

YEAR 11 MATHEMATICS APPLIED

This course is designed for the class studying towards the National Certificate in Employment Skills

The course is based on units of work each with topics assessable by internally assessed Unit Standards.

The aims of this course of study are:

- Students will pass the Unit Standards which are a requirement for National Certificate in Employment Skills.
- Students will gain the 8 Mathematics credits required for NCEA numeracy.
- Students will gain a number of Mathematics credits, in excess of 8, towards NCEA.
- Students gain skills helpful to them when they leave high school gain employment.
- Students will study topics of mathematical interest.
- Students will develop research and reporting skills.

COURSE OUTLINE

Units of Work	US no.s	Credits	Description of Unit Standard
Unit 1 Tables and Graphs	8491 5226	2 2	Read and interpret information presented in tables and graphs. Construct and use tables and graphs.
Unit 2 Statistics and Probability	7565 7571	2 2	Carry out and report on a given statistical investigation Use simulation techniques to determine probability and solve problems
Unit 3 Non calculator unit	8489 23738	2 2	Solve problems which require calculation with whole numbers Use numeracy strategies to solve problems involving whole numbers
Unit 4 Measurement	8492 20662 12319	3 2 2	Use standard units of measurement Make estimates of measurements with common units Find relationships between measurements
Unit 5 Fractions, Decimals and Percentages	20663 8490 5224 5227	2 2 2 3	Use a strategy to estimate the solution to number problems <i>A non-calculator standard</i> Solve problems using calculations with numbers expressed in different forms Use decimals and percentages to solve problems Solve problems involving money

Unit 6			
Geometry and Design	7559	2	Demonstrate knowledge of the mathematics of geometry patterns.
	12322	2	Use mathematics in the design of a given object or process.
Unit 7			
Mathematical Study	7570	2	Carry out and report on a given mathematical study
	12328	2	Demonstrate knowledge of the history of a mathematical topic or mathematician

UNIT 1

8491 version 3

Read and interpret information presented in tables and graphs

level: 1

credit: 2

Elements and Performance Criteria

element 1

Read and interpret information presented in tables.

performance criteria

- 1.1 Specified values are read from the table and communicated to others.
- 1.2 Interpretation of information obtained is consistent with the data in the table.

element 2

Read and interpret information presented in graphs.

performance criteria

- 2.1 Specified values are read from the graph and communicated to others.
- 2.2 Interpretation of information obtained is consistent with the data in the graph.

Assessment Notes

For element 1, the standard must be met in three different types of tables which could include but are not limited to: timetables, tables of statistical information.

For element 2, the standard must be met with three different types of graph which may include but are not limited to: bar graph, line graph, pie graph, pictograph, box-and-whisker graph, stem-and-leaf graph.

Interpretation could include but is not limited to significant features of the tables and graphs such as: greatest or least values; trends; finding totals of values greater or less than a given value.

Calculators and/or computers may be used in achievement of credit for this unit standard.

RESOURCES

Units in Maths Chapter
Mathlinks 1 Chapters 7 and 8
Rugby League (NRL) Table worksheets
Michael Schumacher Worksheets
North and South Island Distances Worksheets
Plan a holiday around NZ Exercise
Christchurch Bus Timetable Worksheets

5226 version 3

Construct and use tables and graphs

level: 1

credit: 2

Elements and Performance Criteria

element 1

Construct tables and graphs.

performance criteria

1.1 Tables and graphs are consistent with the source information.

element 2

Use tables and graphs.

performance criteria

2.1 Tables and graphs are used to obtain information from the data recorded in them.

Assessment Notes

Graphs could include: distance/time graphs; graphs showing relationships between two variables; statistical graphs; etc.

Calculators and computers can be used in achievement of credit for this unit standard.

UNIT 2

7565 version 2

Carry out and report on a given statistical investigation

level: 1

credit: 2

Elements and Performance Criteria

element 1

Carry out and report on a given statistical investigation.

performance criteria

- 1.1 Investigation follows the given plan.
- 1.2 Processing and presentation of information meets the requirements of the investigation.
- 1.3 Conclusions are drawn which are consistent with the information obtained.
- 1.4 Report communicates the relationship between the information obtained and the conclusions drawn.

Assessment Note

The standard **must** be met in a statistical investigation for which the aims and procedures are consistent with the Statistics strand of at least Level 6 in *Mathematics in the New Zealand Curriculum*.

Use simulation techniques to determine probability and solve problems

level: 1

credit: 2

Elements and Performance Criteria

element 1

Use simulation techniques to determine probability and solve problems.

performance criteria

- 1.1 Techniques selected are appropriate to the problems.
- 1.2 Results of the simulations are consistent with the problems.
- 1.3 Results of the simulations are interpreted in terms of the problems.

Assessment Notes

The standard must involve experiments that simulate situations. At least two different tools must be used in the simulation(s). These could include use of dice, coins, cards, spinners, technology (eg computer, calculator).

