

GATE



ALL BRANCHES

GENERAL APTITUDE

Quantitative Aptitude



Lecture No: 14

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TOPICS TO BE COVERED



Basics of Number System



Logical Calculations & Divisibility Test



Cyclicity of Unit digits



Questionnaire Numbers



Q. Mahatma Gandhi was born on 2nd October 1869. What was the week Day?

$$1868 \rightarrow 4 + 2$$

J-3
F-0
M-3

A-2
M-3
J-2

J-5
A-3
S-2

O-2

2



A. Monday



B. Thursday

Assignment



C. Tuesday



D. Saturday


$$1800 \rightarrow 3$$

$$68 \rightarrow 1$$


$\begin{matrix} 68 \\ \swarrow \searrow \\ 17 \quad 51 \\ \downarrow \quad \downarrow \\ 6 \quad 2 \end{matrix}$



Q. The day of the March 16th of any year is the same day of the week as the corresponding date in which month of the same year?

A.  November

B.  July

C.  September

D.  April

Assignment

$$\begin{array}{r}
 \text{M} - 3 \\
 \text{A} - 2 \\
 \text{May} - 3 \\
 \text{June} = 2 \\
 \text{J} - 3 \\
 \text{A} - 3 \\
 \hline
 \text{Nov}
 \end{array}$$



Q.

If January 1st 1992 was a Wednesday. What day of the week was January 1st 2003?

+0



A.

Sunday



B.

Thursday



C.

Friday



D.

Wednesday

Assignment

Handwritten calculations:
 $11 \times 3 = 33$
 $33 \div 7 = 4 \text{ remainder } 5$
 $5 \rightarrow \text{Friday}$



