Immanuel Lutheran College

S.6   Mathematics & Statistics Course Outline (2010 – 2011)

Teacher(s): Ho KC

Textbook: New Way Mathematics & Statistics for HKASL (2nd Edition), Chow Wai-keung, Li Kam-yuk, Manhattan

Reference Book: A Concise Course in Maths & Stat. For HKASLE, C. S. Lee, Learner's Series

Book 1

Chapter 1 – Permutations and Combinations

Date		Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
2 sep - 13 sep	1	State the multiplication principle of counting. Students should be able to find the number of possible ways of performing several operations in sucession	1	Multiplication principle of counting	Exercise 1.1 (p. 5)
	2	Students should be familiar with the factorial notation	2	Factorial notation n! and definition of nPr	Worksheets about permutation
	3	Students should be able to state and make use of the definition nPr in tackling problems about permutation.			
	4	Familiar with the definition of nCr and understand it as the number of different combinations of choosing r objects out of n.	2	Combination, definition of nCr	Worksheets about combination
	5	Solve simple problems about arrangement, selection, and ordered partition	2	Useful characteristics of nCr	

Chapter 2 – The Binomial Expansion

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
14 sep - 30 sep	1. The definition of Binomial Theorem	2	Binomial theorem	Worksheet on Binomial theorem
	2. Able to expand expression in the form of $(a+b)^n$ and $(1+x)^n$, where n is positive integer	1		Exercise 2.2
	3. Get familiar with the summation notation and able to use it to express several terms using the summation sign.			
	4. Students should be able to state the general terms of a binomial expansion and use it to find the coefficient of a specified term	2		Worksheets on Binomial theorem
	5. Students should be able to use binomial series to expand $(1+x)^n$, when n is not positive integer in ascending power of x.	3		Work sheets on Binomial Series
				Test (1)

Chapter 3 – The Exponential Functions

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
4 oct - 22 oct	1. Revision on the law of indices	2	Law of indices	Worksheets on indices
	2. Definition of an exponential function	3	Exponential function and its graph	Worksheets, Graph papers
	3. Graphs of exponential function			
	Solve simple equations with unknown indices	2	Equations involving unknown indices	Exercise 3.2
	4. Definition of the function e^x	3	Exponential Series	Worksheets on Exponential Series
	5. Expressing e^x using binomial series (Exponential series)			
	Application of exponential function in daily life.	2	Application problems of exponential functions	Worksheets on application of exponential function
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Chapter 4 – Logarithmic Functions

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
25 0ct	1.Definition of Logarithmic function	2	Properties of logarithmic functions, Laws of Logarithms	Worksheets on log
-	2.Properties of Logarithmic function			
15 nov	3.Solving equations using logarithmic functions	2		
	4.Graphs of Logarithmic function	2	Graphs of logarithmic function	Graph papers
	5.Reduction of exponential function to linear graph	2	Logarithmic Transformations	Worksheets and graph paper
	6.Application of Logarithmic function in daily life	2	Applications of Logarithmic Functions	Exercise 4.4

Chapter 5 – Limits and Derivatives

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
16 nov	1.Understand the idea of function and limit, the limit notation		Idea of functions, Limits of Functions	Exercise 5.2, 5.3
-	2.Evaluate limits of simple functions	3	Evaluation of Limits, Properties of limit	
25 nov	3.Understand the idea of a derivative, the notation of Δx		Derivatives of Functions	Exercise 5.4
	4.able to find derivatives of simple functions from first principles.	2		
				Test (2)

Chapter 6 – Differentiation

Date	Objectives	Periods	Contents	Teaching Aids /

Date	Objectives	Periods	Contents	Relevant Ex. / Tests / Remarks
29 nov	1.Find the derivative of a function using the differentiation rules	3	Differentiation of a function, product and quotient rule	Exercise 6.1, 6.2
-	2.Do Differentiation using chain rule		Chain rule	Exercise 6.3
17 dec	3.differentiation of inverse function	2	Differentiation of composite function	Exercise 6.4
	4.Differentiation of implicit functions	2	Differentiation of implicit functions	Exercise 6.5
	5.Differentiation of Log, exponential function	3		
	6.Second derivatives	2		**First term Exam**

