**NZQA**

**Approved**

Achievement standard: 91268 Version 2

Standard title: Investigate a situation involving elements of chance using a simulation

Level: 2

Credits: 2

Resource title: Oh what a seed?

Resource reference: Mathematics and Statistics VP-2.13 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-02-2015-91268-02-8200 |
| 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

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Learner instructions

# Introduction

This assessment activity requires you to use a simulation to investigate the sale of seed packets in a seed sales promotion.

You are going to be assessed on how insightfully you investigate the sale of seed packets in a seed sales promotion involving elements of chance.

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

At the end of each winter KB Seedlings has a promotion to boost seed sales. Inside each seed packet is one of four symbols. People who collect all four symbols win a hanging basket containing a variety of raised seedlings.

Some symbols are harder to get than others, as shown in the table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Symbol | Silverbeet | Beetroot | Carrot | Tomato |
| Probability of occurrence | 0.35 | 0.28 | 0.25 | 0.12 |

Alana works for KB Seedlings. Reviewing the annual promotion is part of her job. She knows from past experience most customers buy plants rather than seeds. She thinks people participating in the promotion will stop buying seed packets when they win a hanging basket.

You need to use the promotion information to design and run a simulation to investigate the purchase of seed packets to assist Alana with her review.

You will write a report for the seed company on the promotion. Your report must include a conclusion based on the outcomes of your simulation, and a reflection on your process.

In your report:

* Describe your simulation method with enough detail for another person to replicate it.
* Record the outcomes of your simulation. Record your outcomes clearly enough for someone reading them to be able to confirm or challenge your conclusion/s.
* Use your results to write a conclusion about the number of seed packets a customer will buy. Your conclusion needs to include estimates of the mean number of seed packets bought by a customer winning a hanging basket, the chances of winning a hanging basket if the maximum number of seed packets bought is eight and any other findings from your simulation.
* State any assumptions you have made in your simulation design, and suggest possible improvements and/or other variables to consider when investigating this situation.

The design and description of your simulation, and the quality of your reasoning, 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 investigate a situation, a seed packet sales promotion, involving elements of chance using a simulation, with statistical insight. Learners will integrate statistical and contextual knowledge throughout the simulation process.

# Conditions

Learners will need to work independently.

They may use graphing calculators, and equipment such as dice, spinners, random number tables, or cards to conduct their simulation.

# Resource requirements

Assessors/educators may choose to supply learners with equipment such as dice, spinners, random number tables or cards.

# Additional information

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

# Assessment schedule: Mathematics and Statistics 91268 - Oh what a seed?

|  |  |  |
| --- | --- | --- |
| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner investigates a situation involving elements of chance using a simulation by showing evidence of using each component of the simulation process  The learner has:   * designed the simulation for the situation given. They have identified the tools to be used, defined a trial, decided on the number of trials and determined the data recording method For example, for designing the simulation:   + an appropriate random number generator to establish which symbol is obtained for each seed packet purchase   + a trial has been defined   + a finishing point for any trial has been identified   + a recording system which enables the simulation to be completed has been developed. * conducted the simulation and recorded the results  For example, the outcomes of the simulation are recorded with sufficient clarity that they could be used to challenge or confirm the learner's conclusion/s. * selected and used appropriate displays and measures  For example, results have been displayed using an appropriate table. The mean number of days or chance of winning a hanging basket has been calculated. * communicated findings in a conclusion For example, evidence of a correctly calculated mean number of seed packets purchased by a customer winning a hanging basket and mean or chance is sensibly rounded. It is unlikely that a mean that is rounded to a whole number will be sensible.   *The examples above are indicative of the evidence that is required.* | The learner investigates a situation involving elements of chance using a simulation, with justification, by linking components of the simulation process to the context, explaining relevant considerations made in the design of the simulation and supporting findings with statements which refer to evidence gained from the simulation  The learner has:   * designed the simulation for the situation given. They have identified the tools to be used, defined a trial, decided on the number of trials and determined the data recording method. They have identified and discussed at least one assumption made in designing their simulation For example, for designing the simulation:   + an appropriate random number generator to establish which symbol is obtained for each seed packet purchase. The allocation of probabilities to outcomes has been clearly explained   + a trial has been defined   + a finishing point for any trial has been identified   + a recording system which enables the simulation to be completed has been developed   + at least one assumption has been discussed. * conducted the simulation and recorded the results For example, the outcomes of the simulation are recorded with sufficient clarity that they could be used to challenge or confirm the learner's conclusion/s. * selected and used appropriate displays and measures  For example, results have been displayed using an appropriate table and aspects of the display/s have been discussed. The mean number of days and chance of winning a hanging basket have been calculated. * communicated findings in a conclusion For example, an estimate of the mean number of seed packets purchased and chance of a customer winning a hanging basket after purchasing a maximum of eight seed packets is obtained. The estimates are explained by identifying that the result is an estimate and that different repeats of the simulation would obtain different estimates. Estimates are sensibly rounded; it is unlikely that a mean that is rounded to a whole number will be sensible.   *The examples above are indicative of the evidence that is required.* | The learner investigates a situation involving elements of chance using a simulation, with statistical insight, by integrating statistical and contextual knowledge throughout the simulation process, which may involve reflecting about the process, or considering other variables  The learner has:   * designed the simulation for the situation given. They have identified the tools to be used, defined a trial, decided on the number of trials and determined the data recording method. They have identified and discussed at least two assumptions made in designing their simulation For example, for designing the simulation:   + an appropriate random number generator to establish which symbol is obtained for each seed packet purchase. The allocation of probabilities to outcomes has been clearly explained   + a trial has been defined   + a finishing point for any trial has been identified   + a recording system which enables the simulation to be completed has been developed   + at least two assumptions have been identified and the potential effect of them on the simulation has been discussed. * conducted the simulation and recorded the results For example, the outcomes of the simulation are recorded with sufficient clarity that they could be used to challenge or confirm the learner's conclusion/s. * selected and used appropriate displays and measures For example, results have been displayed using an appropriate table. The mean number of days and chance of winning a hanging basket have been calculated. The learner has discussed the overall aspects of the distribution or simulation. * communicated findings in a conclusion  For example, an estimate of the mean number of seed packets purchased, chance of a customer winning a hanging basket after purchasing a maximum of eight seed packets is obtained and other findings about the purchase of seed packets are communicated. The estimates are explained by identifying that the result is an estimate and that different repeats of the simulation would obtain different estimates. Estimates are sensibly rounded; it is unlikely that a mean that is rounded to a whole number will be sensible. * reflected on the process by identification of potential issues relating to the accuracy of the simulation For example, with respect to the fact there is a finite number of seed packets or that people might swap seed packet symbols. Comments link the identified issue with its effect on the simulation process.   *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.