St Stephen's School

YEAR 11 MAT 3AB

PROGRAMME 2009

Text:, *A J Sadler. Unit 3A, Unit 3B*

Week	Curriculum Council Objective and Content	Ref	Assessment
1.1 1.2	**Unit 3A** *2.2* ***Measurement*** 2.2.1 use the unit circle to identify sine and cosine ratios for acute and obtuse angles (degree measure only) 2.2.2 use the formula *area ΔABC* = $\frac{1}{2}ab\sin C$ 2.2.3 use the sine and cosine rules to determine sides and angles of triangles (two-dimensional contexts only).	Ch 1	
1.3	*1.1* ***Estimation and calculation*** 1.1.1 use mental strategies for estimation in context 1.1.2 evaluate the absolute value of rational numbers 1.1.3 use calculators efficiently 1.1.4 round numbers to a given number of significant figures 1.1.5 round, truncate and choose appropriate accuracy as part of calculation and estimation 1.1.6 recognise the effects of rounding and truncating on the accuracy of results 1.1.7 use the laws of indices to simplify numerical and algebraic expressions and to solve equations.	Ch 2	I1 (5%) (SC)
1.4	*3.1* ***Quantify chance*** 3.1.1 use lists, tree diagrams and two-way tables to determine sample spaces for two- and three- stage events 3.1.2 use Venn diagrams to represent sample spaces for two events and to illustrate subset, intersection, union and complement 3.1.3 use sample spaces to calculate simple probabilities and probabilities for compound events 3.1.5 use the relationship P(A) + P(A′) = 1 to calculate probabilities for complementary events 3.1.6 use set and probability notation such as n(U), n(A), n(A') or n($\overline{A}$), n(A $\cup$ B), n(A $\cap$ B), n(A|B) and P(A), P(A'), P(A $\cup$ B), P(A' $\cap$ B) 3.1.7 calculate probabilities for normal distributions with known mean μ and standard deviation σ 3.1.8 use the 68%, 95%, 99.7% rule for data one, two and three standard deviations from the mean 3.1.9 use probability notation for normal random variables such as P(X < *x*) .	Ch 3	
1.5	3.1.4 use addition and multiplication principles for counting, and use the counts to calculate probabilities	Ch 4	T1 (5%) Ch 1 – 4 (JK)

1.6 1.7	*1.2* ***Equations and inequalities*** 1.2.1 formulate and solve one variable equations and inequalities (absolute value terms not included) 1.2.2 formulate systems of linear equations and inequalities in two variables from word descriptions 1.2.3 solve systems of linear equations in two variables by elimination 1.2.4 solve two-variable linear programming problems graphically, without sensitivity analysis. *1.3* ***Equations and inequalities*** 1.3.1 rearrange algebraic expressions into forms useful for computation, including factorising $a^2x^2-b^2$ and x^2+bx+c 1.3.2 solve algebraically and graphically: • quadratic equations in factored form • cubic equations in factored form • exponential equations $ab^{kx}=c$, $b>0$ (logarithms not required) • simple power equations $x^n=c$, • n = 2, 3, ½, ⅓, -1. 1.3.3 solve simultaneous equations graphically, including linear and quadratic equations 1.3.4 describe how one quantity varies with another by inspecting the formula that relates them, including quantities that are inversely proportional 1.3.5 solve inverse proportion problems 1.3.6 relate the ideas of inverse proportion and reciprocal functions. *2.1* ***Rate*** 2.1.1 convert between rate units including kilometres per hour and metres per second 2.1.2 interpret function of time relationships $y=f(t)$ including distance and displacement relationships 2.1.3 sketch and interpret graphs for $y=f(t)$ relationships 2.1.4 recognise that rate of change is constant for linear relationships.	Ch 5	
1.8 1.9	*3.4* ***Represent data*** 3.4.3 calculate mean, median and mode for ungrouped frequency data and recognise that averages indicate location of frequency distributions 3.4.4 calculate weighted mean, mean for grouped data, and median and modal classes 3.4.5 describe spread between data displayed in frequency tables and graphs using terms such as gaps, clusters, more dense/less dense regions, outliers, symmetry and skewness 3.4.7 determine the standard deviation, σ_n, for grouped and ungrouped data using the inbuilt facility on a calculator 3.4.8 identify extreme and unexpected values 3.4.9 calculate outliers (values more than 1.5 × interquartile range beyond the upper and lower quartiles). 12.3.1.1	Ch 6	I2 (5%) (JK)
	3.4 ***Represent data*** 3.4.1 construct frequency histograms for grouped and ungrouped data	Ch 7	