$$1:52 \frac{8}{11}$$

$$1:23 \frac{7}{11}$$

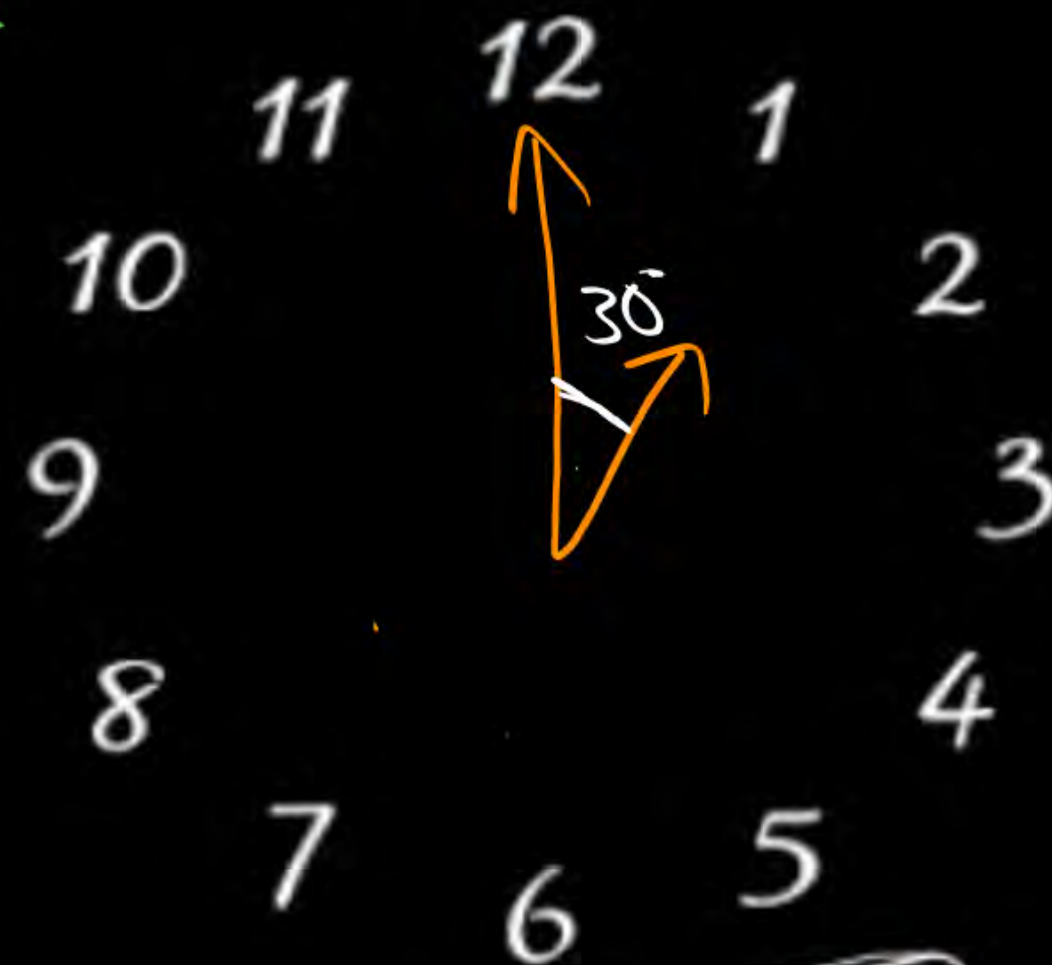


In between 1 O' clock and 2 O' clock at what time the hands of clock form 100° ?

$$260^\circ$$

$$\frac{130}{5.5} = \frac{260}{11} = 23 \frac{7}{11}$$

$$\frac{290}{5.5} = \frac{580}{11} = 52 \frac{8}{11}$$



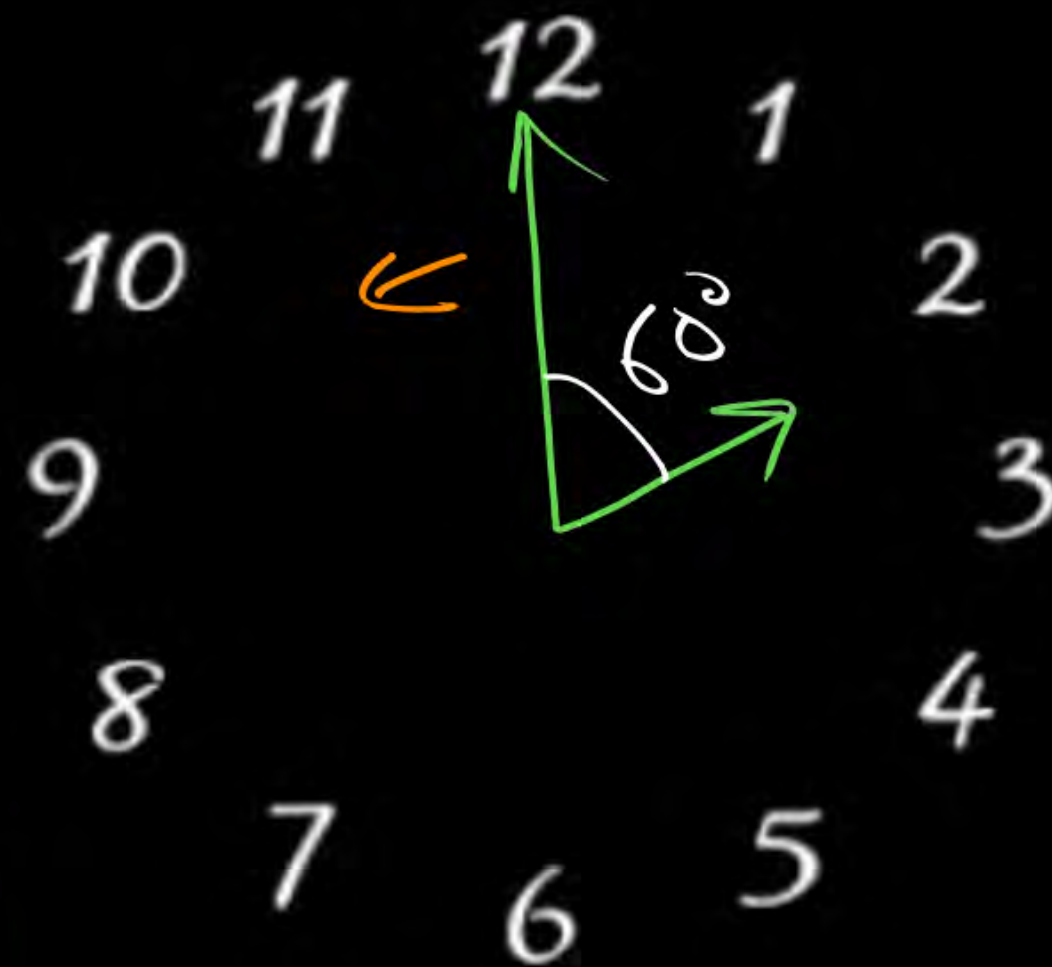
Assignment



In between 1 O' clock and 2 O' clock at what time the hands of clock form 100° ?

