

Year 11 Mathematics and Statistics



St Andrew's College

Student Handout 2017:

Introduction

Programme of Learning

Assessment

Whāia te mātauranga hei orange mō koutou

Seek after learning for the sake of your wellbeing

Kia ora and welcome to Year 12 Mathematics and Statistics for 2017

Mathematics is the exploration and use of patterns and relationships in quantities, space, and time. Statistics is the exploration and use of patterns and relationships in data. These two disciplines are related but different ways of thinking and of solving problems. Both equip students with effective means for investigating, interpreting, explaining, and making sense of the world in which they live.

Mathematicians and statisticians use symbols, graphs, and diagrams to help them find and communicate patterns and relationships, and they create models to represent both real-life and hypothetical situations. These situations are drawn from a wide range of social, cultural, scientific, technological, health, environmental, and economic contexts.

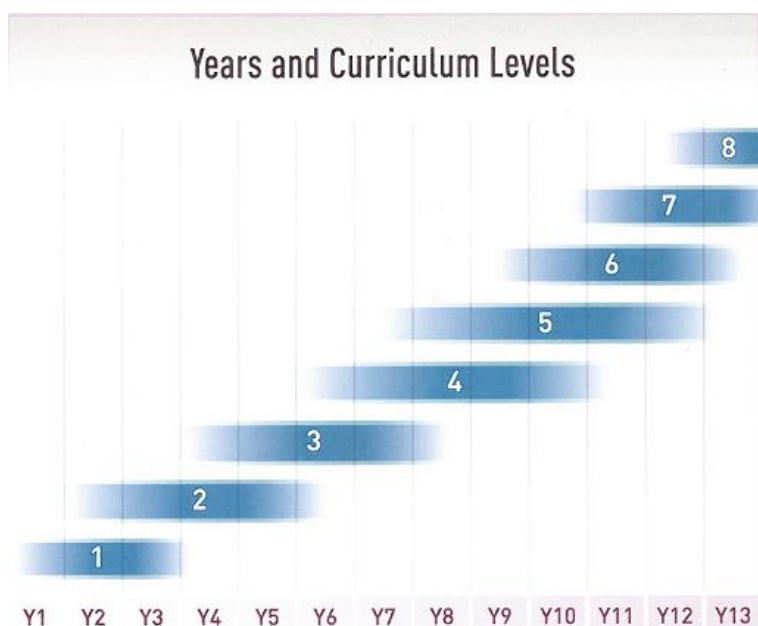
Learning area structure

The achievement objectives are presented in three strands. It is important that students can see and make sense of the many connections within and across these strands.

Number and algebra – Number involves calculating and estimating, using appropriate mental, written, or machine calculation methods in flexible ways. It also involves knowing when it is appropriate to use estimation and being able to discern whether results are reasonable. Algebra involves generalising and representing the patterns and relationships found in numbers, shapes, and measures.

Geometry and measurement – Geometry involves recognising and using the properties and symmetries of shapes and describing position and movement. Measurement involves quantifying the attributes of objects, using appropriate units and instruments. It also involves predicting and calculating rates of change.

Statistics involves identifying problems that can be explored by the use of appropriate data, designing investigations, collecting data, exploring and using patterns and relationships in data, solving problems, and communicating findings. Statistics also involves interpreting statistical information, evaluating data-based arguments, and dealing with uncertainty and variation. The diagram below shows how curriculum levels typically relate to years at school. In Year 11 Mathematics and Statistics your work will be assessed against Level 6 of the New Zealand Curriculum.



Key Learning Outcomes

In a range of meaningful contexts, students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to:

Number and algebra

Number strategies and knowledge

Apply direct and inverse relationships with linear proportions.

Extend powers to include integers and fractions.

Apply everyday compounding rates.

Find optimal solutions, using numerical approaches.

Equations and expressions

Form and solve linear equations and inequations, quadratic and simple exponential equations, and simultaneous equations with two unknowns.

Patterns and relationships

Generalise the properties of operations with rational numbers, including the properties of exponents.

Relate graphs, tables, and equations to linear, quadratic, and simple exponential relationships found in number and spatial patterns.

Relate rate of change to the gradient of a graph.

Geometry and measurement

Shape

Deduce and apply the angle properties related to circles.

Recognise when shapes are similar and use proportional reasoning to find an unknown length.

Use trigonometric ratios and Pythagoras' theorem in two and three dimensions.

Statistics

Statistical investigation

Plan and conduct investigations using the statistical enquiry cycle:

justifying the variables and measures used

managing sources of variation, including through the use of random sampling

identifying and communicating features in context (trends, relationships between variables, and differences within and between distributions), using multiple displays

making informal inferences about populations from sample data

justifying findings, using displays and measures.

Probability

Investigate situations that involve elements of chance:

comparing discrete theoretical distributions and experimental distributions, appreciating the role of sample size

calculating probabilities in discrete situations.

