**NZQA**

**Approved**

Achievement standard: 91265 Version 2

Standard title: Conduct an experiment to investigate a situation using statistical methods

Level: 2

Credits: 3

Resource title: Investigating menu design

Resource reference: Mathematics and Statistics VP-2.10 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-02-2015-91265-02-8197 |
| 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 conduct an experiment to investigate a situation about menu design, using statistical methods.

You are going to be assessed on how you conduct an experiment to investigate a situation about menu design using statistical methods, with statistical insight.

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

Menus are the one piece of advertising every diner is guaranteed to read. It is well known that menus influence the food that customers purchase in restaurants and food outlets, and contribute to sales and profits. The way that menus are presented affects customer choices. Influencing factors include the dimensions of the menu, the font used, use of colour, pictures of dishes, whether prices are included or not, and positioning of items on the menu.

You need to undertake a statistical investigation involving an experiment over an extended period of time on how the design of a restaurant menu can influence customer choice. You will pose an investigative question, plan an experiment, gather and analyse data, and draw conclusions. Your final product will be the presentation of a report describing your experimental design process, data gathering, analysis, and conclusions.

There are three parts to this activity. You may work in small groups for the first two parts but you need to work individually for the third part.

## Part 1: Select an experimental situation

In a group, use the information on menus in the resource below to select an experimental situation to investigate, based on the likely effects of menu design on customer behaviour. Identify the variables you think are important, and write a question to investigate.

Suggestions to base your experiment on include the following.

The effect on customer food choices of:

* using colour in a menu
* using pictures in a menu
* the placing of food choices in a menu
* the dimensions of the menu
* the titles of the dishes and whether the dishes are explained.

You may use another experimental situation involving menu design agreed with your assessor/educator.

## Part 2: Plan and conduct the experiment

Write a plan for the experiment in which you:

* describe the variables and measures you have chosen and why you have chosen them
* explain how you will collect your data and record your results
* link to relevant knowledge about the situation
* describe any related variables and the possible effects of these
* describe the experimental method.

Submit the plan to your assessor/educator for feedback, and adjust as necessary.

As a group conduct the experiment according to the plan. Record the data and make notes about your observations of the data collection and experimental process. These notes will be useful in discussion and reflection of the process in the report write-up.

## Part 3: Prepare a report

Individually complete the investigation and prepare a report. The format of your report could be but is not restricted to, a computer slideshow, a written report, or an oral presentation. Confirm the format with your assessor/educator before you begin.

Your report should contain the following:

* introduction – the investigative question and the purpose of the investigation
* method – the plan and the process used to collect the data
* analysis – selection and discussion of appropriate displays and measures
* discussion – discussion of findings and any reflections on the process
* appendix – evidence of how you conducted the experiment, e.g. the original plan and any modifications, raw data from your experiment and any notes from Part 2.

The quality of your report, including discussion and reasoning about the experimental process and your findings and how well you link this to the context, will determine your overall grade.

# Resource

Well-designed menus are a key to restaurant success. Menus should be easy to follow, have good but not lengthy descriptions of the food and beverage items, and should show the prices. Menus should reflect the theme of the restaurant.

## Prices

Menus should always show prices, although it is best not to list all the prices in one column on the left side of the menu. People read from left to right, so if all the prices are on the left, customers will generally read the prices ahead of the dish descriptions and this could impact their ordering decisions.

## Pictures/colours

It is important not to crowd menus with pictures. If the pictures are not high quality this can have a negative influence on people’s choices.

## Descriptions

Dishes should be explained simply with the key ingredients listed. If dishes have a specific name, then these should reflect the complete dish – not just the key ingredient – and include a description. This allows the customer to get a picture of what they are ordering.

Example 1:

Beetroot Lasagne with Truffle Fondue, Oyster Mushroom, Confit Parsnip & Pecorino Sardo

or

Example 2:

Seasonal Lasagne: Beetroot Lasagne with Truffle Fondue, Oyster Mushroom, Confit Parsnip & Pecorino Sardo.

