**Year 11 Mathematics Applications Program 2015**

**Home Learning:** As a general rule it will be set every Monday and due every Thursday. Please provide note (in diary or otherwise) if student was unable to complete home learning in time.

**Calculators:** A Casio Classpad II will be used throughout this course, with some units being calculator free.

**Tutoring:** Available Wednesday afternoons (unless otherwise specified) from 3:10 to 4:00 depending on student availability.

**Text:** Nelson Senior Maths – General 11 – Macbeth-Dunn et al

<table>
<thead>
<tr>
<th>Term 1</th>
<th>Week</th>
<th>Topic</th>
<th>Syllabus Entry</th>
<th>Chapter</th>
<th>Assessment Task</th>
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<tbody>
<tr>
<td>1-3</td>
<td></td>
<td>Percentages &amp; Rates</td>
<td>Applications of rates and percentages (1.1.4-1.1.6)</td>
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<tr>
<td></td>
<td></td>
<td>• Review of percentages</td>
<td>• compare prices and values using the unit cost method</td>
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<td>• Percentage of a quantity</td>
<td>• apply percentage increase or decrease in contexts, including determining the impact of inflation on costs and wages over time, calculating percentage mark-ups and discounts, calculating GST, calculating profit or loss in absolute and percentage terms, and calculating simple and compound interest</td>
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<td>• Finding the whole from a given percentage</td>
<td>• use currency exchange rates to determine the cost in Australian dollars of purchasing a given amount of a foreign currency, or the value of a given amount of foreign currency, when converted to Australian dollars</td>
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<td>• Percentage increase and decrease</td>
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<td>• Repeated percentage change</td>
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<td>• Mark-ups and discounts</td>
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<td>• Profit and loss</td>
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<td>• Inflation and GST</td>
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<td>• Review of rates</td>
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<td>• Converting rates</td>
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<td>• Currency exchange rates</td>
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<td>• Best buys</td>
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</tbody>
</table>
## Earning Money
- Wages, salaries and overtime
- Commission and piecework
- Bonuses, allowances and annual leave loading
- Government allowances and pensions
- Budgeting
- Investing in shares

## Simple & Compound Interest
- Simple interest
- Simple interest: calculating principal, rate or time
- Savings accounts and credit cards
- Compound interest
- Compound interest: calculating principal, rate or time
- Using finance solvers for compound interest problems

## Applications of rates and percentages (1.1.1-1.1.3 & 1.1.7)
- calculate weekly or monthly wage from an annual salary, wages from an hourly rate, including situations involving overtime and other allowances, and earnings based on commission or piecework
- calculate payments based on government allowances and pensions
- prepare a personal budget for a given income taking into account fixed and discretionary spending
- calculate the dividend paid on a portfolio of shares given the percentage dividend or dividend paid for each share, and compare share values by calculating a price-to-earnings ratio

## Use of spread sheets (1.1.8)
- use a spreadsheet to display examples of the above computations when multiple or repeated computations are required; for example, preparing a wage-sheet displaying the weekly earnings of workers in a fast food store where hours of employment and hourly rates of pay may differ, preparing a budget, or investigating the potential cost of owning and operating a car over a year

## 4-6
- **Week 4: Topic Test 1**
  - Chapter 1 Percentages & Rates

## 7-8
- **Week 7: Investigation 1 due with validation test**
  - Financial Mathematics (given week 5)

## 9 CAMP

## Linear and non-linear expressions (1.2.1-1.2.3)
- substitute numerical values into algebraic expressions, and evaluate (with the aid of technology where complicated numerical manipulation is required)
- determine the value of the subject of a formula, given the values of the other pronumerals in the formula (transposition not required)
- use a spreadsheet or an equivalent technology to construct a table of values from a formula, including tables for formulas with two variable quantities; for example, a table displaying the body mass index (BMI) of people of different weights and heights

