

GATE



ALL BRANCHES

General Aptitude



Number System - 1



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TOPICS TO BE COVERED

- 1.
- 2.
- 3.
- 4.

Basics of Numbers

Logical Approach to Calculations

Divisibility Rules & Unit digit

Brainstorming on Numbers

Previous Session (Revision)



Understanding Numbers



Logical Questions without formulae

1 - 2 + 3 - 4 + 5

----- 2023.



Q.

$$\frac{1 - 2}{-1} + \frac{3 - 4}{-1} + \frac{5 - 6}{-1} + \dots + 2023 = ?$$

2022

$$\begin{array}{r} 2023 \\ - 1011 \\ \hline 1012 \end{array}$$



Q.

$$1! + 2! + 3! + \dots + 2023!$$

$$1! = 1$$

$$2! = 2$$

$$3! = 6$$

$$4! = 24$$

$$5! = 120$$

$$\begin{array}{r} 120 \\ \times 6 \\ \hline 720 \end{array} \rightarrow 6!$$

$$\begin{array}{r} 5040 \\ \times 7 \\ \hline 3540 \end{array} \rightarrow 7!$$

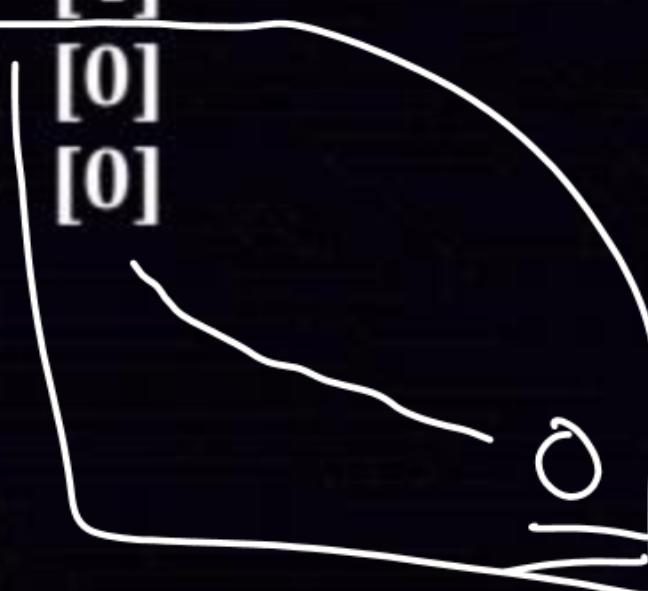
$$\underline{\underline{131}}$$



EXPLANATION

$1! + 2! + 3! + \dots + 2023!$

- $1! = 1$ [1]
- $2! = 2$ [2] 3
- $3! = 6$ [6]
- $4! = 24$ [4]
- $5! = 120$ [0]
- $6! = 720$ [0]



91

$$4 \times 3 \times 2 \times 1 = 24$$

Thus unit digit is 3



Q.

How many zeroes would be at the end in the answer of $100!$?

$$75 = \frac{25 \times 3}{5 \times 5}$$

$$100 = \boxed{25} \times 4$$

24 zeros

$$\begin{array}{r} 1 - 10 \rightarrow 2 \\ 11 - 20 \rightarrow 2 \\ \hline \end{array}$$

$$21 - 30 \rightarrow 3$$

$$31 - 40 \rightarrow 2$$

$$41 - 50 \rightarrow 3$$

$$51 - 60 \rightarrow 2$$

$$61 - 70 \rightarrow 2$$

$$71 - 80 \rightarrow 3$$

$$81 - 90 \rightarrow 2$$

$$91 - 100 \rightarrow 3$$

24

$$\frac{100}{5} = 20$$

$$\frac{20}{5} = 4$$

$$\frac{4}{5} = \underline{\underline{0}} \\ 24$$

Q.

If $80!$ can be denoted maximum 7^x , what would be the value of 'x'?

$$\frac{80}{7} = 11 \boxed{80! \Rightarrow 7^{12}}$$

$$\frac{11}{7} = 1$$

$$\frac{1}{7} = 0$$

12

$$x = 12$$



Q.

How many squares are there in a chessboard?

