NOTES: Finding Remainders of Big Powers (Power Mod) 1. What is MOD? MOD simply means the **remainder** after division. Example: 7 mod 5 = 2 because 7 = 5*1 + 2 (remainder 2) **2. Key Idea:** To find remainder of very big powers like 2^31, 7^19, 9^100: → We look for a repeating pattern in remainders. **3. Example: 2^31 mod 5** First find small powers: 2^1 = 2 → remainder 2 2^2 = 4 → remainder 4 2^3 = 8 → remainder 3 2^4 = 16 → remainder 1 Cycle = [2, 4, 3, 1] (length 4) **4. Reduce the exponent:** 31 mod 4 = 3 So 2^31 has same remainder as 2^3. 2^3 = 8 → 8 mod 5 = 3 **Final Answer:** 3 **5. Why you cannot reduce 2 to 1?** Because 2 mod 5 = 2 (NOT 1). Number smaller than divisor keeps itself as remainder. **6. Summary Shortcut:** 1. Find remainders of first few powers 2. Identify the cycle 3. Divide exponent by cycle length 4. Use the position in cycle to get remainder