How to Solve: Units' Digit of Power of 3

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YouTube Video Link to this Post is Here

Following is Covered in this post

Theory of Units' Digit of Power of 3

- **Find Units' digit of 3^{41}?**
- **Find Units' digit of 3^{97} ?**
- **Find Units' digit of 3^{52} ?**
- **Find Units' digit of 3^{40a+71} (given that a is a positive integer)?**
- **Find Units' digit of 133^{1855} ?**

Theory of Units' Digit of Power of 3

- **To find units' digit of any positive integer power of 3**

We need to find the cycle of units' digit of power of 3	
3^1 units' digit is 3	3^5 units' digit is 3
3^2 units' digit is 9	3^6 units' digit is 9
3^3 units' digit is 7	3^7 units' digit is 7
3^4 units' digit is 1	3^8 units' digit is 1

=> The power repeats after every 4^{th} power
=> **Cycle of units' digit of power of 3 = 4**
=> We need to divide the power by 4 and check the remainder
=> Units' digit will be same as Units' digit of $3^{Remainder}$

NOTE: If Remainder is 0 then units' digit = units' digit of 3^{Cycle} = units' digit of 3^4 = 1

Q1. Find Units' digit of 3^{41}?

Sol: We need to divided the power (41) by 4 and get the remainder
41 divided by 4 gives 1 remainder
=> Units' digit of 3^{41} = Units' digit of 3^1 = 3

Q2. Find Units' digit of 3^{97}?

Sol: 97 divided by 4 gives 1 remainder
=> Units' digit of 3^{97} = Units' digit of 3^1 = 3

Q3. Find Units' digit of 3^{52}?

Sol: 52 divided by 4 gives 0 remainder
=> Units' digit of 3^{52} = Units' digit of 3^4 = 1

Q4. Find Units' digit of 3^{40a+71} (given that a is a positive integer)?

Sol: Remainder of 40a + 71 divided by 4 = Remainder of 40a by 4 + Remainder of 71 by 4
= 0 + 3 = 3
=> Units' digit of 3^{40a+71} = Units' digit of 3^3 = 7

Q5. Find Units' digit of 133^{1855}?

Sol: Units' digit of power of any number = Units' digit of power of the units' digit of that number
=> Units' digit of 133^{1855} = Units' digit of 3^{1855}
=> Remainder of 1855 divided by 4 = Remainder of last two digits by 4

=> Remainder of 55 by 4 = 3
=> Units' digit of 133^{1855} = Units' digit of 3^3 = 7

Hope it helps!