**NZQA**

**Approved**

Achievement standard: 91026 Version 3

Standard title: Apply numeric reasoning in solving problems

Level: 1

Credits: 4

Resource title: ICU on the plane

Resource reference: Mathematics and Statistics VP-1.1 v2

Vocational pathway: Services Industries

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-91026-02-7263 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators 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. |

Vocational Pathway Assessment Resource

Achievement standard: 91026

Standard title: Apply numeric reasoning in solving problems

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Resource reference: Mathematics and Statistics VP-1.1 v2

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Learner instructions

# Introduction

This assessment activity requires you to calculate the amount of money a family will need to deposit to fund its plan to have a registered nurse accompany a grandparent returning to Waimate from Kerikeri.

You are going to be assessed on how effectively you apply numeric reasoning, using extended abstract thinking, to determine the deposit for the nurse. You are required to communicate your solutions clearly and accurately.

The following instructions provide you with a way to structure your work so you can demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them if necessary to suit their learners.

# Task

A family has had an elderly grandparent living with them in Northland for the past seven years. Now, the grandparent wishes to spend her remaining time with her daughter in her home town of Waimate. The Northland family has approached a private nursing company to arrange the hire of a nurse to accompany the elderly grandparent back to Waimate.

The actual cost of hiring a nurse is assessed on a case-by-case basis. The family is advised of the total cost, and the basis of the charge, and informed that a deposit of  is required immediately. They are informed that payment of the deposit constitutes an agreement to pay the remaining charges prior to the nurse undertaking the journey with the elderly grandparent.

Use the information below to calculate the total cost involved and the amount required for the deposit the family will need to make.

* The journey will require a one way flight from Kerikeri to Dunedin for the grandparent and a return flight for the nurse.
* The most suitable outbound flight leaves Kerikeri at 9:35 am and arrives in Dunedin at 2:25 pm.
* The most suitable return flight leaves Dunedin at 9:10 am and arrives in Kerikeri at 2:30 pm the following day.
* The Northland family will drive the nurse and the grandparent to the airport and this will not be factored into the costs.
* The lowest priced fares are $217 (seat + bag), but the nursing company’s policy requires that Flexi Plus fares are used so any changes to timetables and flights can be made without additional cost. These fares usually cost 66% more than the seat + bag option.
* The nurse will require accommodation in Dunedin. This is likely to cost between $98 and $120.
* The nurse and grandparent will hire a rental car to travel the distance from the Dunedin airport to Waimate, which is 183 km. The car will be picked up at 2:30 pm and returned at 8:30 am the next day. The GST inclusive rate is $125 per day, including insurance. The hire car uses approximately 5.5 litres of fuel per 100 km and the fuel will cost $2.20 per litre.
* Additional allowances need to be provided when travelling, these are:
	+ breakfast, a maximum of $30 for the nurse
	+ lunch, a maximum of $20 each person
	+ dinner, a maximum of $50 for the nurse
	+ other incidentals up to a maximum of $20 per person.

The nurse’s fees and overtime are to be paid by the family; this is calculated to the nearest hour and starts from the time of departure and continues to the time of return. The overtime rate applies once the nurse has been working for a period of 12 hours or more. The fee for a nurse is $246 per eight hour day. The overtime rate that applies is time and a quarter.

In the solution to this problem you should:

* show calculations, as appropriate
* use mathematical statements
* explain what you are calculating at each stage of the solution.

The quality of your discussion and reasoning, and how well you link this to the context, will determine the overall grade.

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Assessor/Educator guidelines

# Introduction

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

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity requires learners to perform operations with fractions, percentages, decimals and rates.

The context for this assessment is the cost to a family to transport an elderly grandparent from Kerikeri to her home town, Waimate. The family has decided to hire a registered nurse to accompany the grandparent.

# Conditions

Learners need to work independently to complete this activity.

# Resource requirements

Learners should have access to appropriate technology.

# Additional information

Assessors/educators need to ensure learners are familiar with any context specific vocabulary used in this task.

# Assessment schedule: Mathematics and Statistics 91026 – ICU on the plane

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner applies numeric reasoning in solving problems by:* selecting and using a range of methods in solving problems
* demonstrating knowledge of number concepts and terms
* communicating solutions which usually require only one or two steps

For example:The learner includesat least three different numeric methods that are correctly selected and used in solving problems, such as:* + percentages used to calculate the likely airfare
	+ fractions used to calculate the deposit
	+ rates used to calculate the nurse’s fee or fuel cost.

*The examples above are indicative of the evidence that is required.* | The learner applies numeric reasoning, using relational thinking, in solving problems by involving one or more of:* selecting and carrying out a logical sequence of steps
* connecting different concepts and representations
* demonstrating understanding of concepts
* forming and using a model

and also relating findings to the context, or communicating thinking using appropriate mathematical statements.For example:Different costs are linked to get a total cost for transporting the grandparent from Kerikeri to Waimate, including related expenses and a return trip for the nurse. Calculations include:* + linking individual costs and constraints to get the total amount of money required
	+ using the total cost amount to determine the required deposit.

*The examples above are indicative of the evidence that is required.* | The learner applies numeric reasoning, using extended abstract thinking, in solving problems by involving one or more of:* devising a strategy to investigate or solve a problem
* identifying relevant concepts in context
* developing a chain of logical reasoning or proof

and also using correct mathematical statements, or communicating mathematical insight.For example:The maximum amount required to be deposited by the family is calculated and aspects that could affect this are identified and discussed, such as:* + rounding of costs provided
	+ consideration for additional spending on allowances or less spending on the allowances
	+ variations in fares and car hire
	+ the possibility of cheaper air flights.

*The examples above are indicative of the evidence that is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.