## Websites

The following websites may be useful:

<http://www.menu.co.nz/menu-design/>

<http://restaurants.about.com/od/menudesign/a/How-To-Design-An-Effective-Restaurant-Menu.htm>

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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 conduct an experiment to investigate various effects of restaurant menu design on customer choice using statistical methods, with statistical insight.

# Conditions

Learners will present their work and findings independently (Part 3 of the task), but may work in small groups for the first parts of the task.

During the planning (Part 1) and data collection (Part 2) phases of the investigative process make sure all learners have actively contributed. This may be through direct observation or by questioning learners about the process. Learners cannot achieve this standard without actively contributing to the planning and data collection phases.

Learners may use appropriate technology such as statistical software or spreadsheets.

Relevant contextual knowledge is essential at this level. It is important that you give learners time to research the context before beginning the investigation.

Learners should confirm the format of their report with you.

# Resource requirements

Provide learners with:

* copies of the learner resource
* access to background information using the library or internet
* resources appropriate to their confirmed experimental plan.

# Additional information

The experiment plan should have a simple design. This involves one explanatory variable and one response variable. Possible designs could involve:

* measuring the change in the response variable between two dependent values for the explanatory variable (paired comparison)
* comparing the response variable across two (or more) independent values of the explanatory variable (categorical)
* exploring the relationship between the response variable and independent values of the explanatory variable (numerical).

# Assessment schedule: Mathematics and Statistics 91265 – Investigating menu design

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner conducts an experiment to investigate a situation using statistical methods, showing evidence of using each component of the investigation process by:* posing an investigative question about the experimental situation
* planning the experiment by determining appropriate variables and measures and also determining the data collection and recording methods
* conducting the experiment and collecting the data
* selecting appropriate displays and measures
* discussing the displays and measures
* communicating findings in a conclusion

For example:The learner has clearly compared the sales of the control and treatment items showing the differences between the two sets of data and commented on the distribution.The learner has clearly stated their conclusion to the question in context.*The examples above are indicative of the evidence that is required.* | The learner conducts an experiment to investigate a situation using statistical methods with justification, linking components of the investigation process to the context, explaining relevant considerations in the process, and supporting findings with statements which refer to evidence gained from the experiment by:* posing an investigative question about the experimental situation

For example:The purpose or question must link to the situation being investigated.* planning the experiment by determining appropriate variables and measures and also determining the data collection and recording methods

For example:The learner considers related variables and possible effects of these.* conducting the experiment and collecting the data
* selecting appropriate displays and measures
* discussing the displays and measures, using supporting evidence that is linked to the context
* communicating findings in a conclusion and linking findings to the experimental situation

For example:The learner has clearly analysed the sales on average and what they have increased or decreased by and commented on the middle 50% and clusters. Comments are justified by supporting evidence.The learner has clearly stated their conclusion to their question in context and produced statistical evidence to support their claim.*The examples above are indicative of the evidence that is required.* | The learner conducts an experiment to investigate a situation using statistical methods with statistical insight by, integrating statistical and contextual knowledge throughout the investigation process which may involve reflecting on the process, or considering other relevant variables by:* specifying the purpose of the investigation and the investigative question, and showing how these are relevant to the situation being investigated
* planning the experiment by determining appropriate variables and measures and also determining the data collection and recording methods

For example:The learner considers related variables and possible effects of these and develops the plan to mitigate against these if possible.* conducting the experiment and collecting the data
* selecting appropriate displays and measures
* discussing the displays and measures, integrating statistical and contextual knowledge
* communicating findings in a conclusion and linking findings to the experimental situation

For example:The learner reflects on key aspects of the experimental process, such as considering possible sources of variability in the data, effects of related variables and other areas to investigate.The learner has clearly commented on and analysed any increase in sales after changing the menu and stated the numerical value in context. The learner has commented on the middle 50% and clusters and commented on the appropriate statistics for those food items whose sales increased over a specific threshold.The learner has clearly stated their conclusion in context and given statistically produced evidence to support their findings. The learner has also commented on any unusual values and what other factors could have affected food choices for the experiment and given a possible extension to the experiment based upon their findings.*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.