## Term 2

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<th>Chapter</th>
<th>Assessment Task</th>
</tr>
</thead>
</table>
| 1-3  | Measurement Calculations | Pythagoras’ theorem (1.3.1)  
  - use Pythagoras’ theorem to solve practical problems in two dimensions and for simple applications in three dimensions  
  Mensuration (1.3.2-1.3.4) | 5 | |
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
</table>
| 4-5  | Scales & Similarity | - Areas of composite figures  
- Surface areas of prisms and cylinders  
- Surface areas of pyramids, cones and spheres  
- Surface areas of composite solids  
- Volume and capacity: prisms and cylinders  
- Volume and capacity: pyramids, cones and spheres  
- Volume and capacity: composite solids  

- Areas of similar figures  
- Surface areas and volumes of similar solids  

- Similar figures and scale factors (1.3.5-1.3.8)  
  - review the conditions for similarity of two-dimensional figures, including similar triangles  
  - use the scale factor for two similar figures to solve linear scaling problems  
  - obtain measurements from scale drawings, such as maps or building plans, to solve problems  
  - obtain a scale factor and use it to solve scaling problems involving the calculation of the areas of similar figures and surface areas and volumes of similar solids  

  | 7 | Week 4: Topic Test 3  
Chapters 2 & 5  
Algebra & Measurement |
| 6   | Start Matrix Arithmetic |  |
| 7-8 | Revision & Exam |  |
| 9-10| Matrix Arithmetic | - Areas of composite figures  
- Surface areas of prisms and cylinders  
- Surface areas of pyramids, cones and spheres  
- Surface areas of composite solids  
- Volume and capacity: prisms and cylinders  
- Volume and capacity: pyramids, cones and spheres  
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  | 3 | Week 11: Topic Test 4  
Chapter 3  
Matrices |
| 9-10| Matrices and matrix arithmetic (1.2.4-1.2.7) | - Areas of composite figures  
- Surface areas of prisms and cylinders  
- Surface areas of pyramids, cones and spheres  
- Surface areas of composite solids  
- Volume and capacity: prisms and cylinders  
- Volume and capacity: pyramids, cones and spheres  
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  | 3 | Week 11: Topic Test 4  
Chapter 3  
Matrices |
| 11  | Start Statistical Measures |  |
### Term 3

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<tr>
<th>Week</th>
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</table>
| 1-4  | Statistical Measures | - Collection of data  
- Types of data  
- Displaying categorical data  
- Displaying numerical data: stem-and-leaf plots and dot plots  
- Displaying numerical data: histograms  
- Describing the distribution of numerical data  
- Measures of central tendency: mean  
- Measures of central tendency: median and mode  
- Measures of spread: range and interquartile range  
- Measures of spread: standard deviation  
- Boxplots  
Making Comparisons | - Use of summary statistics  
- Working with outliers  
- Using the mean and standard deviation to describe and compare data  
- Side-by-side column graphs  
- Back-to-back stem-and-leaf plots  
- Constructing and interpreting parallel boxplots  
The statistical investigation process | - review the statistical investigation process; identifying a problem and posing a statistical question, collecting or obtaining data, analysing the data, interpreting and communicating the results  
Making sense of data relating to a single statistical variable | - classify a categorical variable as ordinal, such as income level (high, medium, low) or nominal, such as place of birth (Australia, overseas) and use tables and bar charts to organise and display data  
- classify a numerical variable as discrete, such as the number of rooms in a house, or continuous, such as the temperature in degrees Celsius  
- with the aid of an appropriate graphical display (chosen from dot plot, stem plot, bar chart or histogram), describe the distribution of a numerical data set in terms of modality (uni or multimodal), shape (symmetric versus positively or negatively skewed), location and spread and outliers, and interpret this information in the context of the data  
- determine the mean and standard deviation of a data set using technology and use these statistics as measures of location and spread of a data distribution, being aware of their limitations  
- use the number of deviations from the mean (standard scores) to describe deviations from the mean in normally distributed data sets  
- calculate quantiles for normally distributed data with known mean and standard deviation in practical situations  
- use the 68%, 95%, 99.7% rule for data one, two and three standard deviations from the mean in practical situations  
- calculate probabilities for normal distributions with known mean \( \mu \) and standard deviation \( \sigma \) in practical situations  
Comparing data for a numerical variable across two or more groups | - construct and use parallel box plots (including the use of the ‘Q1 – 1.5 x IQR’ and ‘Q3 + 1.5 x IQR’ criteria for identifying possible outliers) to compare groups in terms of location (median), spread (IQR and range) and outliers, and interpret and communicate the differences observed in the context of the data  
- compare groups on a single numerical variable using medians, means, IQRs, ranges or standard deviations, and as appropriate; interpret the differences observed in the context of the data and report the findings in a systematic and concise manner  
- implement the statistical investigation process to answer questions that involve comparing the data for a numerical variable across two or more groups; for example, are Year 11 students the fittest in | Chapter | Assessment Task |
| 8 & 11 | J. Klup 3AB Ch 7 |
5-10 Linear Equations & Graphs
- Review of linear equations
- Graphing straight lines
- Calculating the gradient of a line
- The general equation of a straight line
- Graphing using gradient and y-intercept
- Special lines
- Developing a linear formula

