

# How to Solve: Units' Digit of Power of 2

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Following is Covered in this post

## Theory of Units' Digit of Power of 2

- Find Units' digit of  $2^{31}$  ?
- Find Units' digit of  $2^{93}$  ?
- Find Units' digit of  $2^{48}$  ?
- Find Units' digit of  $2^{20x+74}$  (given that  $x$  is a positive integer)?
- Find Units' digit of  $132^{1955}$  ?

## Theory of Units' Digit of Power of 2

- To find units' digit of any positive integer power of 2

### We need to find the cycle of units' digit of power of 2

$2^1$  units' digit is 2

$2^2$  units' digit is 4

$2^3$  units' digit is 8

$2^4$  units' digit is 6

$2^5$  units' digit is 2

$2^6$  units' digit is 4

$2^7$  units' digit is 8

$2^8$  units' digit is 6

=> The power repeats after every 4<sup>th</sup> power

=> **Cycle of units' digit of power of 2 = 4**

=> We need to divide the power by 4 and check the remainder

=> Units' digit will be same as Units' digit of  $2^{\text{Remainder}}$

**NOTE: If Remainder is 0 then units' digit = units' digit of  $2^{\text{Cycle}}$  = units' digit of  $2^4 = 6$**

**Q1. Find Units' digit of  $2^{31}$ ?**

**Sol:** We need to divided the power (31) by 4 and get the remainder  
31 divided by 4 gives 3 remainder  
 $\Rightarrow$  Units' digit of  $2^{31} =$  Units' digit of  $2^3 = 8$

**Q2. Find Units' digit of  $2^{93}$ ?**

**Sol:** 93 divided by 4 gives 1 remainder  
 $\Rightarrow$  Units' digit of  $2^{93} =$  Units' digit of  $2^1 = 2$

**Q3. Find Units' digit of  $2^{48}$ ?**

**Sol:** 48 divided by 4 gives 0 remainder  
 $\Rightarrow$  Units' digit of  $2^{48} =$  Units' digit of  $2^4 = 6$

**Q4. Find Units' digit of  $2^{20x+74}$  (given that x is a positive integer)?**

**Sol:** Remainder of  $20x + 74$  divided by 4 = Remainder of  $20x$  by 4 + Remainder of 74 by 4  
 $= 0 + 2 = 2$   
 $\Rightarrow$  Units' digit of  $2^{20x+74} =$  Units' digit of  $2^2 = 4$

**Q5. Find Units' digit of  $132^{1955}$ ?**

**Sol:** Units' digit of power of any number = Units' digit of power of the units' digit of that number  
 $\Rightarrow$  Units' digit of  $132^{1955} =$  Units' digit of  $2^{1955}$   
 $\Rightarrow$  Remainder of 1955 divided by 4 = Remainder of last two digits by 4

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$\Rightarrow$  Remainder of 55 by 4 = 3  
 $\Rightarrow$  Units' digit of  $132^{1955} =$  Units' digit of  $2^3 = 8$

Hope it helps!