For a definition of *problem*, as used in this unit standard, refer to the New Zealand Association of Mathematics Teachers' website at www.nzamt.org.nz/problem.htm

Calculators and/or computers may be used in achievement of credit for this unit standard.

UNIT 3

8489 version 3

Solve problems which require calculation with whole numbers

level: 1

credit: 2

Elements and Performance Criteria

element 1

Solve problems which require calculation with whole numbers.

performance criteria

- 1.1 Method chosen is appropriate to the problem.
- 1.2 Solution is consistent with the problem.

Assessment Notes

The standard must be met without the use of calculators for whole number addition and subtraction (each to a maximum of three digits), and for multiplication and division by one digit, because the skills required relate to estimation and mental calculation.

The appropriateness of the chosen method may be apparent from the correct solution.

In this unit standard, a *problem* refers to questions (presented in text format) that involve one step of calculations in the solution.

Use numeracy strategies to solve problems involving whole numbers

Level **1**

Credits **2**

Elements and performance criteria

Element 1

Use numeracy strategies to solve problems involving whole numbers.

Performance criteria

- 1.1 Strategies that enable the problems to be solved are described or shown.
- 1.2 Correct solutions to the problems are found.

Assessment Notes

To achieve credit the candidate must use at least three different numeracy strategies to solve a range of problems. Numeracy strategies may include but are not limited to – doubling, compensation, part-whole, cancelling common factors.

Calculators must not be used in achievement of credit for this unit standard.

20663

Use a strategy to estimate the solution to number problems

level: 1

credit: 2

Elements and Performance Criteria

element 1

Use a strategy to estimate the solution to number problems.

performance criteria

- 1.1 Approximated numbers in working must be stated.
- 1.2 Strategy used must enable an approximate answer to the problem to be found.
- 1.3 Approximation must be appropriate for the problem.

Assessment Notes

The standard must be met in at least three of: whole numbers; fractions; decimals (which may be money); percentage.

In this unit standard, a *strategy* refers to rounding to one significant figure in order to make an estimate.

Problems must be of sufficient complexity for an estimation of the answer to be appropriate to the problem.

In this unit standard, a *problem* refers to questions (presented in text format) that involve one step of calculations in the solution.

Calculators must not be used in achievement of credit for this unit standard.

UNIT 4

8492 version 4

Use standard units of measurement

level: 1

credit: 3

Elements and Performance Criteria

element 1

Use measurement devices to measure quantities.

performance criteria

- 1.1 Measurement device appropriate to the quantity to be measured is selected.
- 1.2 Measurement is made to an appropriate degree of accuracy.

element 2

Calculate quantities from measurements.

performance criteria

- 2.1 Method selected is appropriate for the quantity to be calculated.
- 2.2 The calculated quantity is consistent with measurements used.
- 2.3 Results of calculations are presented to an accuracy appropriate to the situation.

Assessment Notes

For element 1, the standard must be reached for at least five of the nine units of measurement, including at least one from each of length, mass, volume, time: length – m, cm, mm; mass – kg, g; volume (capacity) – L, mL; time – minutes, seconds.

For element 2, the standard must be reached for calculations of three of the quantities: area; volume; speed; time.

Calculators and/or computers may be used in achievement of credit for this unit standard.

20662

Make estimates of measurements with common units

level: 1

credit: 2

Elements and Performance Criteria

element 1

Make estimates of measurements with common units.

performance criteria

1.1 Estimates are made to an appropriate degree of accuracy.

1.2 Units are appropriate for the estimates.

Assessment Notes

Estimates must be made for at least three of: length (m); mass (kg); volume (L, mL, m³, or cm³); area (m²).

Calculators must not be used in achievement of credit for this unit standard.

12319 version 3

Find relationships between measurements

level: 1

credit: 2

Elements and Performance Criteria

element 1

Take or select measurements to find or demonstrate relationships.

performance criteria

1.1 Measurements made or selected are appropriate and sufficient for the relationship sought.

1.2 Investigation of measurements uncovers or demonstrates any relationship which exists.

Assessment Notes

Assessment tasks for this unit standard could be based on such things as:

finding the relation between the dimensions of standard paper sizes and the origin of this relation; measuring containers that meet given constraints and finding relationships among their dimensions; finding relationships between currency denominations in different systems and their origins; investigating different measuring systems either current (for example, nautical) or historical (for example, time - year, calendars, clocks) and their relationship to systems in common use.

Calculators and computers can be used in achievement of credit for this unit standard.

UNIT 5

8490 version 3

Solve problems using calculations with numbers expressed in different forms

level: 1

credit: 2

Elements and Performance Criteria

element 1

Convert between fractions, decimals and percentages.

performance criteria

1.1 Converted number is written in the required form.

element 2

Solve problems involving conversions between percentages and fractions.

performance criteria

2.1 Method selected is appropriate to the problem.

2.2 Solution is consistent with the problem.

Assessment Notes

Assessment tasks should not include the need for rounding or truncating.