$$\frac{40}{5.5} = \frac{80}{11} = 7\frac{3}{11}$$

$$1:52\frac{8}{11}$$





Q. 2-3 @ 90°
270°

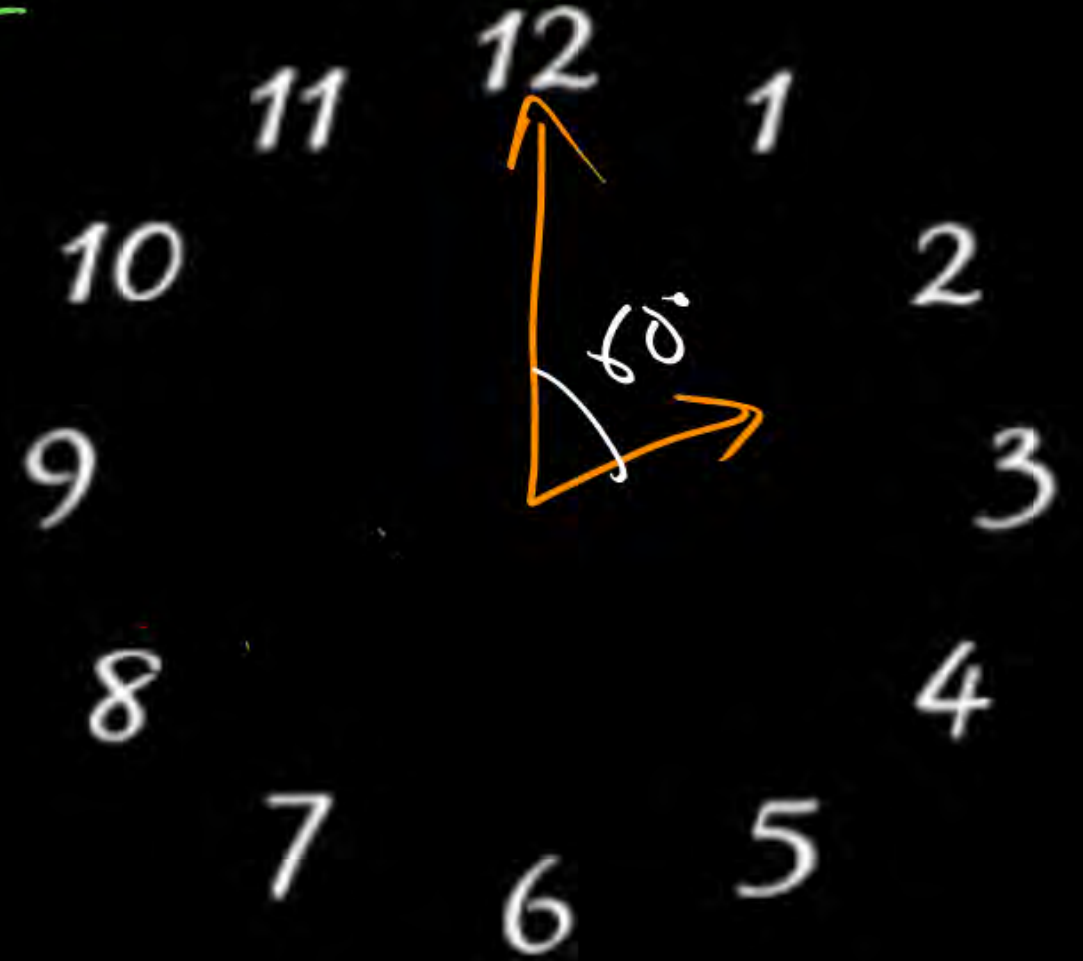
$$2:27\frac{3}{11}$$

$$\cancel{2:60}^?$$

$$\frac{150}{5.5} = \frac{300}{11} = 27\frac{3}{11}$$

3:00

$$\frac{330}{5.5} = \frac{660}{11} = \cancel{60}$$





Gain OR Lose





Q.