1.10	3.4.2 construct boxplots for ungrouped data, outliers not distinguished 3.4.6 calculate cumulative frequency, quartiles and interquartile range for ungrouped data and use them to describe spread *3.5* ***Interpret data*** 3.5.1 discern connections between frequency histograms and boxplots, including the shape of histograms for provided boxplots 3.5.2 discern the advantages/ disadvantages of using frequency histograms and boxplots to display data 3.5.3 discern effects of different equal-sized class intervals on histograms 3.5.4 discern viability of interquartile range, range and standard deviation for ranking datasets in order of spread 3.5.5 interpret spread summaries in terms of their mathematical definitions 3.5.6 reason to include or exclude outliers 3.5.7 discern effects on summary statistics of cropping data (including outliers) 3.5.8 compare datasets, combining interpretation of mean, standard deviation, and skewness or symmetry about the mean 3.5.9 compare datasets, combining interpretation of median, interquartile range and skewness or symmetry about the median 3.5.10 compare scores from two or more sets of data using number of standard deviations from the mean (standard scores) 3.5.11 infer results for populations from samples, recognising possible chance variation between them 3.5.12 show how data can be manipulated to serve different purposes.		
1.11	*1.4* ***Patterns*** 1.4.1 use recursion to determine terms and sums for sequences including arithmetic and geometric sequences 1.4.2 use recursion to study growth and decay. *1.5* ***Finance*** 1.5.1 construct and interpret spreadsheets for making financial decisions 1.5.2 judge adequacy of spreadsheets and make refinements if necessary 1.5.3 calculate loans with reducible interest, including determining the number of years for the balance to fall to a specified amount 1.5.4 calculate annuities using a spreadsheet 1.5.5 interpret and make decisions about loan and repayment amounts with reducible interest.	Ch 8	T2 (10%) Ch 5 - 8 (SC)
1.12	*3.2* ***Interpret chance*** 3.2.1 use probabilities to predict proportions and number of outcomes that are likely to satisfy provided criteria in ***n*** trials 3.2.2 estimate population size using the capture/recapture technique *3.3* ***Collect and organise data*** 3.3.1 plan sampling methods (systematic, random, stratified, self-selection, convenience) and justify choosing a sample instead of a census.	Ch 9	
1.13 1.14	3.2.3 calculate quantiles for normally distributed data with known mean and standard deviation 3.2.4 use number of standard deviations from the mean (standard scores) to describe deviations from the mean in normally distributed data sets.	Ch 10	

