CDS-AFCAT 2 2024

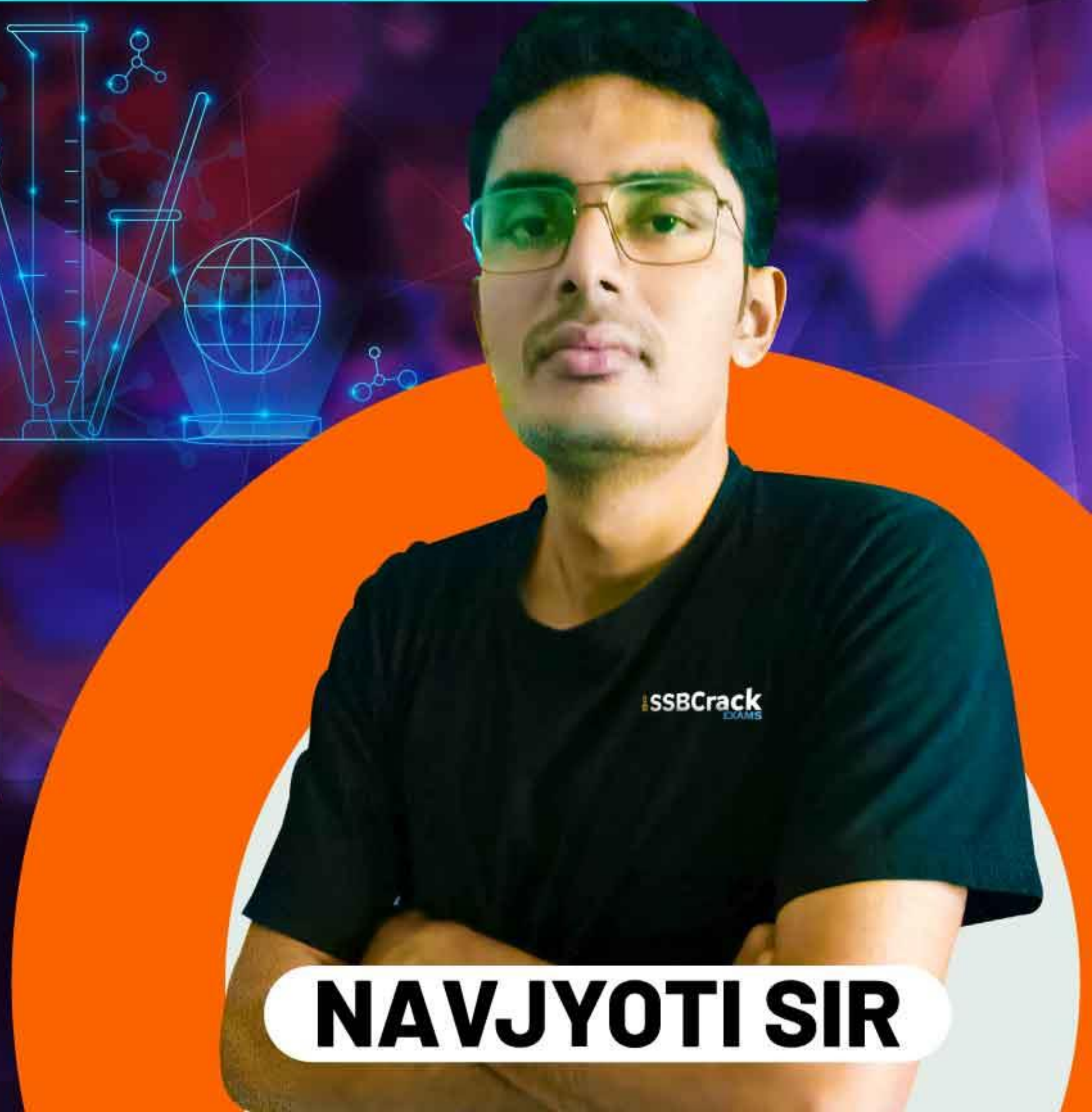
SSBCrack EXAMS

LIVE ●

MATHS

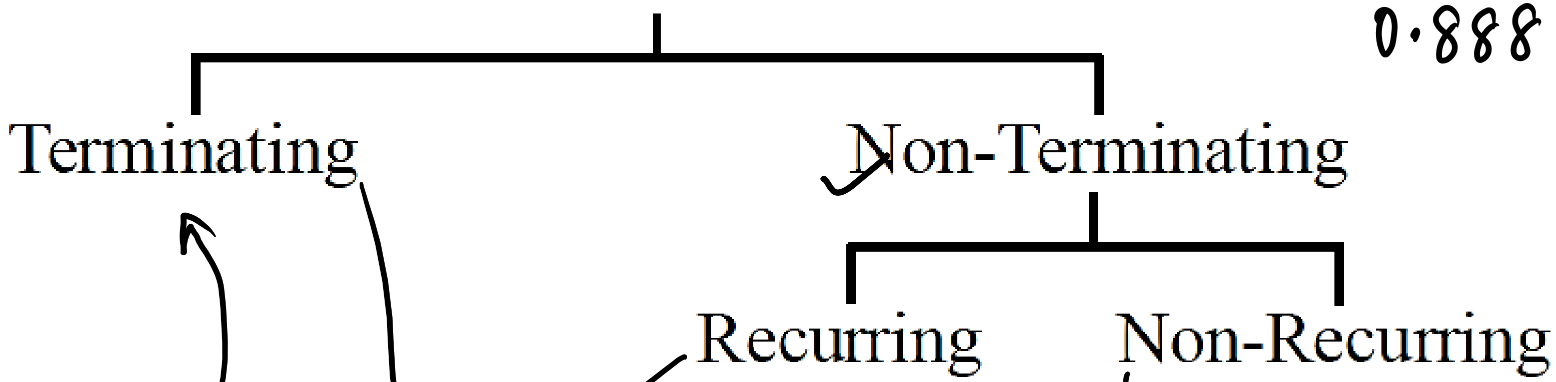
NUMBER SYSTEM

CLASS 2



NAVJYOTI SIR

DECIMAL EXPANSION



Terminating

Non-Terminating ✓

Recurring

Non-Recurring

$\frac{4}{5} = 0.8$

(Rational)

$3.142...$ (Irrational nos.)