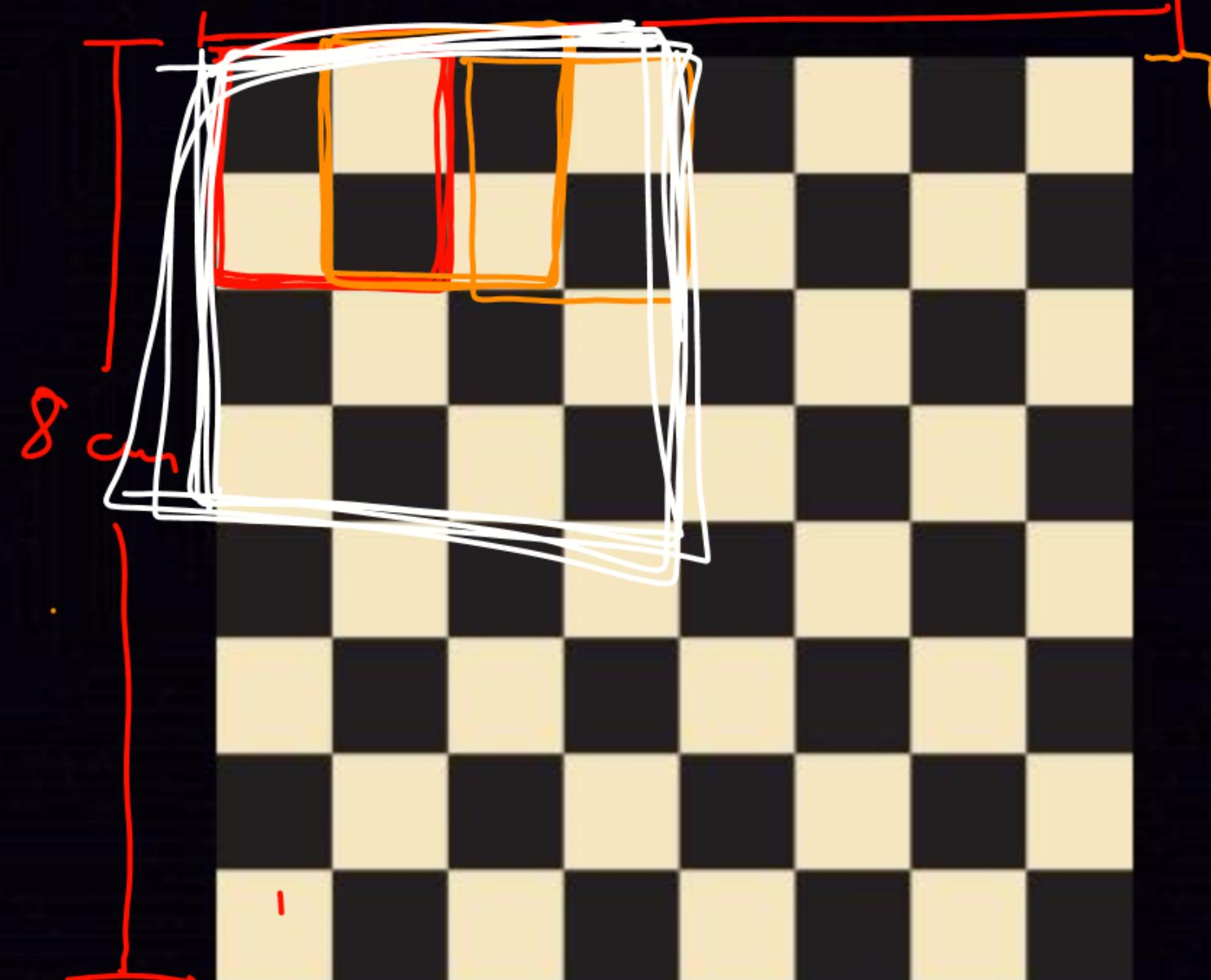
120411

~~8 cm~~

Size

 1×1

No.
 $8 \times 8 = 64$

 2×2 $7 \times 7 = 49$ 3×3 $6 \times 6 = 36$ 4×4 $5 \times 5 = 25$ 5×5 $4 \times 4 = 16$ 6×6 $3 \times 3 = 9$ 7×7 $2 \times 2 = 4$ 8×8 $1 \times 1 = 1$ 