A Clock which gains 5 minutes in every one hour was set correct at 5am. What would be the time shown by that clock at 1pm the same day?

1:40



Q.

A clock which looses 10 minutes in every one hour was set correct at 4am, what would be the time shown by that clock at 4pm the same day?

4pm - 2hr

2pm



Number System



Even

whole Natural

$$\begin{array}{r} 2 \overline{) 3} \\ \underline{2} \\ 1 \end{array}$$

1 — ∞
Whole

0 & Natural

Basic



- Natural Number ✓
- Whole Number ✓
- Even Number ✓
- ODD Number ✓
- Integers ✓
- Prime Numbers Number
- Composite Numbers {Non-Prime}
- Rational & Irrational

factors / multiples

13 → 1, 13

6 → 1, 2, 3, 6

1 → Prime
Composite

6 → 6, 12, 18, 24, 30, 36, 42, 48, 54

60, 66, 72, 78, 84, 90, 96, 102

----- 108



$$\begin{array}{r}
 9 \overline{) 382} \quad 42.444 \\
 \underline{36} \\
 22 \\
 \underline{18} \\
 40 \\
 \underline{36} \\
 40 \\
 \underline{36} \\
 40 \\
 \underline{36} \\
 40
 \end{array}$$

Rational

$$\boxed{42.\overline{4}} \Rightarrow \frac{382}{9}$$

$$\frac{p}{q}$$

$$q \neq 0$$

$$3 \rightarrow \frac{3}{1}$$

$$8 \rightarrow \frac{-8}{1}$$

$$3.4 \rightarrow \frac{34}{10} = \frac{17}{5}$$

$$0 \rightarrow \frac{0}{1}$$

$$42\overline{4} = x$$

$$\begin{array}{r} 10x = 424.4444 \dots \\ - x = 42.4444 \dots \\ \hline \end{array}$$

$$9x = 382$$

$$x = \frac{382}{9}$$

Irrational

$\sqrt{2}$

= 1.41421356285713

847796 -

Decimal

Terminates

Non-Terminating

Repeating

Non-Repeating



$2\pi r$



Irrational

$$= \frac{22}{7}$$



3.14



5726



575

Q. $\overset{-1}{\boxed{1-2}} + \overset{-1}{3-4} + \overset{-1}{\boxed{5\dots\dots 2023}} = ?$

$$\begin{array}{r}
 \boxed{2022} \\
 \hline
 \boxed{-1011} \\
 + 2023 \\
 \hline
 \underline{1012} \quad \checkmark
 \end{array}$$



$$1! + 2! + 3! + \dots + 2024!$$

= Ans

3) Ans(



$$\begin{array}{r} 120 \\ \times 6 \\ \hline 720 \\ \times 7 \\ \hline 5040 \end{array}$$

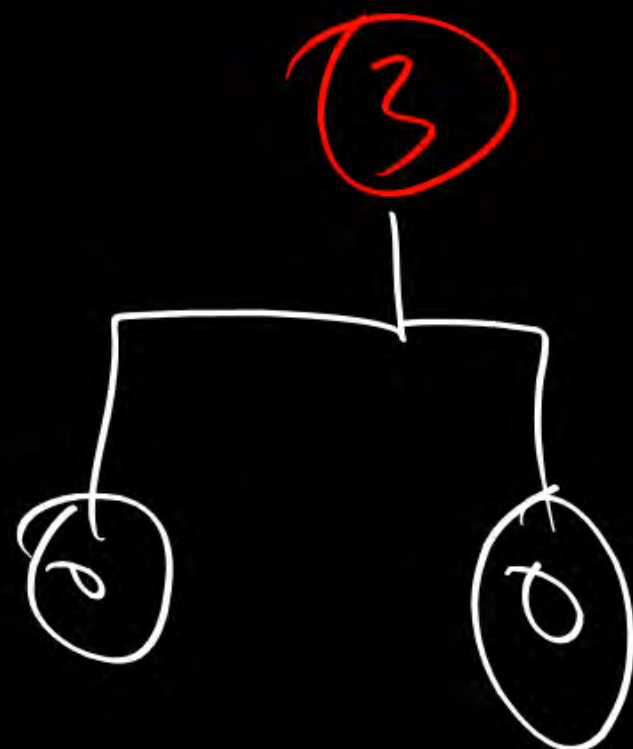
$$\begin{array}{l} 1! \rightarrow 1 \\ 2! \rightarrow 2 \\ 3! \rightarrow 6 \\ 4! \rightarrow 24 \\ 5! \rightarrow 120 \end{array}$$