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Chapter 7 – Applications of Differentiation

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
19 Jan	1.Understanding f'(x) is the rate of change of f(x) with respect to x	1	Gradients, Rate of change	Exercise 7.1, 7.2
-	2.Finding Gradient of a curve using first derivative	2		Worksheets and Graph
25 Feb	3.Students should be able to write down equation of tangent and normal to a curve	2		papers
	4.Identify increasing function, decreasing functions, finding local max. and min., turning point, stationary point, concave upward/downward, point of inflection	3	Maxima and Minima	Exercise 7.3
	5.Sketching simple curves	2	Concavity and Second Derivative Test, Asymtotes	Exercise 7.4, 7.5
	6.Solve problems involving finding max. and min. of a function	2	Problems on Maximization and Minimization	Exercise 7.6
	7.Understand the concept of a differential and use it in approximation	3	Approximation	Exercise 7.7
				Test (3)

Chapter 8 – Indefinite Integration

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
28 Feb - 16 Mar	1. Understanding ideas of primitive function and indefinite integration	2		Exercise 8.1
	2. The concept of indefinite integration as the reverse process of differentiation			
	3. Finding indefinite integral of various functions using basic integration formulae	2		Exercise 8.2
	4. Finding indefinite integrals using substitution	3		Exercise 8.3
	5. Students should be able to solve practical problems about indefinite integrals	3		Exercise 8.4

Chapter 9 – Definite Integration

Date	Objectives	Periods	Contents	Teaching Aids / Relevant Ex. / Tests / Remarks
21 mar - 29 apr	1. Evaluate definite integrals		Substitution in definite integration	
	2. Understanding the relationship between a definite integral and the area under curve	3	Plane areas	
	3. Find plane areas using definite integrals	2	Trapezoidal rule	
	1. Approximate definite integrals using the trapezoidal rule	3	Applications of definite integrals	
	2. Use definite integrals in application problems	2		**Test (4)**

Chapter 10 – Basic Statistical Measures

Date	Objectives	Periods	Contents	Relevant Ex. /

Date	Objectives	Periods	Contents	Remarks
3 may	1. Concepts about population and sample	2	Populations and Samples	Exercise 10.1
-	2.Calculate the mean of a set of ungrouped data	2	Measures of Central Tendency	Exercise 10.2
20 may	3.Calculate the mean of grouped data			
	4.Calculate the weighted mean, and be able to identify situations where it should be used			
	5.Finding median, mode	2		
	6.To understand the definition and be able to find the range, interquartile range and quartiles of a set of data	3	Measures of Dispersion	Exercise 10.3
	7.To find the variance and standard deviation of different types of data			

Chapter 11 – Basic Statistical Measures

Date	Objectives	Periods	Contents	Relevant Ex. / Remarks
23 may	1. Distinguish between a discrete variable and a continuous variable	1	Discrete and Continuous Variables	Exercise 11.1
-	2. Define relative frequencies, cumulative frequencies, cumulative relative frequencies and include them in frequency tables	2	Frequency tables	Exercise 11.2
8 jun	3. Draw bar charts to represent frequency distributions of qualitative or discrete variables	1	Graphical Representations	Exercise 11.3
	4. Draw histograms to represent frequency distributions of continuous variables, with equal or unequal class widths	1		
	5. Draw frequency polygons/curves and cumulative frequency polygons/curves	1		
	6. Construct stem-and-leaf diagrams for sets of data	1		
	7. Find basic statistical measures for frequency distributions	2	Statistical Measures for Frequency Distributions	Exercise 11.4
	8. Sketch symmetric and skewed distributions and mark on them the			

		Second Term Exam
relative positions of the mean, the median and the mode	1	
	10	