$0.888...$

$\frac{1}{3} = 0.33...$

$= 0.\overline{3}$

$0.6\overline{7}$

TERMINATING & NON – TERMINATING DECIMAL

- A terminating decimal is a decimal, that has an end digit. It is a decimal, which has a finite number of digits(or terms). Ex: $0.15, 0.86$ etc.
- Non – terminating are the one that does have an end term. It has an infinite number of terms. Ex: $0.5444, 0.11111$ etc.
- There are two forms of Non – terminating decimal:

1) Repeating Non – terminating decimal ✓
2) Non – repeating Non – terminating decimal.

REPEATING & NON – TERMINATING DECIMAL

- **Repeating & Non – terminating decimal**: Repeating decimals are the one, which has a set of terms in decimal to be repeated uniformly.

Ex: $0.66666 \ldots.,0.123123 \ldots$ etc.

It is to be noted that the repeated term in decimal is represented by a bar on top of the repeated part. Ex: $0.3333 \ldots, 0.\overline{3}$.

Non – terminating and repeating decimals are rational numbers and can be represented in the form of p/q, where q is not equal to zero.

WAY TO SOLVE REPEATING & NON – TERMINATING

- **Type 1**: Fraction of the $0.\overline{ab}$

The way to convert such type of decimal to a fraction is given by:

$$\overline{ab} = \frac{Repeated\ term}{Number\ of\ 9's\ for\ repeated\ terms}$$

$0.\overline{3} = \frac{3}{9} = \frac{1}{3}$

Ex: $0.\overline{8}, 0.\overline{126}$

$0.\overline{8} = \frac{8}{9}$

$0.\overline{126} = \frac{126}{999}$

WAY TO SOLVE REPEATING & NON – TERMINATING

- **Type 2**: Fraction of the $0.ab\overline{cd}$

The way to convert such type of decimal to a fraction is given by:

$(0.abcdcdcd\ldots)$

$$0.\underbrace{ab}\overline{cd} = \frac{(\overbrace{ab}\overline{cd}) - ab}{\underbrace{Number\ of\ 9's\ for\ the\ repeated\ terms}\ \&\ 0's\ for\ the\ non\text{-}repeated\ terms}$$

Ex: $0.12\overline{34}, 0.00\overline{79}$

$$0.\underline{12}\underbrace{\overline{34}} = \frac{1234 - 12}{9900} = \frac{1222}{\underbrace{9900}}$$

$$0.\underbrace{00}\overline{79} = \frac{79 - 00}{9900} = \frac{79}{\underbrace{9900}}$$

NON – REPEATING & NON – TERMINATING DECIMAL

- **Non – repeating & Non – terminating decimal**: Non Repeating decimals are the one, which does not have a set of terms in decimal to be repeated uniformly.

They are said to be an irrational number.

Ex: $\sqrt{2} = 1.4142135 \ldots$

(except 1, 4, 9, 16, 25 - - .)

The square root of all terms, except perfect squares, are irrational numbers.

$\sqrt{3}, \sqrt{5}, \sqrt{6}, \sqrt{8},$

QUESTION

Simplify by converting to fractions:

a) $0.\overline{24} = \frac{24}{99}$

b) $0.2\overline{341} = \frac{2341}{9999}$

c) $\underbrace{0.00\overline{7}}_{} + 17.\overline{83} = \frac{7-0}{900} + 17 + 0.\overline{83} = \frac{7}{900} + 17 + \frac{83}{99}$

QUESTION

Solve the following:

a) $3.\overline{76} - 1.\overline{4576}$

b) $0.4\overline{6} + 0.7\overline{23} - \underbrace{0.3\overline{9} \times 0.\overline{7}}$

$$\left(\frac{46-4}{90} + \frac{723-7}{990} - \right.$$

LAW OF SURDS & INDICES

- ❖ $\left(a^{\frac{1}{n}}\right)^{n} = a$
- ❖ $\left(a^{\frac{1}{n}}\right)^{\frac{1}{m}} = a^{\frac{1}{mn}}$
- ❖ $\underbrace{a^m \times a^n} = a^{m+n}$
- ❖ $\underbrace{(a^m)^n} = \underbrace{a^{mn}}$
- ❖ $\underbrace{a^{-m}} = \dfrac{1}{a^m} =$
- ❖ $\underbrace{a^0 = 1}$
- ❖ $a^{\frac{1}{n}} b^{\frac{1}{n}} = (ab)^{\frac{1}{n}}$
- ❖ $\underbrace{a^m \div a^n} = a^{m-n}$
- ❖ $\underbrace{a^{\frac{1}{m}}} = \underbrace{\sqrt[m]{a}}$
- ❖ $\underbrace{a^{m/n}} = \sqrt[n]{a^m}$

$$\left\{ (a^m)^{\frac{1}{n}} = \right\}$$

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$\sqrt[2]{a} = a^{\frac{1}{2}}$$

SPECIAL SERIES

(i) Value of $\sqrt{P+\sqrt{\underbrace{P+}\sqrt{P+.....\infty}}} = \underbrace{\frac{\sqrt{4P+1}+1}{2}}$

$x = \sqrt{P + x}$

(ii) Value of $\sqrt{P-\sqrt{P-\sqrt{P-.....\infty}}} = \frac{\sqrt{4P+1}-1}{2}$

(iii) Value of $\sqrt{P.\sqrt{P.\sqrt{P......\infty}}} = P$ ✓

(iv) Value of $\sqrt{P\underbrace{\sqrt{P\sqrt{P\sqrt{P\sqrt{P}}}}}_{..n}} = P^{(2^n-1)\div 2^n}$ $= \left(P^{1-\frac{1}{2^n}}\right)$

where n → no. of times P repeated.

