

CHAPTER 4- PRINCIPLE OF MATHEMATICAL INDUCTION

Focus Area Based Questions

1. Consider the statement :

$$P(n): 1+3+3^2 + \dots + 3^{n-1} = \frac{3^n - 1}{2}.$$

a) Show that P(1) is true.

b) Prove by principle of Mathematical Induction that P(n) is true for all $n \in \mathbb{N}$.

2. Consider the statement “ $3^{2n+2} - 8n - 9$ is divisible by 8”.

a) Verify the statement is true for $n = 1$.

b) Prove the statement using the principle of mathematical induction for all natural numbers.

3. Consider the statement

$$P(n): 1^3 + 2^3 + 3^3 + \dots + n^3 = \left[\frac{n(n+1)}{2} \right]^2$$

a) Verify that P(n) is true.

b) By P.M.I show that P(n) is true for all $n \in \mathbb{N}$.

4. Prove that

$$1.2 + 2.3 + 3.4 \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$$

By using the Principle of mathematical induction for all $n \in \mathbb{N}$.

5. Consider the statement :

" $7^n - 3^n$ is divisible by 4"

- a) Verify the result for $n=1$.
- b) Prove the statement using mathematical induction.

6. Consider the statement :

$P(n): 1+3+5+\dots+(2n-1) = n^2$

- a) Verify $P(1)$ is true.
- b) Prove $P(n)$ by induction

PMI FOCUS AREA VIDEO LINK: <https://youtu.be/pHrvp78HliM>