YEAR 12 - MATHEMATICS

HSC Topic 1 – MATHEMATICAL INDUCTION

MATHEMATICS EXTENSION 1

LEARNING PLAN			
Learning Intentions Student is able to:	**Learning Experiences** Implications, considerations and implementations:	**Success Criteria** I can:	**Resources**
understand the nature of inductive proof, including the 'initial statement' and the inductive step		Describe the inductive process of proof, setting up the initial statement and inductive step	Basic Skills for Mathematical Induction 1 Basic Skills for Mathematical Induction 2
prove results using mathematical induction for sums:	**NO AP's and GP's done as yet, so the use of these terms will be foreign.** eg (i) $1+4+9+...+n^2=n(n+1)(2n+1)/6$ for any positive integer n.	Construct an inductive proof for summation statements	Summation type

	(ii) $1^2+2^2+3^2+\square+n^2=\frac{1}{6}n(n+1)(2n+1)$ (iii) $1)$		
prove results using mathematical induction for divisibility:	eg (i) $3^{4n}-1$ is divisible by 80. (Note: Try and prove that $3^{4n}=80p+1$, p an integer). (ii) $3^{2n}-1$ is divisible by 8 for any positive integer n. (iii) Prove that 32n+4-22n is a multiple of 5. (iv) Prove by mathematical induction that n3+2n is divisible by 3 for all positive integers n.	Construct an inductive proof for divisibility statements	Divisibility type
identify errors in false 'proofs by induction'	eg. Cases where only one of the required two steps of a proof by induction is true, and understand that this means that the statement has not been proved. Show that the inductive step can be proven for the false proposition that 1+2+3+...+n=12(n-1)(n+2) for integers n≥1, but the initial case does not hold true	Recognise cases where the inductive process fails in one of the two steps and leads to a false proof	
recognise situations where proof by mathematical induction is not appropriate	e.g. to prove that $\sqrt{2}$ is irrational proof by contradiction, establishment of trigonometric identities.		

Established Goals(Syllabus Outcomes): ME12 -1, 6, 7
Estimated Time: 1 weeks (*4 lessons*)