

Year 13 Statistics Professional Development for Teachers: A Road Tour

Road Tour Programme

Plenary

Changing Needs in a Changing World

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There is a rapidly increasing awareness throughout society of the so-called “data deluge”: the explosion in quantities of data being collected, the explosion of settings in which it is being collected, and expansions in the conceptions and scope of what constitutes data. This is accompanied by advances in ways of understanding data, particularly via computer-based visualisation. Foundations are being laid in the statistics strand of the New Zealand curriculum for living in this new world. This involves moving on from some of the traditional ways of “doing statistics” that we have become comfortable with and changing emphasis from the details of how we “do statistics” to focussing on underlying fundamental ways of reasoning and thinking. In this talk we will address these issues with a particular emphasis on statistical inference at Year 13.

Workshops offered:

AS 3.8

A new look at Time Series analysis using iNZight

This workshop compares the changes between AS 3.1 and AS 3.8 at Achieved/Merit and Excellence levels. Details on how to use the time series module of iNZight, including necessary data protocols, and an example of a typical time series analysis using the Polar Ice data set (currently available on NZQA website) will be covered. A brief explanation of the Seasonal Lowess Model and the Holt-Winters Model, both of which are used by iNZight, will be given. There will also be a discussion of why these models are an improvement over past techniques used. Details of resources that have been developed for time series analysis using iNZight will also be available.

Presenters: Rachel Passmore, Saint Kentigern College (NZ Royal Society Endeavour Teacher Fellow) and Ruth Kaniuk, Lynfield College

AS 3.9

Investigating bivariate measurement data using iNZight

This workshop will focus on key issues when teaching bivariate data and will address some possible misconceptions. Teaching points will be related to AS 3.9, especially to differences between AS 3.9 and the previous standard. Regression analysis will be conducted using iNZight.

Presenters: Ruth Kaniuk, Lynfield College and Maxine Pfannkuch, Auckland University

AS 3.10A

Sample-to-Population Inference: The Path to 3.10

This workshop will focus on the expectations and requirements of AS 3.10 “Use Statistical Methods to Make a Formal Inference”. We will look at the progressions of key ideas from AS 1.10 to AS 2.9 and AS 3.10 and discuss what good teaching and assessment may mean in this standard.

Note: The technical aspects of how to construct bootstrap confidence intervals for a population parameter will not be covered.

Presenter: Michelle Dalrymple, Cashmere High School

AS 3.10B

A guide to bootstrapping

This workshop introduces the bootstrapping process as a method for constructing a confidence interval for the population median. A hands-on activity and an introduction to using iNZight to construct bootstrap confidence intervals are included. We will also look at the success rate of bootstrap confidence intervals containing the population parameter and construction of bootstrap confidence intervals for a mean and a difference between means/medians.

Presenter: Joss Cumming, Auckland University

AS 3.11A

Conducting and assessing experiments for 3.11

This workshop will provide guidance for conducting and assessing experiments for the new standard AS 3.11. In particular, the use of experimental design principles, informed contextual knowledge and the practical aspects of co-ordinating student-designed experiments will be covered. Ideas for investigations involving experiments will be shared and advice for incorporating this standard into a Year 13 teaching and learning programme will be shared.

Note: *It would be helpful for teachers to bring a web-connected device such as an Android or Apple smartphone or tablet, or a laptop.*

Presenter: Anna Martin, Avondale College

AS 3.11B

A guide to the randomisation test

This workshop introduces the randomisation test as a tool for making conclusions from experiments. A hands-on activity and an introduction to using iNZight to perform a randomisation test are included. We will also consider both large and small tail proportions and how the design of a study determines what types of inferences we can make. Randomisation tests will be conducted using iNZight

Presenter: Marie Fitch, Auckland University

AS 3.12A

Non-Sampling Errors as they Apply to Polls and Surveys and Observational Studies

This workshop will outline a possible teaching unit for standard AS 3.12. The content will include strategies for developing students' statistical literacy skills, ideas for sourcing media articles, non-sampling errors and potential biases with examples from the media, the methodologies used by polling companies, and a comparison of observational and experimental studies. The accompanying resource pack will include articles, templates, worry questions and PowerPoints.

Presenter: Dru Rose, Westlake Girls High School

AS 3.12B

Margin of Error and testing claims in the media

This workshop will use iNZight visualisation tools and other simulation activities to build a conceptual understanding of margin of error, and the "rules of thumb" for testing claims in statistically-based reports. The accompanying resource pack will include a teaching outline, the activities, media reports, and worksheets.

Presenter: Dru Rose, Westlake Girls High School

AS 3.13

Apply probability concepts in solving problems

This workshop will use hands-on learning experiences to explore some of the new concepts in probability at level 8 NZC. We will investigate randomness, true probability vs model estimates vs experimental estimates, and probability distribution tables and graphs.

Presenter: Marion Steel, Team Solutions (Epsom Girls Grammar School)

AS 3.14

Apply probability distributions in solving problems

This workshop will use hands-on learning experiences to explore probability distributions. We will trial some activities investigating: discrete and continuous probability distributions; mean and standard deviation of random variables; distribution of true probabilities versus distribution of model estimates of probabilities versus distribution of experimental estimates of probabilities.

Presenter: Marion Steel, Team Solutions (Epsom Girls Grammar School)

AS 2.12

Risk in context – resources useful for teaching content related to AS 2.12

Statistical information is prolific in today's media, yet many of us are easily misled or have difficulty in interpreting and challenging statements that are made. What does "Eating bacon increases your chances of bowel cancer by 20%" really mean? To be informed citizens, it is important that we are able to understand statements that are made about risk so that we can make informed decisions about our lifestyles. This workshop will illustrate how to calculate a variety of statistics relating to risk, and explore their interpretations within given contexts. It will also give teachers some background knowledge for teaching risk in Year 12.

Presenter: Stephanie Budgett, Auckland University