In element 1, conversion is between all the forms: fractions, decimals and percentages (ie six different types).

In element 2, the assessment task must include solving problems involving the conversion between percentages and fractions.

The appropriateness of the chosen method may be apparent from the correct solution.

In this unit standard, *problems* refer to questions (presented in text format) that involve one step of calculations in the solution.

Calculators and/or computers may be used in achievement of credit for this unit standard.

Use decimals and percentages to solve problems

level: 1

credit: 2

Elements and Performance Criteria

element 1

Use decimals and percentages to solve problems.

performance criteria

1.1 Method chosen is appropriate to the problem.

1.2 Solution is consistent with the problem.

Assessment Notes

The standard topic in be met using operations with decimals and at least two from the following list: expressing one quantity as a percentage of another; finding a percentage of a quantity; increasing or decreasing quantities by a given percentage.

The appropriateness of the chosen method may be apparent from the correct solution.

In this unit standard, a *problem* refers to questions (presented in text format) that involve one step of calculations in the solution.

Calculators and/or computers may be used in achievement of credit for this unit standard.

Solve problems involving money

level: 1

credit: 3

Elements and Performance Criteria

element 1

Solve problems involving money.

performance criteria

1.1 Method chosen is appropriate to the problem.

1.2 Solution is consistent with the problem.

Assessment Notes

The standard must be met in each of: wage calculations; budgeting; purchase options (such as cash payments, credit).

The appropriateness of the chosen method may be apparent from the correct solution.

For a definition of *problem*, as used in this unit standard, refer to the New Zealand Association of Mathematics Teachers' website at www.nzamt.org.nz/problem.htm

Calculators and/or computers may be used in achievement of credit for this unit standard.

7559 version 2

Demonstrate knowledge of the mathematics of geometry patterns

level: 1

credit: 2

Elements and Performance Criteria

element 1

Demonstrate knowledge of the mathematics of geometry patterns.

performance criteria

- 1.1 Performance of techniques which illustrate knowledge of the topic is consistent with the mathematics of the topic.
- 1.2 Key mathematical features are described.

Assessment Note

The standard **must** be met in at least three of the following: frieze, kowhaiwhai, wall paper, tessellations, Escher patterns, fractals, envelopes, packing, golden rectangle, tangrams, dissection of a cube, spirals, pentominoes.

Calculators and computers could be used in achievement of credit for this unit standard.

Use mathematics in the design of a given object or process

level: 1

credit: 2

Elements and Performance Criteria

element 1

Use mathematics in the design of a given object or process.

performance criteria

- 1.1 Mathematics used is appropriate to the design or process.
- 1.2 Design enables the object to be constructed or the process to be carried out.

element 2

Describe the mathematics involved in the design or process.

performance criteria

- 2.1 Description of the mathematics is appropriate for the design or process.
- 2.2 Description enables the mathematics to be reworked in similar situations.

Assessment Note

The standard must be met using mathematics at levels 5 or 6 of Mathematics in the New Zealand Curriculum.

The standard could be met through a project of the following type: designing a garment, designing a stained glass window, or paper engineering.

Calculators and computers can be used in achievement of credit for this unit standard.

7570 version 2

Carry out and report on a given mathematical study

level: 1

credit: 2

Elements and Performance Criteria

element 1

Carry out and report on a given mathematical study.

performance criteria

- 1.1 Study follows the given plan.
- 1.2 Processing and presentation of information meets the requirements of the study.
- 1.3 Conclusions are drawn which are consistent with the information obtained.
- 1.4 Report communicates the relationship between the information obtained and the conclusions drawn.

Assessment Note

The standard **must** be met in a study for which the aims and procedures are consistent with at least Level 6 of *Mathematics in the New Zealand Curriculum*.

Demonstrate knowledge of the history of a mathematical topic or mathematician

level: 1

credit: 2

Elements and Performance Criteria

element 1

Demonstrate knowledge of the history of a mathematical topic or mathematician.

performance criteria

- 1.1 Knowledge demonstrated meets the objectives agreed with the assessor.
- 1.2 Sources of information are acknowledged.

Examples of possible topics and mathematicians include:

Egyptian – Rhind papyrus mathematics; numeration – Babylonian, Roman, Arabic; geometry of the Greeks; influence of China and India; history of mathematics in a specified culture; lives of selected mathematicians – Zeno and his paradoxes, Hypatia, Leonardo da Vinci, Copernicus, Galileo, Emilie du Chatelet, Maria Agnesi, Napier, Alexander Aitken, Pascal, Ada Lovelace; other topic or mathematician approved by the assessor.

The topic and related learning objectives must be agreed with the assessor before the learning programme is undertaken (but can be varied during it with the approval from the assessor). At this level it is accepted that the assessor may give guidance on the formulation of objectives and on suitable references.

Demonstration of knowledge may be in the form of oral and/or visual presentation, question and answer, written report, role-play, or other means. It must not consist solely of material copied directly from the source.