**NZQA**

**Approved**

Achievement standard: 91030 Version 3

Standard title: Apply measurement in solving problems

Level: 1

Credits: 3

Resource title: Community garden project

Resource reference: Mathematics and Statistics VP-1.5 v2

Vocational pathway: Construction and Infrastructure

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| Quality assurance status | These materials have been quality assured by NZQA.  NZQA Approved number A-A-02-2015-91030-02-7267 |
| 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: 91030

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Learner instructions

# Introduction

This assessment activity requires you to apply measurement in solving problems by determining the quantities of materials needed to build a community garden.

You are going to be assessed on how you apply measurement, using extended abstract thinking, when determining the quantities of materials needed to build the community garden. 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 local youth group is undertaking a project to help build a community garden.

The project involves:

* building a tunnel house
* building four garden boxes
* filling the garden boxes and covering the floor of the tunnel house with soil
* building a fence around the garden
* covering the area around the tunnel house and garden boxes with stone pebbles.

See Resource A for information about the community garden.

Provide the following information for the community garden committee:

* the amount of plastic sheeting needed to cover the tunnel house
* the length of the surrounding fence
* whether 5 m3 of soil will be enough to fill all of the garden boxes and cover the floor of the tunnel house
* an estimate of the volume of stone pebbles needed to cover the area around the tunnel house and garden boxes to a depth of 10 cm.

Show all calculations that you have used and clearly communicate your methods using appropriate mathematical statements. Explain your choice of models and discuss how accurate they are. Identify any assumptions you need to make and discuss how they might affect your calculations.

# Resource A: Information about the community garden

## Tunnel house

The tunnel house can be modelled by two different three-dimensional geometric solids as shown in the photograph. A sketch of the tunnel house is also shown.



2.3 m

2.4 m

4.0 m

## Garden Boxes

This is a sketch of one of the garden boxes. Each box has a width of 1.1 m and a height of 60 cm.

## Soil

All of the garden boxes are to be filled level to the top with soil***.*** The floor of the tunnel house will be covered with soil to a depth of 20 cm.

## Fence and stone pebbled area

The fence will be placed 6.0 m from the sides of the tunnel house.

The enclosed area is to be covered with stone pebbles to the edge of the existing shrub garden.

Fence

Shrub garden

4.0 m

2.3 m

Stone pebbles

3.2 m

3.0 m

1.0 m

Tunnel house

Fence

**Diagram not to scale**

## Formulae sheet

Area of circle = 

Circumference of circle = 

Area of trapezium = 

Area of parallelogram = 

Area of triangle = 

Volume of prism = base area × *h*

Volume of pyramid =  × base area × *h*

Volume of cylinder = 

Volume of cone = 

Volume of sphere =

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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 apply measurement, using extended abstract thinking, when determining the amount of materials needed to build a community garden. Calculations include the area of plastic sheeting needed for a tunnel house, volume of the soil needed for the tunnel house and garden boxes, the length of the fence and volume of stone pebbles needed.

# Conditions

Learners need to work independently and may use any appropriate technology.

# Resource requirements

Provide learners with a sheet of formulae and Resource A.

# Additional information

Taking measurements is not a requirement of the standard. It is acceptable for learners to complete this activity using provided measurements.

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

# Assessment schedule: Mathematics and Statistics 91030 – Community garden project

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner applies measurement in solving problems by:   * selecting and using a range of methods in solving problems * demonstrating knowledge of measurement concepts and terms * communicating solutions which would usually require only one or two steps   The learner selects and correctly uses at least three different methods when determining the materials needed to build the community garden.  For example, the learner has completed at least three of the following:   * calculated the surface area of plastic sheeting needed to cover the tunnel house * calculated the volume of a component shape (other than a cuboid) when finding the amount of soil or stone pebbles required * calculated the length of the fence * correctly used units in the measurements and calculations at a level of precision appropriate to the task.   The learner has clearly identified what is being calculated.  *The examples above are indicative of the evidence that is required.* | The learner applies measurement, 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 a context, or communicating thinking using appropriate mathematical statements  For example:  The learner has calculated the required area of plastic sheeting and has found the length of the fence. The required volumes of soil have been calculated and linked to a decision relating to the amount of available soil. The learner has used mathematical models to estimate the volume of pebbles that are needed.  Working is shown and correct units used.  *The examples above are indicative of the evidence that is required.* | The learner applies measurement, 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 * forming a generalisation   and also using correct mathematical statements, or communicating mathematical insight  For example:  The learner has calculated the required area of plastic sheeting and has found the length of the fence. The required volumes of soil have been calculated and linked to a decision relating to the amount of available soil. The learner has used mathematical models to make an accurate estimate of the volume of pebbles that are needed.  They have discussed the accuracy of at least one model, for example from those used to estimate the area of the shrub garden, or made a relevant assumption and have linked this to the accuracy of their calculations.  The strategy used is clear, working and units are shown and reasoning is clearly communicated.  *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.