Course Endorsement:

It is possible to gain Course Endorsement in Year 11 Mathematics and Statistics. Course endorsement provides recognition for a student who has performed exceptionally well in an individual course.

Students will gain an endorsement for a course if, in a single school year, they achieve:

- 14 or more credits at Merit or Excellence, and
- at least 3 of these credits are from the externally assessed Probability standard (4 credits) and 3 credits are from internally assessed standards.

Course Entry Requirements for Level 2 Mathematics and Statistics 2018:

St Andrew's College offers two different Level Three Mathematics and Statistics courses, all offering Achievement Standards and all 'approved' subjects for university entrance. The requirements for entry into these course are as follows:

12 Mathematics with Calculus:	12 credits in Level 1 Mathematics. At least a Merit grade in the Algebra (AS 91027) and Graphs (AS 91028) externals. This course progresses from the Year 13 Mathematics with Calculus course.
12 Mathematics with Statistics:	12 credits in Level 1 Mathematics. At least an Achieved grade in either the Algebra (AS 91027) or Graphs (AS 91028) externals. Students from Level 1 Mathematics should also aim for an Achieved grade in the Multivariate Statistics (AS 91035) and Chance (AS 90137) internals. This course progresses from the Year 12 Mathematics and Statistics course. This course should not be done in combination with 13 Statistics.
12 General Mathematics:	12 credits in Level 1 Mathematics.

The School Examination results from Term Three will provide pre-entry into these courses. If you do not gain pre-entry, you will need to use your NZQA examination results and risk missing out on a place in a course if the classes are full.

Year 11 Mathematics and Statistics Programme 2017:

TERM I			TERM II			TERM III			TERM IV		
1	30-Jan to 3-Feb	Teacher Only Teacher Only	1	1-May to 5-May	Teacher Only 1.2 Algebra External 4 Credits	1	24-Jul to 28-Jul	Teacher Only Tutor interviews 1.3 Graphs External 4 Credits	1	16-Oct to 20-Oct	Revision
2	6-Feb to 10-Feb	Tutor interviews Waitangi Day 1.6 Geometry External 4 Credits	2	8-May to 12-May		2	31-Jul to 4-Aug		2	23-Oct to 27-Oct	Labour day
3	13-Feb to 17-Feb		3	15-May to 19-May		3	7-Aug to 11-Aug		3	30-Oct to 3-Nov	
4	20-Feb to 24-Feb		4	22-May to 26-May		4	14-Aug to 18-Aug		4	6-Nov to 10-Nov	Exam Leave begins
5	27-Feb to 3-Mar		5	29-May to 2-Jun	1.4 Linear Algebra Internal 3 Credits	5	21-Aug to 25-Aug	Geom and Graphs Common Test Algebra	5	13-Nov to 17-Nov	Junior Exams Exams Start
6	6-Mar to 10-Mar		6	5-Jun to 9-Jun	Queens BDay	6	28-Aug to 1-Sep		6	20-Nov to 24-Nov	Show Day
7	13-Mar to 17-Mar	1.10 Statistics Internal 4 Credits	7	12-Jun to 16-Jun	1.13 Probability Internal 3 Credits	7	4-Sep to 8-Sep		7	27-Nov to 1-Dec	
8	20-Mar to 24-Mar		8	19-Jun to 23-Jun		8	11-Sep to 15-Sep		8	4-Dec to 8-Dec	Teacher Only Teacher Only
9	27-Mar to 31-Mar		9	26-Jun to 30-Jun		9	18-Sep to 22-Sep	Prelim Exams Algebra CAT			
10	3-Apr to 7-Apr	Tournament week	10	3-Jul to 7-Jul				3 WEEKS BREAK			
		3 WEEKS BREAK			2 WEEKS BREAK						

11 Mathematics 2017

Summary of Requirements for Level One Standards

This section contains a summary of the expected outcomes for each of the Statistics Level One Achievement Standards. The purpose of this summary is to give students a simplified and easily accessed idea of what will be assessed for each standard. These summaries in no way replace the actual Achievement Standards and it is assumed that teachers will both provide access to the standards and will fully explain the standards to the students during the normal teaching and learning process. Students will also have access to exemplars that indicate achievement levels for each assessment.

<i>Internal assessment credits</i>	<i>External assessment credits</i>
11	12

External Assessments:

Mathematics with Statistics 91027/4: A.S 1.2 Apply algebraic procedures in solving problems

External: 4 credits

The following achievement objectives taken from the Equations and Expressions, and Patterns and Relationships threads of the Mathematics and Statistics learning area are related to this standard:

- generalise the properties of operations with fractional numbers and integers
 - generalise the properties of operations with rational numbers including the properties of exponents
 - form and solve linear equations and inequations, quadratic and simple exponential equations, and simultaneous equations with two unknowns.
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- This standard will be summatively assessed by a Common Assessment Task MCAT late in Term 3 (Sept 19th).
 - Electronic technology is not permitted in the assessment of this achievement standard.

