**NZQA**

**Approved**

Achievement standard: 91034 Version 3

Standard title: Apply transformation geometry in solving problems

Level: 1

Credits: 2

Resource title: Geometric gardens

Resource reference: Mathematics and Statistics VP-1.9 v2

Vocational pathway: Primary Industries

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| Quality assurance status | These materials have been quality assured by NZQA.  NZQA Approved number A-A-02-2015-91034-02-7275 |
| 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: 91034

Standard title: Apply transformation geometry in solving problems

Level: 1

Credits: 2

Resource title: Geometric gardens

Resource reference: Mathematics and Statistics VP-1.9 v2

Vocational pathway: Primary Industries

Learner instructions

# Introduction

This assessment activity requires you to apply transformation geometry to design a garden.

You are going to be assessed on how you use extended abstract thinking to apply transformation geometry in the design of your garden. Use correct mathematical statements and clearly communicate your thinking about the transformations used in the design of the garden.

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

For thousands of years transformations and symmetry have been features of garden design. In many gardens the use of transformations can be seen in the shapes of garden beds and their layout in the garden and also in the selections and arrangement of the plants.

Working independently you should:

* design a garden using transformation geometry. Your garden must involve at least three different transformations
* draw a diagram of your garden showing the garden beds and the arrangement of the plants
* write instructions for your design and describe any symmetries in the design. Your instructions need to include descriptions of the transformations that have been used and enable your design to be reproduced accurately.

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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 transformation geometry, using extended abstract thinking, to design a garden.

# Conditions

Learners will work independently on the activity.

# Resource requirements

Learners need access to appropriate technology.

# Additional information

Ensure learners are familiar with any context specific vocabulary used in this resource.

Before starting their own garden design, learners need to look at pictures of formal gardens. These could include:

* Chateau Villandry
* The Knot Garden at the Red Lodge, Bristol
* The Gardens of Versailles
* Château de Chenonceau
* Hampton Court Palace
* Nong Nooch Tropical Botanical Garden.

# Assessment schedule: Mathematics and Statistics 91034 – Geometric gardens

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner applies transformation geometry in solving problems by:   * selecting and using a range of methods in solving problems * demonstrating knowledge of geometrical concepts and terms * communicating solutions using geometrical terms or representations   For example:  The learner uses at least three different methods, which are correctly identified in the design of the shapes and placement of the garden beds and/or the arrangement of the plants.  The methods that could provide evidence are:   * + reflection   + rotation   + translation   + enlargement   + symmetry.   *The examples above are indicative of the evidence that is required.* | The learner applies transformation geometry, 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   and also relating findings to a context, or communicating thinking using appropriate mathematical statements  For example:  The learner describes the transformations used in their garden design with the appropriate detail for the transformations to be positioned correctly, and describes the arrangement of the plants. Any symmetries in the design and/or arrangement of the plants are also described.  *The examples above are indicative of the evidence that is required.* | The learner applies transformation geometry, using extended abstract thinking, in solving problems by involving one or more of:   * devising a strategy to investigate a situation * identifying relevant concepts in context * developing a chain of logical reasoning, or proof   and using correct mathematical statements, or communicating mathematical insight  For example:  The learner accurately describes the transformations in the shapes of the garden beds, their layout in the garden and the arrangement of the plants. The description includes the use of colour in the garden beds and the three-dimensional aspects of the garden.  *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.