SPECIAL SERIES

(a) Sum of first n natural numbers

$$\left\{ = 1 + 2 + \underbrace{3 + \ldots + n}_{} = \frac{n(n+1)}{2} \right\} \checkmark$$

(b) Sum of first n odd natural numbers

$$= 1 + 3 + 5 + \ldots + (2n - 1) = n^2$$

$$\underbrace{1+3+5}_{} = (3)^2 = 9 \;\Big|\; 1+3+5 \ldots 15 = (8)^2$$

(c) Sum of first n even natural numbers

$$= 2 + 4 + 6 + \ldots + 2n = n(n+1)$$

$$\downarrow$$

$$2\left(1 + \underbrace{2+3\ldots}_{} n\right) = \cancel{2}\left[\frac{n(n+1)}{\cancel{2}}\right) = \underbrace{n(n+1)}_{}$$

SPECIAL SERIES

(ii) Sum of squares of first n natural numbers

$$= 1^2 + 2^2 + 3^2 + \ldots + n^2 = \frac{n\,(n+1)\,(2n+1)}{6}$$ ✓

(iii) Sum of cubes of first n natural numbers

$$= 1^3 + 2^3 + 3^3 + \ldots + n^3 = \left[\frac{n\,(n+1)}{2}\right]^2$$

SPECIAL SERIES

- Consider, a special series $\left(\frac{1}{1\times2}\right)+\frac{1}{2\times3}+\frac{1}{3\times4}+\cdots\underbrace{\dots\dots}+\frac{1}{n\times\underbrace{(n+1)}}$

$$\left(\frac{1}{1}-\frac{1}{2}\right)+\left(\frac{1}{2}-\underbrace{\frac{1}{3}}\right)+\left(\underbrace{\frac{1}{3}}-\frac{1}{4}\right)+\cdots+\left(\frac{1}{\underset{\checkmark}{n}}-\underbrace{\frac{1}{n+1}}\right)$$

$$=\underbrace{\left(1-\frac{1}{n+1}\right)}=$$

$$\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+\cdots\dots\dots+\frac{1}{n\times(n+1)}=\underbrace{\frac{1}{1}\left[\frac{1}{1}-\frac{1}{n+1}\right]}=\left[\underbrace{1}-\frac{1}{\text{Last term }\underbrace{\text{in denominator}}}\right]$$

QUESTION

Find the sum of series $\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+\cdots\ldots\ldots+\frac{1}{99\times100}$

$\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+\frac{1}{20}+ \ldots$

$= 1-\frac{1}{\text{Last denominator term}}$ $= 1-\frac{1}{100} = \frac{99}{100}$

QUESTION

Find the sum of series $\frac{1}{\underbrace{6\times7}_{}}+\frac{1}{7\times8}+\frac{1}{8\times9}+\cdots\ldots\ldots+\frac{1}{24\times25}$.

$$\left(\frac{1}{1\times2}+\frac{1}{2\times3}+\cdots\frac{1}{24\times25}\right)-\left(\frac{1}{1\times2}+\frac{1}{2\times3}+\frac{1}{3\times4}+\frac{1}{4\times5}+\frac{1}{5\times6}\right)$$

ARITHEMETIC PROGRESSION

- A sequence is called an arithmetic progression, if the difference of any two consecutive terms is constant.
- The difference of any two consecutive terms of $a, a+d, a+2d$ … is constant, then this series is known as arithmetic progression.
- Its first term is a and common difference is d.
- nth term of series, $\boxed{T_n = a + (n-1)d}$
- Last term of series, $l = \underline{a + (n-1)d}$
- Sum of n terms of series, $\underline{S_n = \frac{n}{2}[2a + (n-1)d]} = \frac{n}{2}[a + l]$

$$\begin{array}{cccc} & a+d & a+2d & a+3d \\ a & a+d & a+d+d & a+d+d+d \\ 1, & 4, & 7, & 10, \quad 13 \ldots \end{array}$$

$+3 \quad +3 \quad +3 \quad +3$

a ① ② ③ ④

$a+(2-1)d \quad a+(3-1)d \quad a+(4-1)d$

IMPORTANT PROPERTIES

- If constant is added to or subtracted from each term of an A.P. then the resulting sequence is also an A.P. with same common difference.
- If each term of A.P. is multiplied or divided by constant k, then the resulting sequence is also AP with common difference with kd or d/k.
- If three numbers a, b & c are in A.P. then $2b = a + c$.
- $T_n = S_n - S_{n-1}$

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

$$= \frac{n}{2}\left[\text{first term} + \text{last term}\right]$$

$$\underbrace{\underbrace{a_1 \quad a_2 \quad - \; - \; - \; a_{n-1}}_{S_{n-1}} \; \boxed{a_n}}_{S_n}$$

$$S_n - S_{n-1} = a_n$$

3 nos. in AP : $a-d \; ; \; a \; ; \; a+d$

4 nos. " " : $a-3d, \; a-d, \; a+d, \; a+3d$

5 " " : $a-2d, \; a-d, \; a, \; a+d, \; a+2d$

6 nos in AP : $a-5d, \; a-3d, \; a-d, \; a+d, \; a+3d, \; a+5d$

common difference $= d$

(common diff $= \underline{2d}$)

QUESTION

In an A.P., if $a = \underbrace{-7.2}, d = \underbrace{3.6}, a_n = \underbrace{7.2}$, then find the value of n.

$$a_n = a + (n-1)d$$

$$7.2 = -7.2 + (n-1)3.6$$

GEOMETRIC PROGRESSION

- A sequence is know as geometric progression, if the ratio of any term to its previous term is constant.
- If $a_1, a_2, a_3, \ldots \ldots \ldots a_n$ are in G.P.
- Then, $\frac{a_2}{a_1} = \frac{a_3}{a_2} = \frac{a_4}{a_3} = \cdots \ldots \ldots = \frac{a_{n-1}}{a_n} = r$,where, r is common ratio.
- Nth term of G.P., $\underbrace{T_n = ar^{n-1}}$
- Last term of G.P., $\underbrace{l = ar^{n-1}}$

2, 4, 8, 16, 32, 64

×2 ×2 ×2

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

a ar ar^2

$\frac{2}{①}$ $(2 \cdot 2^{1})$ $(2 \cdot 2^{2})$

② ③

$\underbrace{ar^{n-1}}$

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GEOMETRIC PROGRESSION

- Sum of n terms of G.P.,

☐ $S_n = \frac{a(r^n-1)}{r-1}$ *where* $r > 1$

☐ $S_n = \frac{a(1-r^n)}{1-r}$ *where* $r > 1$

- Sum of infinite terms of G.P. $S_\infty = \frac{a}{1-r}$, *where* $\underbrace{|r|}$ < 1

$$S_n = \frac{a(r^n-1)}{(r-1)} \quad r > 1$$

$$r < 1, \quad S_n = \frac{a(1-r^n)}{(1-r)}$$

When $r<1$,

$n \to \infty$, $\left.\right\}$ $\underbrace{r^n \to 0}$

$$S_\infty = \frac{a(1-0)}{1-r} = \left(\frac{a}{1-r}\right)$$

$\underbrace{|r| < 1}$

IMPORTANT PROPERTIES

- If all terms of a GP multiplied or divided by same constant, then it remains a G.P. with same common ratio.
- The reciprocals of the terms of a given G.P. form a G.P.
- If three numbers a, b & c are in A.P. then $b^2 = ac$.
- $T_n = S_n - S_{n-1}$

