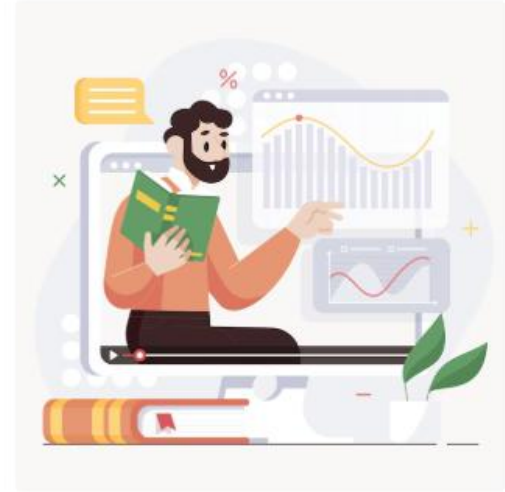# Quantitative Aptitude:
Number Systems

Unit's Place

Unit's Place: Problems Level 2

Q1. The unit's place of the number $34^{123!}$ is:

A. 4   B. 8   C. 1   D. 6 ✓

$4^{123!}$

$\Rightarrow 4^{EVEN}$

$\Rightarrow \underline{6}$

$0! = \underline{1}$

$1! = \underline{1}$
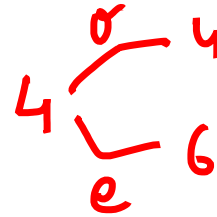
$2! = 2$

$3! = 3 \times 2 = 6$

$4! = 4 \times 3 \times 2 = 24$

$5! = 5 \times 4 \times 3 \times 2 = 120$

$n \geq 2 ; \quad n! = EVEN$

$4 \overset{o}{\underset{e}{\Big\langle}} \quad \begin{array}{l} 4 \\ 6 \end{array}$

$k \times 2 = even$

Q2. The unit's digit of the sum $54^{345!} + 89^{357!}$ is:

A. 7   B. 1   C. 5   D. 9

$$\Rightarrow \quad 4^{345!} + 9^{357!}$$

$$\Rightarrow \quad 4^{even} + 9^{even}$$

$$\Rightarrow \quad 6 + 1$$

$$\Rightarrow \quad 7$$

$$4 \begin{cases} o \to 4 \\ e \to 6 \end{cases} \qquad 9 \begin{cases} o \to 9 \\ e \to 1 \end{cases}$$

Q3. The unit's digit of $345^{222!} \times 654^{333!} + 789^{444!}$ is:

A. 3   B. 1   C. 5   D. 9

$5 \times 4^{333!} + 9^{444!}$

$5 \times 4^{E} + 9^{E}$

$= 5 \times 6 + 1$

$= 0 + 1 = 1$

$5 \rightarrow 5$

$4 \begin{cases} 4 \\ 6 \end{cases}$

$9 \begin{cases} 9 \\ 1 \end{cases}$

Q4. What is the last digit of the expression
$23!^{1234!} + 55!^{777!} \times 66!^{888!}$?

A. 3   B. 1   C. 0   D. 9

$0^{1234!} + 0^{777!} \times 0^{888!}$

$0 + 0 \times 0$

$= 0$

$0! = 1$

$1! = 1$

$2! = 2$

$3! = 6$

$4! = 24$

$5! = 120$

$6! = 720$

$7! = 5040 \dots$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

$n \geq 5 ; \ n! \text{ ends with } 0$

Q5. What is the last digit of the expression
$123^{123!} + 642^{56!} \times 678^{468!}$?

A. 3   B. 1   C. 7   D. 9

$3^{123!} + 2^{56!} \times 8^{468!}$

$3^{200} + 2^{200} \times 8^{200}$

$1 + 6 \times 6$

$1 + 6 = 7$

$3 \left\{ \begin{array}{c} 3 \\ 9 \\ 7 \\ 1 \end{array} \right.$ $2 \left\{ \begin{array}{c} 2 \\ 4 \\ 8 \\ 6 \end{array} \right.$ $8 \left\{ \begin{array}{c} 8 \\ 4 \\ 2 \\ 6 \end{array} \right.$

$101 = 10 \times 9 \times 6 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$

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Q6. N = 1! + 2! + 3! +.........+ 2010!. What is the digit in the unit's place of N?

A. 3   B. 2   C. 1   D. 0

$\longrightarrow n \geq 5 ; \ n! \ \text{ends with } 0$

$1! + 2! + 3! + 4! + 5! + \ldots + 2010!$

$\underbrace{\qquad\qquad\qquad\qquad}_{0}$

$1 + 2 + 6 + 4 +$

$= 13$

$\Rightarrow 3$

Q7. $\overline{1234567}^{\,98765} \times 369^{\,135!} + 357^{\,999!}$

$\Rightarrow 7^{65} \quad \times \quad 9^{Even} \quad + \quad 0$

$\dfrac{65}{4} \xrightarrow{R} 1$

$\Rightarrow 7^{1} \times 1 + 0$

$\Rightarrow 7 \times 1 + 0$

$\Rightarrow 7 + 0 = 7$

65
40   25
24   1

$7 \Big\lceil \begin{array}{c} 7 \\ 9 \\ 3 \\ 1 \end{array}$

$9 \Big\lceil \begin{array}{c} 0 \\ 9 \\ E\,1 \end{array}$