R = ?
3
0 0
2 1
3 2
4 Can't be

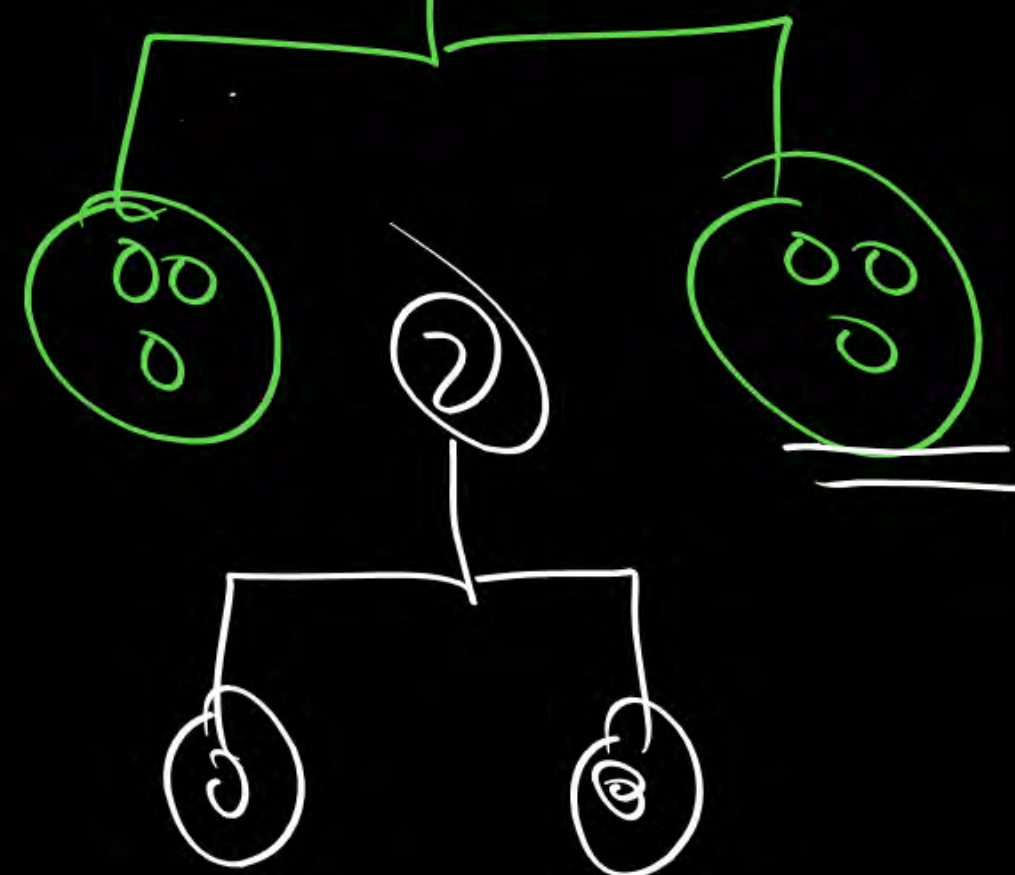


2 chance

There are 8 balls of which one is defective. Given that the defective ball is of less weight and remaining are of equal weights. What are the minimum number of chances a common balance is to be used to find the defective one?



