solutions.

There are four aspects that I followed to develop this modelling or problem-solving task. The first aspect is choosing the context where mathematicians will often look at a situation or a scenario and say, "That's a very interesting context. I wonder what mathematics process is involved here." The next aspect is identifying the questions of interest. We can't identify every question of interest that we think of, as the task is only two to three hours. It is not necessary to cover every single dot point listed in the study design. However, it would be wise for us to focus on a particular context, which can be explored in some depth. This can be done by relating the questions of interest and relevant concepts to skills and processes that the students have learnt. Subsequently, the students can then use whatever depth of skills that required of them. Or similarly, one that they come up with by themselves to be applied in the task.Next, we devise an assessment scheme.

In this set of videos, a three-part real-life sample task has been developed. Now, I will share with you how the context was chosen and what has inspired me to write up these tasks. I was tossing up between Mechanics and Probability and Statistics area of study. In my opinion, both areas are quite interesting to investigate. In the end, I opted for the Probability and Statistics area of study. Statistics is all about data, but then just looking at the data alone is not that interesting. If we are able to interpret the data, then it becomes more interesting. Many companies are now looking for professionals who can sift the goldmine data and help them drive swift business decisions more efficiently.

Using Hypothesis Testing, we try to interpret or draw conclusions on the population using sample data. Hypothesis testing is one of the most important processes for measuring the validity, the reliability of outcomes in any systematic investigation. So I have decided to label my task title Hypothesis Testing And here's a brief introduction to the hypothesis testing. Let's just read thought it.

This modelling or problem-solving task considers a range of problems related to application of the central limit theorem and hypothesis testing. The central limit theorem gives the remarkable result, regardless of the shape of the regional population distribution, and provided that the sample size is large enough, that the sampling distribution of the mean approaches a normal distribution. Hypothesis testing in statistics is a way of testing the results of observation or experiment to see whether claims are reasonable or not.

I think it would be a good idea to get the students to understand the purpose of the hypothesis testing and provide them with some examples of hypothesis testing in real-life contexts before the SAC. For example, we can get students to discuss how the hypothesis tests are often used in biology. The biologists want to determine whether some new treatment, fertiliser, pesticide, chemical, et cetera, causes increased growth, stamina, immunity, et cetera in plants, or animals. This will ultimately help the students to have a good understanding of how mathematicians bring maths in real-life scenarios in order to solve a problem.

So that's the end of video one. In video two, I shall discuss how I have developed Part 1 of the modelling and problem-solving task.

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