NZQA Approved

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

# Internal Assessment Resource

# Mathematics and Statistics Level 2

This resource supports assessment against:

Achievement Standard 91269 version 2

Apply systems of equations in solving problems

## Resource title: Performing Arts Showcase

2 credits

This resource:

- Clarifies the requirements of the standard
- Supports good assessment practice
- Should be subjected to the school's usual assessment quality assurance process
- Should be modified to make the context relevant to students in their school environment and ensure that submitted evidence is authentic

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|---|---|
| Date version published by Ministry of Education | February 2015 Version 2<br>To support internal assessment from 2015 |
| Quality assurance status | These materials have been quality assured by NZQA.<br>NZQA Approved number A-A-02-2015-91269-02-5596 |
| Authenticity of evidence | Teachers must manage authenticity for any assessment from a public source, because students may have access to the assessment schedule or student exemplar material.<br>Using this assessment resource without modification may mean that students' work is not authentic. The teacher may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

# Internal Assessment Resource

**Achievement Standard Mathematics and Statistics 91269:** Apply systems of equations in solving problems

**Resource reference:** Mathematics and Statistics 2.14A v2

**Resource title:** Performing Arts Showcase

**Credits:** 2

## Teacher guidelines

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Mathematics and Statistics 91269. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing students against it.

## Context/setting

The context for this activity is planning a school event where the focus is on ticket sales. This activity requires students to use systems of equations involving two variables to model ticket sales over a three-year period.

## Conditions

This activity may be conducted in one or more sessions. Confirm the time frame with your students.

Students work independently to complete the task.

Students should have access to appropriate technology.

## Resource requirements

Provide students with the Level 2 formulae sheet.

## Additional information

This activity can be adapted to the name of a similar event at your school, for example, the school talent quest, musical, or show. The focus could be placed on other variables, for example, the types of performances and the length of performances.

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| Achievement | Achievement with Merit | Achievement with Excellence |
|---|---|---|
| Apply systems of equations in solving problems. | Apply systems of equations, using relational thinking, in solving problems. | Apply systems of equations, using extended abstract thinking, in solving problems. |

## Student instructions

## Introduction

The student committee is planning the upcoming Performing Arts Showcase at your school this year. They are trying to determine if the number of adults attending the event is decreasing and how much they should make the price of adult tickets this year.

This activity requires you to use systems of equations to model the information provided about past ticket sales and to provide the student committee with information about adult ticket sales and the future price of adult tickets.

Your overall grade will be determined by the quality of your reasoning and how well you link this to the context.

## Task

Working independently, use the information outlined in Resource A to provide the planning committee with the following information:

- the change in the adult tickets sales in 2011 compared to 2010
- the price they should set the adult tickets in 2012 if they want to make a profit of $3210 from ticket sales.

Clearly communicate your findings using appropriate mathematical statements. Show equations that you have used as well as any relevant calculations or graphs.

## *Resource A*

There are two different ticket prices – a child ticket that is for all children and students up to the age of 18 and an adult ticket.

2010 Performing Arts Showcase:

- The total number of tickets sold was 400.
- The relationship between the number of child tickets and adult tickets sold can be modelled by $x^2 + y = 22750$, where $x$ represents the number of child tickets and $y$ represents the number of adult tickets.

2011 Performing Arts Showcase:

- The cost of a child ticket was \$5 and the cost of an adult ticket was \$10.
- The relationship between the number of child tickets and adult tickets sold can be modelled by $xy = 1000 + 100x$, where $x$ represents the number of child tickets and $y$ represents the number of adult tickets.
- More than 300 tickets were sold.
- The money generated from ticket sales was \$2050.

2012 Performing Arts Showcase:

- The cost of a child ticket is planned to be \$5 and the cost of an adult ticket is not determined yet.
- The relationship between the expected number of child tickets and adult tickets to be sold can be modelled by $200x + y^2 = 80000$, where $x$ represents the number of child tickets and $y$ represents the number of adult tickets.
- The planning committee wants to make \$3210 from ticket sales.
- There needs to be only one possibility for the number of child and adult tickets to be sold.

# Assessment schedule: Mathematics and Statistics 91269 Performing Arts Showcase

Teacher note: Teachers will need to adapt this assessment schedule to include examples of the types of responses that can be expected.

| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
|---|---|---|
| The student has applied systems of equations in solving problems.<br>The student correctly selects and uses methods with systems of equations. They have demonstrated knowledge of concepts and terms and communicated using appropriate representations.<br><br>For example:<br>*For 2010, the student has formed a system of equations from the information provided and solved them simultaneously to find the number of adult tickets sold in that year. They have correctly selected and presented the positive solution only as the answer.* | The student has applied systems of equations, demonstrating relational thinking in solving problems.<br>The student has selected and carried out a logical sequence of steps.<br>The student has related their findings to the context or communicated their thinking using appropriate mathematical statements.<br><br>For example:<br>*In determining how many adult tickets were sold in 2011, the student forms a system of equations, and finds the possible solutions. The student considers both solutions for the number of adult tickets sold in 2011, selects the correct solution based on the information provided and links it to the number of adult tickets sold in 2010 to determine the change in adult ticket sales.*<br>*In considering the price of adult tickets in 2012, the student forms a system of equations based on the information provided, and forms a quadratic equation that could be solved to find the price of the adult ticket.* | The student has applied systems of equations, using extended abstract thinking, in solving problems.<br>The student has used correct mathematical statements or communicated mathematical insight.<br><br>For example:<br>*The student has determined the change in adult ticket sales from 2010 to 2011, formed a system of equations, which contains an unknown constant for the price of the adult ticket in 2012, and formed a quadratic equation that could be solved to find the price of the adult ticket. The student has linked the type of solution of the quadratic equation (only one solution possible) to the discriminant of the equation, and has found the price of adult ticket.* |

Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.