Case 1 =
Case 2 = 1



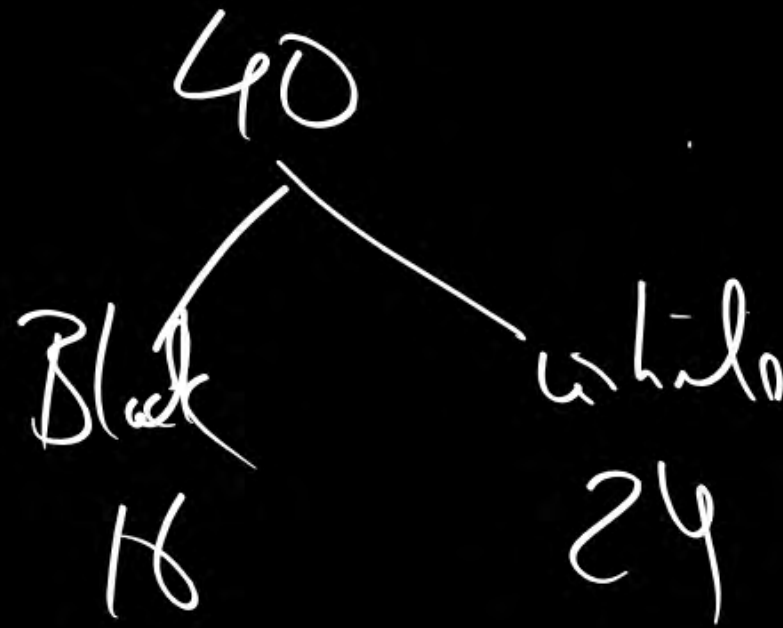




A bag consist of 48 red colour balls, 16 green colour balls, 12 yellow colour balls, 14 grey colour balls, 11 black colour balls and 16 white colour balls. How many minimum number of balls are to be taken out from the bag randomly so that we get atleast two balls of same colour?



Q. A shelf consist of 40 socks. 40% of these are black and remaining are white. How many minimum number of socks are to taken out from the shelf randomly (blindly), so that we get atleast two black socks?

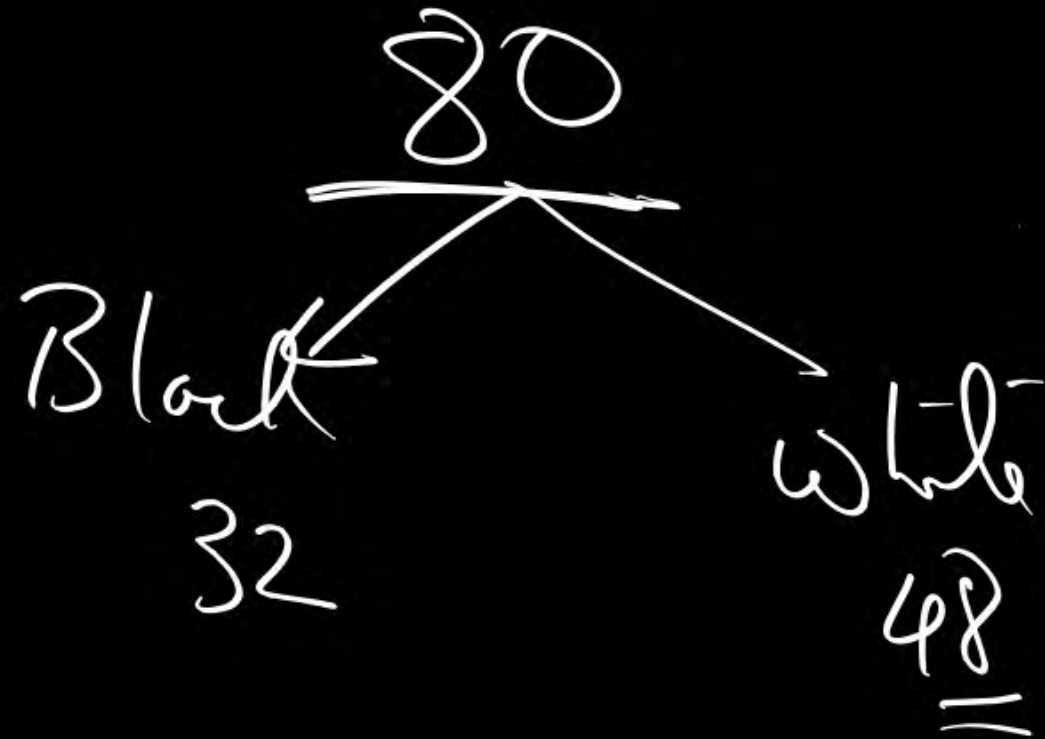


26



Q. A box consist of 40 pairs of shoes of equal size. 40% of these are black and remaining are white. How many minimum number of shoes are to taken out from the box randomly, so that we get atleast a pair of black shoes?

