MATHEMATICS SPECIALIST 3CD

SEMESTER 1 2010

EPW 1

MATHEMATICAL INDUCTION

VALIDATION

Name:_____

Time: 45 minutes Date: 25th March 2010

Total Marks 20

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1. (3 marks)

Explain briefly why the product $(n - 1).n.(n + 1)$ is always divisible by 6 where n is a positive integer.

For questions 2 and 3 the proofs should have the four steps mentioned below.

Step 1 Show it is true for n = 1

Step 2 Assume it is true for n = k
Step 3 Prove it is true for n = k + 1
Step 4 Concluding statement

2. (8 marks)

Use the principles of Mathematical Induction to prove that these results are true for all positive integers n.

$$1 + 4 + 7 + \ldots + (3n - 2) = \frac{n(3n - 1)}{2}$$

3. (9 marks)

Use Proof by Induction to verify de Moivre's theorem

$(|z|\text{cis}\theta)^n = |z|^n \text{cis}(n\theta)$ for all positive integers n.