



INDIAN SCHOOL DARSAIT

DEPARTMENT OF MATHEMATICS



Subject : Mathematics Topic : PMI Date of Worksheet :11/5/2017

Resource Person: Sunitha Rajeev Date of submission:16/5/2017

Name of the Student : _____ Class & Division : XI Roll Number : __

S.No.	Questions	Marks
Section A (Basics):		
<u>Steps to be followed:</u>		
Step 1: Consider the given statement to be P(n).		
Step 2: Prove P(1) is true.		
Step 3: Assume P(k) is true.		
Step 4: Prove P(k+1) is true.		
Section B :		
Prove the following by PMI:		
1.	$1 + 3 + 5 + \dots + (2n - 1) = n^2$	4
2.	$1.3 + 2.4 + 3.5 + \dots + n.(n + 2) = \frac{1}{6} n (n + 1)(2n + 7)$	4
3.	$a + (a + d) + (a + 2d) + \dots + (a + (n - 1)d) = \frac{n}{2} (2a + (n - 1) d)$	4
4.	$4^n + 15n - 1$ is divisible by 9 for all $n \in \mathbb{N}$	4
5.	Prove by induction that the sum of cubes of any three consecutive natural numbers is divisible by 9.	6
6.	Prove using PMI the rule of exponents $(ab)^n = a^n b^n, n \in \mathbb{N}$	4
7.	Prove that if 3^{2n} is divided by 8, the remainder is always 1, where n is a natural number.	6
Section C (Hots):		
1.	Using principle of mathematical induction, prove that	6
$\cos \alpha \cos 2\alpha \cos 4\alpha \dots \cos(2^{n-1}\alpha) = (\sin 2^n \alpha) / (2^n \sin \alpha)$ for all $n \in \mathbb{N}$		
2.	For all positive integer n, prove that	6
$(n^7/7) + (n^5/5) + (2n^3/3) - (n/105)$ is an integer		