Mathematics with Statistics 91028/3: A.S 1.3 Investigate relationships between tables, equations and graphs

External: 4 credits

The following achievement objectives taken from the Patterns and Relationships, Equations and Expressions, and Number Strategies and Knowledge threads of the Mathematics and Statistics learning area are related to this achievement standard:

- find optimal solutions, using numerical approaches
 - solve linear equations and inequations, quadratic and simple exponential equations, and simultaneous equations with two unknowns
 - relate graphs, tables, and equations to linear, quadratic, and simple exponential relationships found in number and spatial patterns
 - relate rate of change to the gradient of a graph.
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- This standard will be studied in term three, before the school examinations.
 - The school examination will provide evidence for a derived grade for this topic, should the need arise.
 - Students will be summatively assessed in the NZQA external exam at the end of the year.

Mathematics with Statistics 91031/4: A.S 1.6 Apply geometric reasoning in solving problems

External: 4 credits

The following achievement objectives taken from the Shape thread of the Mathematics and Statistics learning area are related to this achievement standard:

- deduce the angle properties of intersecting and parallel lines and the angle properties of polygons and apply these properties
 - recognise when shapes are similar and use proportional reasoning to find an unknown length
 - use trigonometric ratios and Pythagoras' theorem in two dimensions
 - deduce and apply the angle properties related to circles.
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- This standard will be studied in term one and students will sit a formative assessment at the end of the unit.
 - The school examination will provide evidence for a derived grade for this topic, should the need arise.
 - Students will be summatively assessed in the NZQA external exam at the end of the year.

Internal Assessments

Mathematics with Statistics 91029/3: A.S 1.4 *Apply linear algebra in solving problems.*

Internal: 3 credits

The following achievement objectives taken from the Equations and Expressions, and Patterns and Relationships threads of the Mathematics and Statistics learning area.

Students need to be familiar with methods related to:

- using formulae
 - forming, graphing or manipulating linear models such as when solving problems
 - comparing the rate of change to the gradient of a graph
 - using simultaneous equations, inequations, or graphs when solving problems such as those involving simple linear programming.
- Students will have the opportunity for formative assessment(s) before the actual NCEA summative task.
 - There will be ONE reassessment opportunity for this standard, should a student not achieve the Standard or would like to improve their grade.
 - There will not be a resubmission opportunity for this standard.

Mathematics with Statistics 91035/3: A.S 1.10 *Investigate a given multivariate data set using the statistical enquiry cycle.*

Internal: 4 credits

The achievement standard is aligned to the Statistical Investigation thread of the Mathematics and Statistics learning area.

Students need to be familiar with the statistical enquiry cycle to investigate a given multivariate data set, which involves:

- investigating data that has been collected from a survey situation
 - posing an appropriate comparison question using a given multivariate data set
 - selecting and using appropriate display(s)
 - giving summary statistics such as the five summary values (minimum, maximum, median, quartiles)
 - discussing features of distributions comparatively, such as shape, middle 50%, shift, overlap, spread, unusual or interesting features
 - communicating findings, such as informal inference and supporting evidence, in a conclusion.
- Students will have the opportunity to write a practice report for formative assessment before the actual NCEA summative task.
 - There will be a resubmission opportunity for this standard should a student fall slightly short of a grade.
 - There will not be a reassessment opportunity for this standard.

Mathematics with Statistics 91038/3: A.S 1.13 *Investigate a situation involving elements of chance.*

Internal: 3 credits

The achievement standard is aligned to the following achievement objectives taken from the Probability thread of the Mathematics and Statistics learning area:

- Compare and describe the variation between theoretical and experimental distributions in situations that involve elements of chance.
 - Investigate situations that involve elements of chance:
 - comparing discrete theoretical distributions and experimental distributions, appreciating the role of sample size
 - calculating probabilities in discrete situations.
- Students will have the opportunity to write a practice report for formative assessment before the actual NCEA summative task.
 - There will be a resubmission opportunity for this standard should a student fall slightly short of a grade.
 - There will not be a reassessment opportunity for this standard.

11 Mathematics: How am I going?

Below is some space for you to track your achievement in this course.

INTERNAL SUMMATIVE ASSESSMENTS

Topic	1 st Assessment	Reassessment (if sat)	Final (best) Grade
1.1 Numeric Reasoning (Done at the end of year 10)			
1.4 Linear Algebra			
1.10 Multivariate Statistics			
1.13 Elements of Chance			

EXTERNAL FORMATIVE ASSESSMENT

Topic	School Prelim (derived grade)
1.2 Algebra	
1.3 Graphs, Tables and Equations	
1.6 Geometry	

Course Endorsement: *am I on track?*

What do I need? 14 or more credits at Merit or Excellence at the lower level supports endorsement

What have I got?

At least 3 credits from internally assessed standards	Total of internal <i>Merit</i> credits achieved	Total of internal <i>Excellence</i> credits achieved
At least 3 credits from externally assessed standards	Total of internal <i>Merit</i> credits needed	Total of internal <i>Excellence</i> credits needed