Size

1×1

$$4 \times 4 = 16$$

2×2

$$3 \times 3 = 9$$

3×3

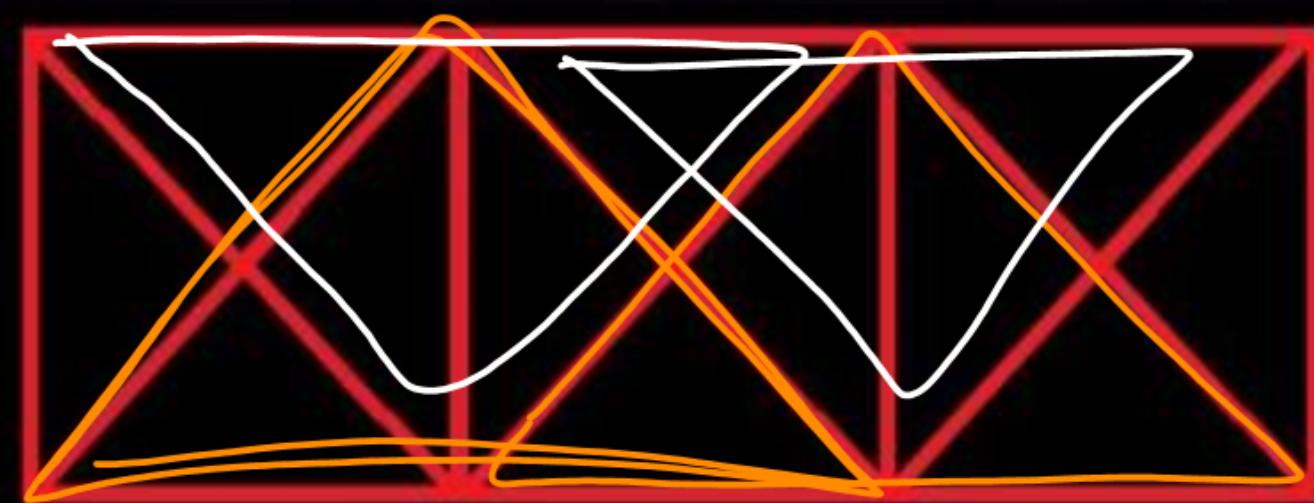
$$2 \times 2 = 4$$

4×4

$$\begin{array}{c} 1 \times 1 = 1 \\ \hline || 30 \end{array}$$

Q.

How many triangles are there in the given figure?