$a, ar, ar^2 \ldots$

$\frac{1}{a}, \frac{1}{ar}, \frac{1}{ar^2} \ldots$

$$\frac{b}{a} = \frac{c}{b} \Rightarrow \underline{b^2 = ac}$$

$(a, b, c \text{ in } GP)$

QUESTION ⓐ

Which term of the G.P. $2, 1, \frac{1}{2}, \frac{1}{4}$, is $\frac{1}{128}$?

$n = ?$

$a_n = ar^{n-1}$ $\left(r = \frac{1}{2}\right)$

$$\frac{1}{128} = (2)\left(\frac{1}{2}\right)^{n-1}$$

$$\frac{1}{2^7} = \frac{2^1}{2^{n-1}} \Rightarrow \frac{1}{2^7} = \frac{1}{2^{n-2}} \Rightarrow 7 = n-2$$

$$\boxed{n = 9}$$

$2, 1, \frac{1}{2}, \ldots \frac{1}{128}$

③

2^7

⑨

HARMONIC PROGRESSION

- A sequence $\underline{a_1, a_2, a_3, \ldots \ldots \ldots a_n}$ is called a harmonic progression, if the sequence is $\underline{\frac{1}{a_1}, \frac{1}{a_2}, \frac{1}{a_3}}, \ldots \ldots \frac{1}{a_n}$ is an arithmetic progression.
- The sequence $\underline{1, 3, 5, 7}$ is H.P. because $1, \underline{\frac{1}{3}, \frac{1}{5}}, \frac{1}{7}$ is an A.P.

$2, 5, 8, 11$ is AP

$\Rightarrow \frac{1}{2}, \frac{1}{5}, \frac{1}{8}, 11$ is $\underline{HP}$

ARITHEMETIC, GEOMETRIC & HARMONIC MEAN

- Let a and b be two quantities, then Arithmetic mean(A.M.) of a and b is $\frac{a+b}{2}$.
- Let a and b be two quantities, then Geometric mean(G.M.) of a and b is $\sqrt[2]{a \times b}$.
- Let a and b be two quantities, then Harmonic mean(H.M.) of a and b is $\frac{2ab}{a+b}$.
- Relation between A.M., G.M. & H.M. is $G^2 = A \times H$.

$$\frac{2}{HM} = \frac{1}{a} + \frac{1}{b}$$

$$(A > G > H)$$

For n- quantities,

$$AM = \frac{a_1 + a_2 + a_3 + \text{--} a_n}{n}$$

$$GM = \sqrt[n]{a_1 a_2 a_3 \text{---} a_n}$$

$$HM \Rightarrow \left\{ \frac{n}{HM} = \frac{1}{a_1} + \frac{1}{a_2} + \frac{1}{a_3} + \text{--} \frac{1}{a_n} \right)$$

QUESTION

Find two numbers whose A.M. is 34 and G.M. is 16.

$$\frac{a+b}{2} = 34 \Rightarrow \underbrace{a+b}_{} = \underbrace{68}_{}$$

$$\sqrt{ab} = 16$$

$$\underbrace{ab}_{} = \underbrace{256}_{} \quad (16 \times 16)$$

$$\underbrace{2^4 \times 2^4}_{}$$

$$2^6 \quad 2^4$$

$$64 \quad 4$$

$$\underbrace{64, 4}_{}$$

NUMBER OF FACTORS OF COMPOSITE NUMBER

It is possible to find the number of factors of a composite number without lising all those factors.

Let N be a composite number such that $N = (x)^a\,(y)^b\,(z)^c \ldots$ where x, y, z... are different prime numbers. Then the number of divisors (or factors) of $N = (a+1)\,(b+1)\,(c+1)\ldots$

Here factors and divisors means the same.

Take 12 for instance, it can be expressed as $12 = 2^2 \times 3^1$.

$12 = \underline{1, 2, 3, 4, 6, 12}$

prime factorisation, →

no. of factors $= (a+1)(b+1)$ - - -

$= (2+1)(1+1) = 3 \times 2 = \boxed{6}$

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$12 = 2^2 \times 3^1$

no. of prime factors,

distinct

②

(2, 3)

{How many prime factors seperately (bases)

Total

$2+1$

$\underbrace{(3)}$

(add the powers of prime factors)

EXAMPLE

What is the number of prime factors of 30030?

(a) 4 (b) 5

(c) 6 (d) None of these

$$\begin{array}{r|l} 2 & 30030 \\ \hline 3 & 15015 \\ \hline 5 & 5005 \\ \hline 7 & 1001 \\ \hline 11 & 143 \\ \hline & 13 \end{array}$$

$30030 = 2^{1} \times 3^{1} \times 5^{1} \times 7^{1} \times 11^{1} \times 13^{1}$

no. of prime factors = (add powers)

$= \boxed{6}$

NUMBER OF ZEROES IN FACTORIAL

Sometimes we come across problems in which we have to count number of zeros at the end of factorial of any numbers.

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

$8! = 8 \times 7 \times 6 \times --- 1$

Ex. Number of zeros at the end of 10!

$$10! = 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

Here basically we have to count number of fives, because multiplication of five by any even number will result in 0 at the end of final product. In 10! we have 2 fives thus total number of zeros are 2. ✓

Counting number of zeros at the end of n! value will be

$$\left\{\frac{n}{5}+\frac{n}{5^2}+\frac{n}{5^3}+\frac{n}{5^4}+\right\}\cdots\cdots$$

The integral value of this number will be the total number of zeros.

$$\left(\frac{10}{5}\right)+\left(\frac{10}{25}\right)+$$

not counting as division should give natural no.