1.15	Review 3A		
1.16 1.17	Exams		Exam Sem 1 (20%)
1.18	Unit 3B *1.1* ***Functions and graphs*** 1.1.1 apply polynomial, exponential and power functions to practical situations including optimisation and use numerical and graphical techniques 1.1.2 interpret graphs: – domain and range – intercepts and points – slope at a point – local and global maxima and minima.	Ch 1	
1.19 1.20	*1.3* ***Calculus*** 1.3.1 understand the calculus of polynomial functions: – average rate of change – derivative as instantaneous rate of change and slope of a curve at a point – limit (informally) – indefinite integral as an anti-derivative 1.3.2 differentiate $y = x^n$, n a whole number 1.3.3 use the sum and product rules to differentiate polynomials 1.3.4 use differentiation to determine tangent lines at a point for polynomial functions 1.3.5 use differentiation to sketch polynomial functions (points of inflection not required) 1.3.8 use notations for the derivative: y', f', $f'(x)$, $\frac{dy}{dx}$, $\frac{df}{dx}$ and $\frac{d}{dx}f(x)$	Ch 2	
2.1 2.2	1.3.6 use differentiation to solve optimisation problems with polynomial functions	Ch 3	
2.3 2.4	1.3.7 determine and interpret the anti-derivatives of polynomial functions that are expressed in expanded form	Ch 4	I3 (5%) (SC)
2.5	*2.1* ***Measurement*** 2.1.1 estimate the area between the x-axis and graphs of simple polynomial functions using the areas of circumscribed and inscribed rectangles.	Ch 8	T3 (10%) Ch 1 – 4 (JK)
2.6	*3.1* ***Represent data*** 3.1.1 describe association (positive, negative, weak, strong or none)	Ch 5	

2.7	3.1.2 determine Pearson's correlation coefficient *r* using a calculator 3.1.3 describe properties of regression lines (least-squares relationship and passing through $(\bar{x}, \bar{y})$) 3.1.4 calculate and graph regression models for data with linear trends 3.1.5 calculate residuals for linear models and construct residual plots *3.2* ***Interpret data*** 3.2.1 place expressions of association (weak, strong etc.) on a scale from -1 to 1 3.2.2 recognise correlation does not imply causality 3.2.3 discern 'goodness of fit' for regression lines, using visual inspection of scatterplots, residual plots and correlation coefficient 3.2.4 consider regression lines: – to include or crop outliers – effects on the lines of cropping outliers and other data – whether intercepts are valid – variables that explain data above and below the lines – alternative models that might fit data better than a line including quadratic, exponential 3.2.5 predict from regression lines, recognising the risks of extrapolation, and assess reliability 3.2.6 explain why regression lines are used for prediction, rather than data points and why predicted and actual results are likely to differ 3.2.7 recognise that regression lines for samples and populations may differ due to chance variation 3.2.8 predict from regression lines, making seasonal adjustments for periodic data.		
2.8	***Represent data*** 3.1.6 calculate moving averages, regression lines for moving averages, and seasonal adjustments for periodic time-series data.	Ch 6	
2.9 2.10	*1.2* ***Equations and inequalities*** 1.2.5 formulate and solve one variable equations and inequalities (absolute value terms not included) 1.2.6 formulate systems of linear equations and inequalities in two variables from word descriptions 1.2.7 solve systems of linear equations in two variables by elimination 1.2.8 solve two-variable linear programming problems graphically, without sensitivity analysis.	Ch 7	
2.11	*2.2* ***Networks*** 2.2.1 analyse project networks 2.2.2 construct project networks 2.2.3 determine critical paths and minimum completion times for projects with fixed activity times.	Ch 9	T4 (10%) Ch 5 – 8 (SC)
2.12	*2.3* ***Reason geometrically*** 2.3.1 distinguish general geometric arguments from those based on specific cases 2.3.2 follow and ascertain the validity of geometric arguments.	Ch 9 (page 151) Worksheet	

2.13	*1.4* ***Patterns*** 1.4.1 make conjectures about numbers such as the 'sum of two odd numbers is even' 1.4.2 search for counter-examples to conjectures in order to disprove them 1.4.3 construct simple deductive proofs using algebra such as 'prove that the sum of two odd numbers is even' 1.4.4 follow algebraic deductive arguments and ascertain their validity.	Ch 12	
2.14	Review 3A and 3B		
2.15 2.16	Exam 3A and 3B		Exam Sem 2 (30%)

Assessment Weightings

Type	Number	Weightings %	Total %
Investigations	3	5, 5, 5	15
Tests	4	5, 10, 10, 10	35
Exams	2	20, 30	50

Full details of the Calculus syllabus is found at the Curriculum Council website at www.curriculum.wa.edu.au