Smallest

 $\rightarrow 12$ Small ≥ 12 Big $\rightarrow 4$ $\frac{12}{4} = 3$

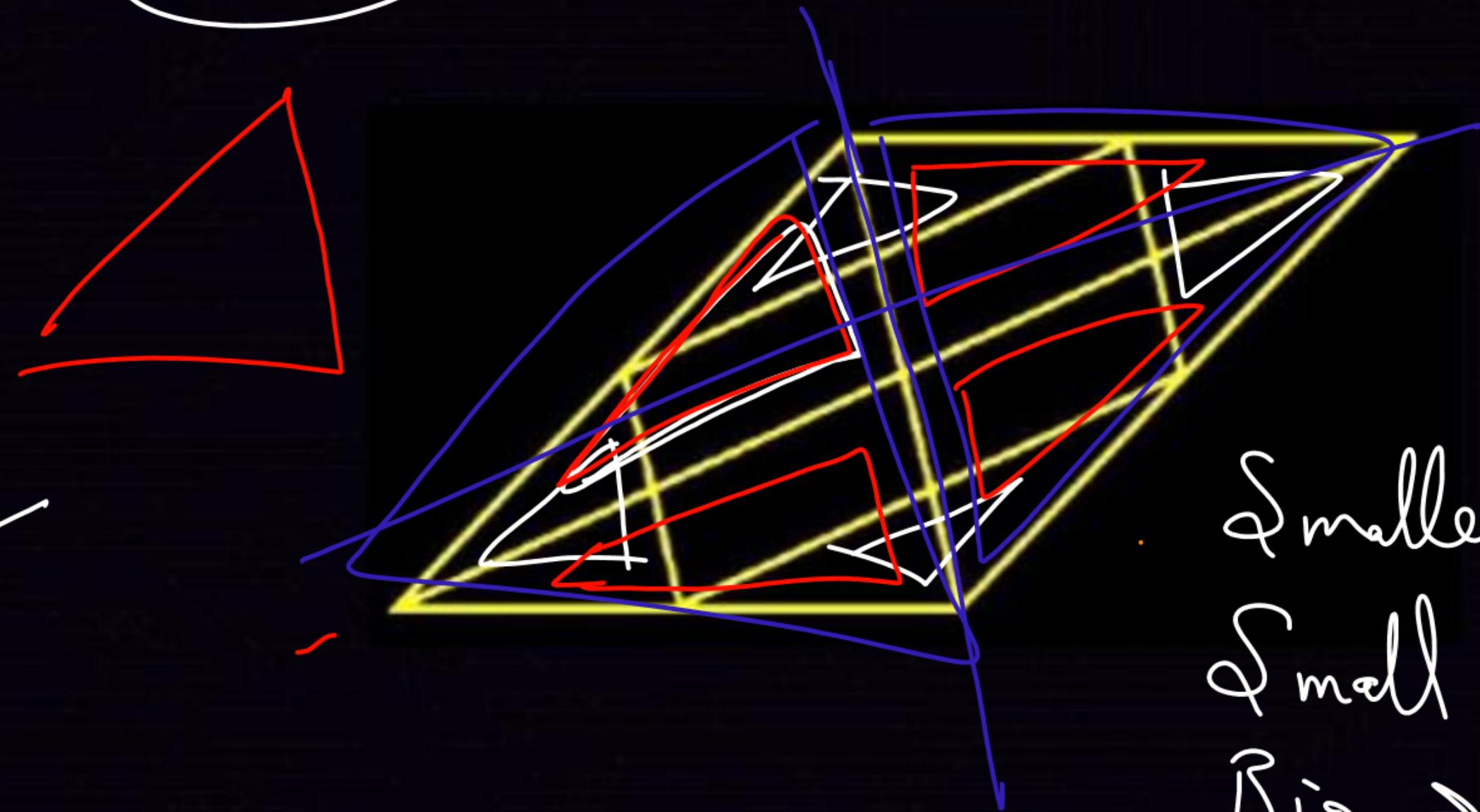
SPATIAL

- A. 22
B. 18
C. 28
D. 32

Q.

How many triangles are present in the given figure?

- A. 12
- B. 16
- C. 20
- D. 24



$$S_{\text{smallest}} > 8$$

$$S_{\text{small}} \rightarrow 4 + 4$$

$$B_{\text{big}} \rightarrow 4$$



Q. Count the number of squares in the given figure?

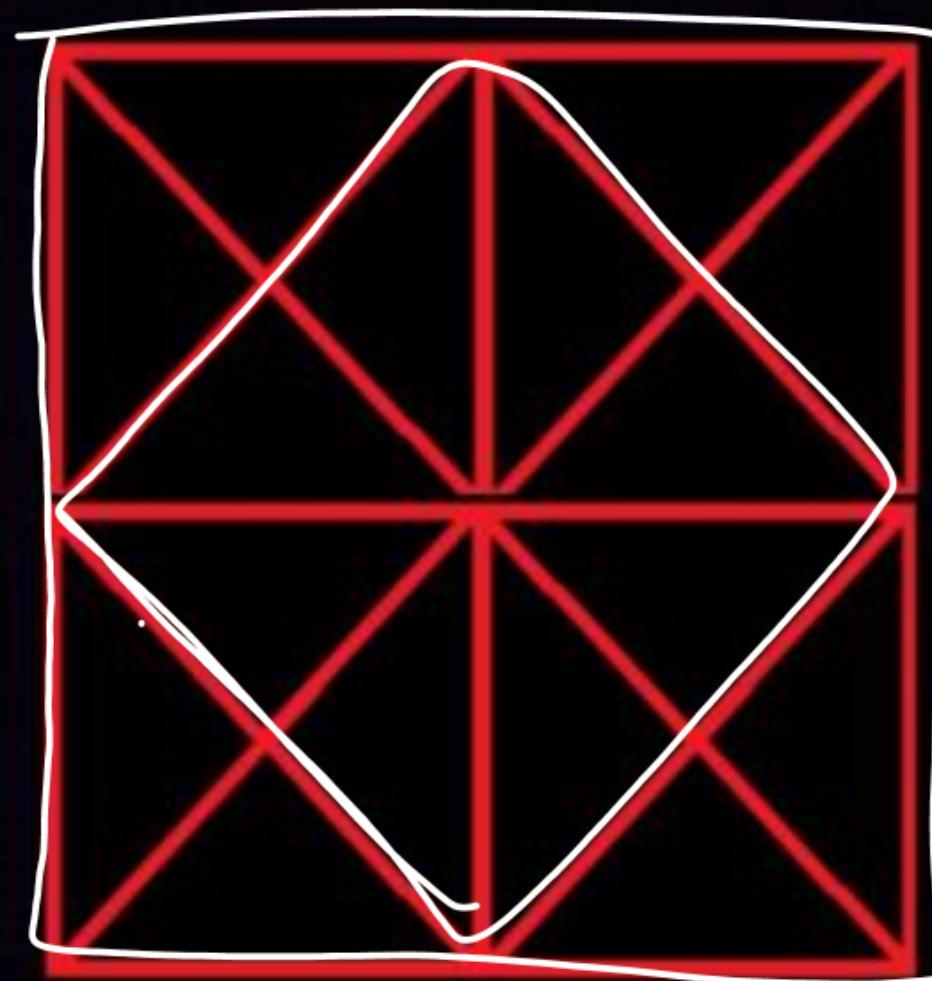
- A. 10
- B. 11
- C. 12
- D. 13

Smallest \Rightarrow 4

Small \Rightarrow 4

Big \Rightarrow 2

—
10





P
W

$$r^3 + r^7 = \underline{\underline{0}}$$

What would be the unit digit in the answer of:
 $1987^{2943} + 2023^{3119}$?