$10! \Rightarrow 2$

Q) What is the remainder after dividing the number $\underset{\sim}{37}^{1000}$ by 9?

(a) 1 (b) 3

(c) 7 (d) 9

$$\frac{\checkmark 37^{1000}}{\checkmark 9} = \left(\frac{(9\times4)+1}{9}\right)^{1000} = \frac{\checkmark 1^{1000}}{\checkmark 9}$$

Remainder $(1 \div 9) = \boxed{1}$

Q) What is the remainder after dividing the number 37^{1000} by 9?

(a) 1
(b) 3
(c) 7
(d) 9

Ans: (a)

Q) What is the remainder when $27^{27} - 15^{27}$ is divided by 6?

(*a*) 0 (*b*) 1 (*c*) 3 (*d*) 4

$a^n - b^n$ — when n is odd, divisible by $a+b$.

$a = 27$; $b = 15$

$a + b = 27 + 15$

$= \boxed{42}$ → (multiple of 6)

$= 6 \times 7$

| $27^{27} - 15^{27}$ is divisible by 6.

remainder $= 0$

Q) What is the remainder when $27^{27} - 15^{27}$ is divided by 6?

(*a*) 0 (*b*) 1 (*c*) 3 (*d*) 4

Ans: (a)

Q) What is the maximum value of m, if the number $N = \underline{90 \times 42} \times \underline{324 \times 55}$ is divisible by 3^m?

(a) 8 [✓ (b) 7]

(c) 6 (d) 5

$$90 \times 42 \times 324 \times 55$$

$$(\underbrace{3 \times 3}_{3^2} \times 10) \times (\underbrace{3 \times 2 \times 7}_{3^1}) \times (\underbrace{3^4 \times 4}_{3^4}) \times (\underbrace{11 \times 5})$$

$$2 + 1 + 4 = \boxed{7}$$

Q) What is the maximum value of m, if the number $N = 90 \times 42 \times 324 \times 55$ is divisible by 3^m?

(a) 8	(b) 7
(c) 6	(d) 5

Ans: (b)

Q) The digit in the unit's place of the number represented by $(7^{95} - 3^{58})$ is:

(a) 0

[✓ (b) 4]

(c) 6

(d) 7

$7^{\underline{95}} - 3^{58}$

$= 7^{rem(95 \div 4)} - 3^{remainder(58 \div 4)}$

$= (7^3 - 3^2)$ unit digits

$= 3 - 9$ ⑩

$= \boxed{-6} \mid \boxed{4}$

7^1 — 7

7^2 — 9

7^3 — 3

7^4 — 1

3^1 — 3

3^2 — 9

3^3 — 7

3^4 — 1

Q) The digit in the unit's place of the number represented by $(7^{95} - 3^{58})$ is:

(a) 0	(b) 4
(c) 6	(d) 7

Ans: (b)

Q) The sum of $5^2 + 6^2 + 7^2 + \ldots + 15^2$ is

(a) 1110 (b) 1120

(c) 1310 (d) 1210

$$(1^2 + 2^2 + 3^2 \,- - -\, \underline{15^2}) - (1^2 + 2^2 + 3^2 + 4^2)$$

$$\frac{15 \times 16 \times 31}{6} - \frac{4 \times 5 \times 9}{6} = \_\_\_\_\_\_$$

Q) The sum of $5^2 + 6^2 + 7^2 + \dots + 15^2$ is

(a) 1110 (b) 1120

(c) 1310 (d) 1210

Ans: (d)

Q) If x 959 y is divisible by 44 and y >5, then what are values of the digit x and y ?

(a) $x = 7, y = 6$

(b) $x = 4, y = 8$

(c) $x = 6, y = 7$

(d) None of these

Q) If x 959 y is divisible by 44 and $y > 5$, then what are values of the digit x and y ?

(a) $x = 7, y = 6$

(b) $x = 4, y = 8$

(c) $x = 6, y = 7$

(d) None of these

Ans: (a)

Q) If the number 413283P759387 is divisible by 13, then what is the value of P?

(*a*) 3
(*b*) 6
(*c*) 7
(*d*) 8

Q) If the number 413283P759387 is divisible by 13, then what is the value of P?

(*a*) 3 (*b*) 6 (*c*) 7 (*d*) 8

Ans: (d)

Q) The number of prime factors in the expression $(6)^{10} \times (7)^{17} \times (11)^{27}$ is:

(a) 54 (b) 64 (c) 71 (d) 81

Q) The number of prime factors in the expression $(6)^{10} \times (7)^{17} \times (11)^{27}$ is:

(a) 54 (b) 64 (c) 71 (d) 81

Ans: (b)

SSBCrack EXAMS

Q) The seven digit number 876p37q is divisible by 225. The values of p and q can be respectively

(a) 9, 0
(b) 0, 0
(c) 0, 5
(d) 9, 5

Q) The seven digit number 876p37q is divisible by 225. The values of p and q can be respectively

(a) 9, 0 (b) 0, 0

(c) 0, 5 (d) 9, 5

Ans: (d)

Q) The sum of three fractions is $2\frac{11}{24}$. When the largest fraction is divided by the smallest, the fraction thus obtained is $\frac{7}{6}$ which is $\frac{1}{3}$ more than the middle one. The fractions are:

(a) $\frac{3}{5}, \frac{4}{7}, \frac{2}{3}$

(b) $\frac{7}{8}, \frac{5}{6}, \frac{3}{4}$

(c) $\frac{7}{9}, \frac{2}{3}, \frac{3}{5}$

(d) None of these

Q) The sum of three fractions is $2\frac{11}{24}$. When the largest fraction is divided by the smallest, the fraction thus obtained is $\frac{7}{6}$ which is $\frac{1}{3}$ more than the middle one. The fractions are:

(a) $\frac{3}{5}, \frac{4}{7}, \frac{2}{3}$

(b) $\frac{7}{8}, \frac{5}{6}, \frac{3}{4}$

(c) $\frac{7}{9}, \frac{2}{3}, \frac{3}{5}$

(d) None of these

Ans: (b)

Q) If the sum of two numbers is 55 and the H.C.F. and L.C.M. of these numbers are 5 and 120 respectively, then the sum of the reciprocals of the numbers is equal to:

(a) $\frac{55}{601}$ (b) $\frac{601}{55}$ (c) $\frac{11}{120}$ (d) $\frac{120}{11}$

Q) If the sum of two numbers is 55 and the H.C.F. and L.C.M. of these numbers are 5 and 120 respectively, then the sum of the reciprocals of the numbers is equal to:

(a) $\frac{55}{601}$ (b) $\frac{601}{55}$ (c) $\frac{11}{120}$ (d) $\frac{120}{11}$

Ans: (c)

Q) If the points P and Q represent real numbers $0.7\overline{3}$ and $0.5\overline{6}$ on the number line, then what is the distance between P and Q?