$$\begin{array}{r}
 + 48 \\
 + 16 \\
 + 1 \\
 \hline
 65
 \end{array}$$



~~$$\begin{array}{r}
 50 \\
 \hline
 \hline
 \end{array}$$~~



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

A.

60

B.

48

C.

11

D.

24

$$\begin{aligned}
 &5 \times 5 = 25 \\
 &25 \times 2 \\
 &25 \times 3 \\
 &25 \times 4
 \end{aligned}$$

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \dots \infty$$

24 zeroes

$$1-10 \rightarrow 2$$

$$51-60 \rightarrow 2$$

$$11-20 \rightarrow 2$$

$$61-70 \rightarrow 2$$

$$21-30 \rightarrow 3$$

$$71-80 \rightarrow 3$$

$$31-40 \rightarrow 2$$

$$81-90 \rightarrow 2$$

$$41-50 \rightarrow 3$$

$$91-100 \rightarrow 3$$



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

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

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

$$\frac{\quad}{24}$$



If $50!$ can be denoted maximum 7^x , then the value of x is?

$$\underline{\underline{x=8}}$$

$$\frac{50}{7} = 7$$

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

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

8

$$50! \rightarrow 7^{\textcircled{x}8}$$

$$50! \rightarrow 6$$

$$\textcircled{22}$$

$$\frac{50}{2} = 25$$

$$\frac{25}{2} = 12$$

$$\frac{12}{2} = 6$$

$$\frac{6}{2} = 3$$

$$\frac{3}{2} = 1$$

$$2 \times 3 \rightarrow 22$$

$$\downarrow$$

$$47$$

$$\frac{50}{3} = 16$$

$$\frac{16}{2} = 8$$

$$\frac{8}{2} = 4$$

$$\frac{4}{2} = 2$$



Find the number of zeroes in following multiplication:
 $5 \times 10 \times 15 \times 20 \times 25 \dots \times 50$?



✓ Assignment



96



28



10



24





What would be the unit digit in the answer of:

$$2932^{193} + 1614^{311}$$

$$= 6$$

$$\begin{array}{l} 2^1 = 2 \\ 2^2 = 4 \\ 2^3 = 8 \\ 2^4 = 16 \\ 2^5 = 32 \end{array}$$

$$\begin{array}{l} 4^1 = 4 \\ 4^2 = 16 \\ 4^3 = 64 \\ 4^4 = 256 \end{array}$$



Q. What would be the unit digit in the answer of:

$$\underline{2913}^{1902} + \underline{1647}^{460} \quad ?$$

$$9 + 1 = 10$$

0

$$\begin{aligned} 3^1 &= 3 \\ 3^2 &= 9 \\ 3^3 &= 7 \\ 3^4 &= 1 \\ 3^5 &= 3 \\ 3^6 &= 9 \end{aligned}$$

$$\begin{aligned} 7^1 &= 7 \\ 7^2 &= 9 \\ 7^3 &= 3 \\ 7^4 &= 1 \\ 7^5 &= 7 \end{aligned}$$

A.

0

B.

5

C.

3

D.

2





Q. What would be the unit digit in the answer of:

$$9326^{397} + 1475^{363}$$

Assignment



Q. What is the greatest number of 4 digits that when divided by any of the numbers 6, 9, 12, 17 leaves a remainder of 1?

Assignment



A. 9997



B. 9793



C. 9895



D. 9487





Q. Which largest number of 5 digits is divisible by 99 ?



A.

99999



B.

99981



C.

99909



D.

99990

Assignment





Q. Which one of the following is a composite number ?

Assignment



A. 101



B. 103



C. 141



D. 137



