Achievement Standard

Subject Reference   Mathematics 2.6

Title   Simulate probability situations, and apply the normal distribution

Level   2   **Credits**   2   **Assessment**   Internal

Subfield   Statistics and Probability

Domain   Probability

Registration date   20 October 2004   **Date version published**   20 October 2004

This achievement standard requires simulating probability situations and applying the normal distribution.

Achievement Criteria

	Achievement Criteria	Explanatory Notes
Achievement	• Design and use a simulation method to explore a situation involving probabilities. • Use the normal distribution model to find probabilities in straightforward problems.	• Simulations could include the use of dice and random number generators. • This will require the use of $z = \dfrac{X - \mu}{\sigma}$ in context. (Problems will be limited to those that require the use of only one value of z). • Problems could involve finding an expected number.
Achievement with Merit	• Use simulations and theoretical probability techniques to solve problems. • Solve problems using the normal distribution model.	• Theoretical techniques could include the use of probability trees, tables and informal conditional probability (reduced sample space). Problems could include making predictions for simulations and finding expected numbers for theoretical probability. • Problems will include a selection from: − those that require the use of more than one z-value or other multiple step problems − finding the expected number.

	Achievement Criteria	Explanatory Notes

Achievement with Excellence	• Interpret the outcome of modelling a probability situation.	• Assessment will involve a selection from:
		  – combinations of theoretical and experimental probabilities
		  – the results of a simulation used in conjunction with a second simulation eg predator-prey
		  – interpretation of results from normal distribution calculations including recommendations arising from the result
		  – inverse normal problems
		  – discussing limitations of the model used, either in the simulation or in the use of the normal distribution.

General Explanatory Notes

1   This achievement standard is derived from *Mathematics in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1992:
   • achievement objectives p. 198
   • suggested learning experiences p. 199
   • sample assessment activities pp. 200-201
   • mathematical processes pp. 24, 26, 28.

2   *Simulations* could include examples such as "How many students need to be chosen for you to expect that each of the 4 school houses is represented?", "How many people do you need to choose before you can expect at least 2 of them to share the same birth month?"

3   Appropriate technology (such as spreadsheets) should be used to aid simulation.

Quality Assurance

1   Providers and Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against achievement standards.

2   Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

   Accreditation and Moderation Action Plan (AMAP) reference   0226