(a) $\frac{1}{6}$ (b) $\frac{1}{5}$ (c) $\frac{16}{45}$ (d) $\frac{11}{90}$

Q) If the points P and Q represent real numbers $0.7\overline{3}$ and $0.5\overline{6}$ on the number line, then what is the distance between P and Q?

(a) $\frac{1}{6}$ (b) $\frac{1}{5}$ (c) $\frac{16}{45}$ (d) $\frac{11}{90}$

Ans: (a)

Q) Minimum difference between x and y such that 1x 71y 61 is exactly divisible by 11 is

(a) 2 (b) 3 (c) 1 (d) 0

Q) Minimum difference between x and y such that 1x 71y 61 is exactly divisible by 11 is

(a) 2 (b) 3 (c) 1 (d) 0

Ans: (a)

Q) The value of

$$\frac{1}{\sqrt{7}-\sqrt{6}}-\frac{1}{\sqrt{6}-\sqrt{5}}+\frac{1}{\sqrt{5}-2}-\frac{1}{\sqrt{8}-\sqrt{7}}+\frac{1}{3-\sqrt{8}} \text{ is}$$

(a) 0 (b) 1 (c) 5 (d) 7

Q) The value of

$$\frac{1}{\sqrt{7}-\sqrt{6}}-\frac{1}{\sqrt{6}-\sqrt{5}}+\frac{1}{\sqrt{5}-2}-\frac{1}{\sqrt{8}-\sqrt{7}}+\frac{1}{3-\sqrt{8}} \text{ is}$$

(a) 0 (b) 1 (c) 5 (d) 7

Ans: (c)

Q) What is the unit digit in the expansion of 67^{32}?

(*a*) 1 (*b*) 3 (*c*) 7 (*d*) 9

Q) What is the unit digit in the expansion of 67^{32}?

(*a*) 1 (*b*) 3 (*c*) 7 (*d*) 9

Ans: (a)

Q) Three men start together to travel the same way around a circular track of 11 kms. Their speeds are 4, $5\frac{1}{2}$, and 8 kms per hour respectively. When will they meet at the starting point?

(a)	22 hrs	(b)	12 hrs
(c)	11 hrs	(d)	44 hrs

Q) Three men start together to travel the same way around a circular track of 11 kms. Their speeds are 4, $5\frac{1}{2}$, and 8 kms per hour respectively. When will they meet at the starting point?

(a) 22 hrs

(b) 12 hrs

(c) 11 hrs

(d) 44 hrs

Ans: (a)

Q) One pendulum ticks 57 times in 58 seconds and another 608 times in 609 seconds. If they started simultaneously, find the time after which they will tick together.

(a) $\frac{211}{19}$ s

(b) $\frac{1217}{19}$ s

(c) $\frac{1218}{19}$ s

(d) $\frac{1018}{19}$ s

Q) One pendulum ticks 57 times in 58 seconds and another 608 times in 609 seconds. If they started simultaneously, find the time after which they will tick together.

(a) $\frac{211}{19}$ s

(b) $\frac{1217}{19}$ s

(c) $\frac{1218}{19}$ s

(d) $\frac{1018}{19}$ s

Ans: (c)

Q) The LCM of $x^3 - 1$, $x^4 + x^2 + 1$ and $x^4 - 5x^2 + 4$ is

(a) $(x - 1)(x + 1)(x - 2)$

(b) $(x - 1)(x + 1)(x + 2)$

(c) $(x^2 - 1)(x^2 - 4)$

(d) $(x^2 - 1)(x^2 - 4)\ (x^2 + x + 1)(x^2 + 1 - x)$

Q) The LCM of $x^3 - 1$, $x^4 + x^2 + 1$ and $x^4 - 5x^2 + 4$ is

(a) $(x - 1)(x + 1)(x - 2)$

(b) $(x - 1)(x + 1)(x + 2)$

(c) $(x^2 - 1)(x^2 - 4)$

(d) $(x^2 - 1)(x^2 - 4)(x^2 + x + 1)(x^2 + 1 - x)$

Ans: (d)

Q) What is the HCF of $36(3x^4 + 5x^3 - 2x^2)$, $9(6x^3 + 4x^2 - 2x)$ and $54(27x^4 - x)$?

(a) $9x\ (x + 1)$

(b) $9x\ (3x - 1)$

(c) $18x\ (3x - 1)$

(d) $18x\ (x + 1)$

Q) What is the HCF of $36(3x^4 + 5x^3 - 2x^2)$, $9(6x^3 + 4x^2 - 2x)$ and $54(27x^4 - x)$?

(a) $9x(x + 1)$

(b) $9x(3x - 1)$

(c) $18x(3x - 1)$

(d) $18x(x + 1)$

Ans: (c)

SSBCrack EXAMS

Q) What is the HCF of the polynomials $x^3 + 8$, $x^2 + 5x + 6$ and $x^3 + 2x^2 + 4x + 8$?

(a) $x + 2$
(b) $x + 3$
(c) $(x + 2)^2$
(d) None of these

Q) What is the HCF of the polynomials $x^3 + 8$, $x^2 + 5x + 6$ and $x^3 + 2x^2 + 4x + 8$?