A handwritten diagram of a circuit with four nodes labeled A, B, C, and D. The circuit consists of a loop with resistors R₁, R₂, R₃, and R₄. The voltage across the top branch is V. The current flowing clockwise through the loop is I.

The diagram shows the following components and values:

- Resistor R₁: 2943 ohms (labeled 2943)
- Resistor R₂: 28 ohms (labeled 28)
- Resistor R₃: 14 ohms (labeled 14)
- Resistor R₄: 12 ohms (labeled 12)
- Voltage V: 35V (labeled 35)
- Current I: 8A (labeled 8)
- Node A: (A) (labeled A)
- Node B: (B) (labeled B)
- Node C: (C) (labeled C)
- Node D: (D) (labeled D)
- Terminal pair: 6V (labeled 6)
- Terminal pair: None (labeled None)

Below the diagram, there is a box containing the text $R=3$.

$f^1 = 7$
 $f^2 = 9$
 $f^3 = 3$
 $f^4 = 1$
 $f^5 = 7$
 $f^6 = 9$

$R = 1 \times 7$
 $R = 2$
 $R = 3$
 $R = 0$

$g^1 = 3$
 $g^2 = 9$
 $g^3 = 7$
 $g^4 = 1$
 $g^5 = 3$

$R = 1$
 $R = 2$
 $R = 3$
 $R = 0$



Q.

$$\begin{array}{r} 6 \\ + \quad 8 \\ \hline = 14 \end{array}$$

$$\boxed{2934\cancel{9}38} + \boxed{518\cancel{3}17} \quad ?$$

(A) 9

(B) 8

(C) 2

(D) None

$$\begin{array}{c} \text{odd} \\ 1 \\ \hline 4 = 4 \quad R=1 \\ \text{odd} \\ 2 \\ \hline 4 = 6 \quad R=0 \\ \text{odd} \\ 3 \\ \hline 4 = 6 \quad R=0 \\ \text{odd} \\ 4 \\ \hline 4 = 6 \quad \cancel{\underline{R=0}} \end{array}$$

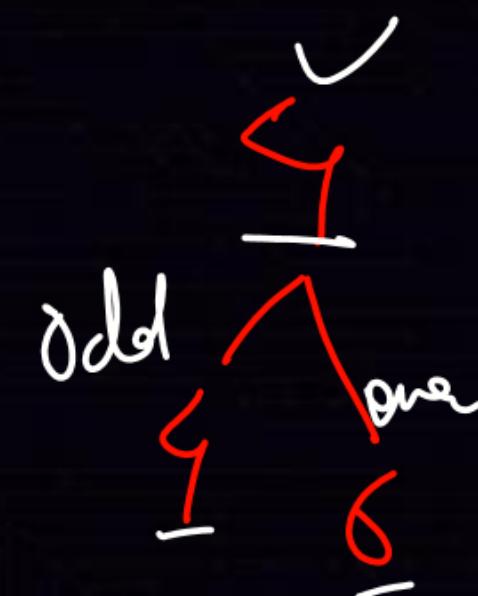
$$\begin{array}{l} 8^1 = 8 \quad R=1 \\ 8^2 = 4 \quad R=2 \\ 8^3 = 2 \quad R=3 \\ 8^4 = 6 \quad R=0 \\ 8^5 = 8 \end{array}$$

Q.

$$5926^{\text{973}} + 9475^{\text{363}} \quad ?$$

$$0 \quad | \quad 5 \quad 6 \quad \text{Same}$$

TIME: 10 Seconds



- If base unit digit is
- 0 1 5 6
- Then same
- If base unit digit is
- 4 or 9
- 4 case rep 4 and 6
- 9 case rep 9 and 1

but,

- If base unit digit is
- 2 3 7 8
- 2 case: 2 4 8 6
- 3 case: 3 9 7 1
- 7 case: 7 9 3 1
- 8 case: 8 4 2 6



*Thank
you!*