Applications of Simultaneous Equations, Piecewise and Step Graphs
- Review of linear graphs
- Solving simultaneous equations graphically
- Solving simultaneous equations by substitution
- Solving simultaneous equations by elimination
- Practical applications of simultaneous equations
- Drawing piecewise graphs
- Applications involving piecewise graphs
- Step graphs

Linear equations
- identify and solve linear equations (with the aid of technology where complicated manipulations are required)
- develop a linear formula from a word description and solve the resulting equation

Straight-line graphs and their applications
- construct straight-line graphs both with and without the aid of technology
- determine the slope and intercepts of a straight-line graph from both its equation and its plot
- construct and analyse a straight-line graph to model a given linear relationship; for example, modelling the cost of filling a fuel tank of a car against the number of litres of petrol required.
- interpret, in context, the slope and intercept of a straight-line graph used to model and analyse a practical situation

Simultaneous linear equations and their applications
- solve a pair of simultaneous linear equations graphically or algebraically, using technology when appropriate
- solve practical problems that involve determining the point of intersection of two straight-line graphs; for example, determining the break-even point where cost and revenue are represented by linear equations

Piece-wise linear graphs and step graphs
- sketch piece-wise linear graphs and step graphs, using technology when appropriate
- interpret piece-wise linear and step graphs used to model practical situations; for example, the tax paid as income increases, the change in the level of water in a tank over time when water is drawn off at different intervals and for different periods of time, the charging scheme for sending parcels of different weights through the post

9 & 10

Week 5:
- Chapter 5
- Topic Test

Statistics & Comparisons

Week 7:
- Investigation 2 due with validation test

Statistics (given week 6)

Week 10:
- Chapter 10
- Topic Test 6
- Linear & simultaneous equations & graphs

Term 4

<table>
<thead>
<tr>
<th>Week</th>
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</thead>
</table>
| 1-3  | Applications of Trigonometry | use trigonometric ratios to determine the length of an unknown side, or the size of an unknown angle in a right-angled triangle
- determine the area of a triangle, given two sides and an included angle by using the rule
  \[
  \text{area} = \frac{1}{2} ab \sin C, \quad \text{or given three sides by using Heron's rule, and solve related practical problems}
  \]
- solve problems involving non-right-angled triangles using the sine rule (acute triangles only when determining the size of an angle) and the cosine rule
- solve practical problems involving right-angled and non-right-angled triangles, including problems | 10 | Investigation 4 due with validation test
- Applications of Trigonometry (given week 3)
• The sine rule: finding an unknown angle
• The cosine rule
• Mixed applications involving non-right-angled triangles
• Area of a triangle: trigonometry
• Area of a triangle: Heron’s formula

<table>
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<tr>
<th>Assessment</th>
<th>Date</th>
<th>Number &amp; Algebra</th>
<th>Measurement</th>
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