(a) $x + 2$

(b) $x + 3$

(c) $(x + 2)^2$

(d) None of these

Ans: (a)

Q) Every prime number of the form $3k + 1$ can be represented in the form $6m + 1$ (where, k and m are integers), when

(a) k is odd

(b) k is even

(c) k can be both odd and even

(d) No such form is possible

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(a) k is odd
(b) k is even
(c) k can be both odd and even
(d) No such form is possible

Ans: (b)

Q) The sum of first 47 terms of the series

$$\frac{1}{4}+\frac{1}{5}-\frac{1}{6}-\frac{1}{4}-\frac{1}{5}+\frac{1}{6}+\frac{1}{4}+\frac{1}{5}-\frac{1}{6}\ldots\ldots \text{ is}$$

(a) 0

(b) $-\frac{1}{6}$

(c) $\frac{1}{6}$

(d) $\frac{9}{20}$

Q) The sum of first 47 terms of the series

$$\frac{1}{4}+\frac{1}{5}-\frac{1}{6}-\frac{1}{4}-\frac{1}{5}+\frac{1}{6}+\frac{1}{4}+\frac{1}{5}-\frac{1}{6}\ldots\ldots \text{ is}$$

(a) 0

(b) $-\frac{1}{6}$

(c) $\frac{1}{6}$

(d) $\frac{9}{20}$

Ans: (b)

Q) If 10^n divides $6^{23} \times 75^9 \times 105^2$, then what is the largest value of n?

(*a*) 20 (*b*) 22 (*c*) 23 (*d*) 28

Q) If 10^n divides $6^{23} \times 75^9 \times 105^2$, then what is the largest value of n?

(*a*) 20 (*b*) 22 (*c*) 23 (*d*) 28

Ans: (a)

Q) What is the remainder when $(17^{23} + 23^{23} + 29^{23})$ is divided by 23 ?

(a) 0	(b) 1
(c) 2	(d) 3

Q) What is the remainder when $(17^{23} + 23^{23} + 29^{23})$ is divided by 23 ?

(a) 0 (b) 1

(c) 2 (d) 3

Ans: (a)

Q) The LCM of $(x^3 - x^2 - 2x)$ and $(x^3 + x^2)$ is

(a) $x^3 - x^2 - 2x$

(b) $x^2 + x$

(c) $x^4 - x^3 - 2x^2$

(d) $x - 2$

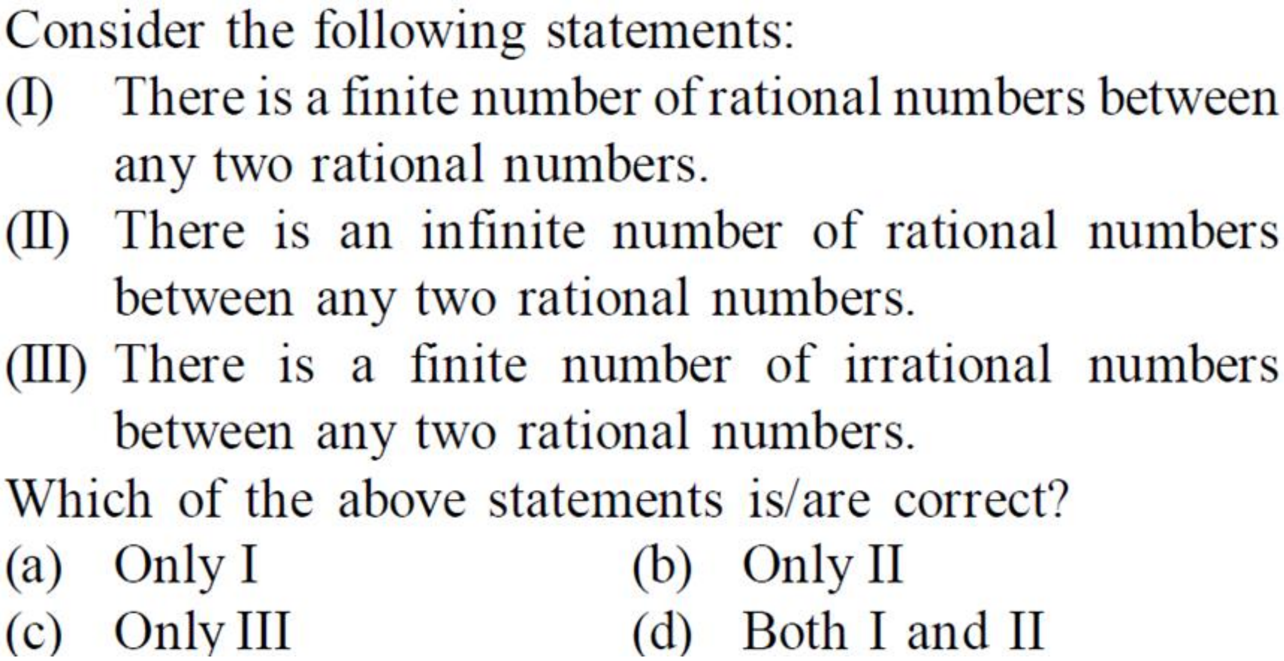
Q) The LCM of $(x^3 - x^2 - 2x)$ and $(x^3 + x^2)$ is

(a) $x^3 - x^2 - 2x$ (b) $x^2 + x$

(c) $x^4 - x^3 - 2x^2$ (d) $x - 2$

Ans: (c)

Q)



Consider the following statements:

(I) There is a finite number of rational numbers between any two rational numbers.

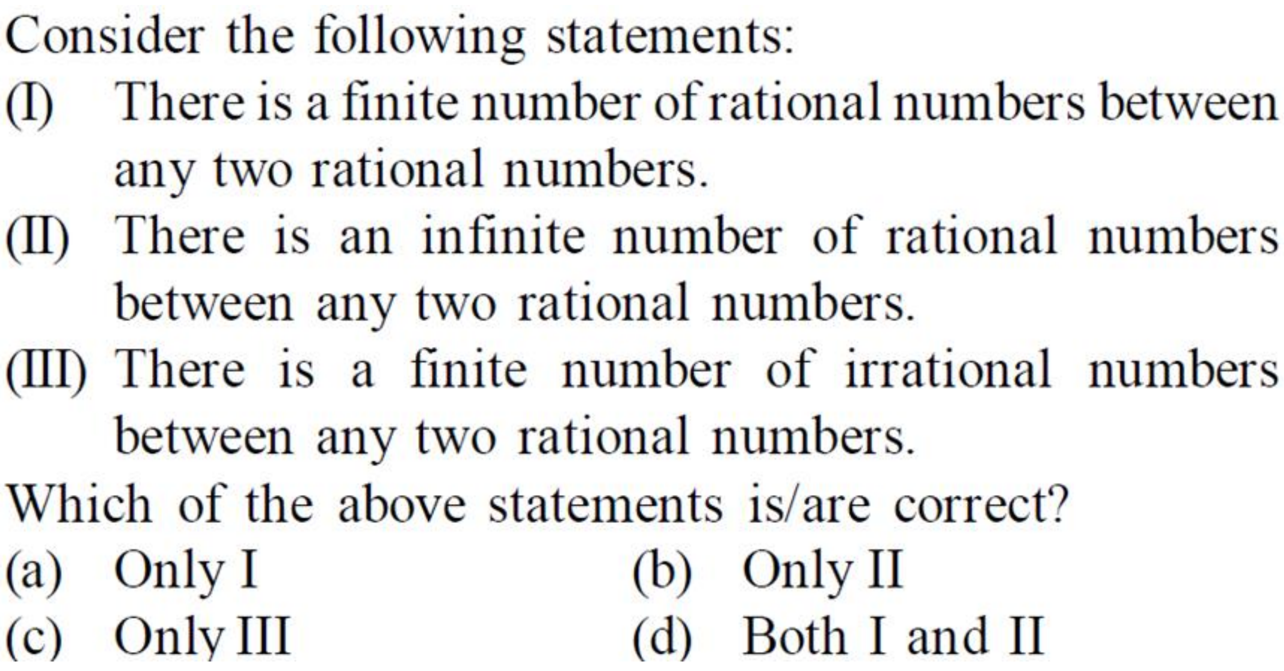
(II) There is an infinite number of rational numbers between any two rational numbers.

(III) There is a finite number of irrational numbers between any two rational numbers.

Which of the above statements is/are correct?

(a) Only I
(b) Only II
(c) Only III
(d) Both I and II

Q)



Consider the following statements:

(I) There is a finite number of rational numbers between any two rational numbers.

(II) There is an infinite number of rational numbers between any two rational numbers.

(III) There is a finite number of irrational numbers between any two rational numbers.

Which of the above statements is/are correct?

(a) Only I

(b) Only II

(c) Only III

(d) Both I and II

Ans: (b)

Q) If $\frac{1}{1\times 2}+\frac{1}{2\times 3}+\frac{1}{3\times 4}+\ldots+\frac{1}{n(n+1)}=\frac{99}{100}$ then what is the value of n?

(*a*) 98 (*b*) 99 (*c*) 100 (*d*) 101

Q) If $\frac{1}{1\times 2}+\frac{1}{2\times 3}+\frac{1}{3\times 4}+\ldots+\frac{1}{n(n+1)}=\frac{99}{100}$ then what is the value of n?

(*a*) 98 (*b*) 99 (*c*) 100 (*d*) 101

Ans: (b)

Q) The highest four-digit number which is divisible by each of the numbers 16, 36, 45, 48 is

(*a*) 9180 (*b*) 9360 (*c*) 9630 (*d*) 9840

Q) The highest four-digit number which is divisible by each of the numbers 16, 36, 45, 48 is

(*a*) 9180 (*b*) 9360 (*c*) 9630 (*d*) 9840

Ans: (b)

Q) What is the remainder when $(17^{29} + 19^{29})$ is divided by 18?

(*a*) 6 (*b*) 2 (*c*) 1 (*d*) 0

Q) What is the remainder when $(17^{29} + 19^{29})$ is divided by 18?

(*a*) 6 (*b*) 2 (*c*) 1 (*d*) 0

Ans: (d)

Q) The expression $5^{2n} - 2^{3n}$ has a factor

(a) 3

(b) 7

(c) 17

(d) None of the above

Q) The expression $5^{2n} - 2^{3n}$ has a factor

(a) 3

(b) 7

(c) 17

(d) None of the above

Ans: (c)

Q) Which one of the following is the largest divisor of $3^x + 3^{x+1} + 3^{x+2}$, if x is any natural number?

(a) 3 (b) 13 (c) 39 (d) 117

Q) Which one of the following is the largest divisor of $3^x + 3^{x+1} + 3^{x+2}$, if x is any natural number?

(a) 3 (b) 13 (c) 39 (d) 117

Ans: (c)

Q) Consider the following statements:

If p is a prime such that p + 2 is also a prime, then

I. $p(p + 2) + 1$ is a perfect square.

II. 12 is a divisor of $p + (p + 2)$, if $p > 3$.

Which of the above statements is/are correct ?

(a) Only I
(b) Only II
(c) Both I and II
(d) Neither I nor II

Q) Consider the following statements:

If p is a prime such that $p + 2$ is also a prime, then

I. $p\,(p + 2) + 1$ is a perfect square.

II. 12 is a divisor of $p + (p + 2)$, if $p > 3$.

Which of the above statements is/are correct ?

(a) Only I

(b) Only II

(c) Both I and II

(d) Neither I nor II

Ans: (c)

Q) Which one of the following is correct?

The sum of two irrational numbers

(a) is always a natural or irrational

(b) may be rational or irrational

(c) is always a rational number

(d) is always an irrational number

Q) Which one of the following is correct?

The sum of two irrational numbers

- (a) is always a natural or irrational
- (b) may be rational or irrational
- (c) is always a rational number
- (d) is always an irrational number

Ans: (b)

Q) If we divide a positive integer by another positive integer, what is the resulting number?

(a) It is always a natural number
(b) It is always an integer
(c) It is a rational number
(d) It is an irrational number

Q) If we divide a positive integer by another positive integer, what is the resulting number?

(a) It is always a natural number
(b) It is always an integer
(c) It is a rational number
(d) It is an irrational number

Ans: (c)

Q) Consider the following statements in respect of three 3-digit numbers XYZ, YZX and ZXY :

1. The sum of the numbers is not divisible by $(X+Y+Z)$.
2. The sum of the numbers is divisible by 111.

Which of the above statements is/are correct?

(*a*) 1 only
(*b*) 2 only
(*c*) Both 1 and 2
(*d*) Neither 1 nor 2

Q) Consider the following statements in respect of three 3-digit numbers XYZ, YZX and ZXY :

1. The sum of the numbers is not divisible by $(X + Y + Z)$.
2. The sum of the numbers is divisible by 111.

Which of the above statements is/are correct?

(*a*) 1 only (*b*) 2 only

(*c*) Both 1 and 2 (*d*) Neither 1 nor 2

Ans: (b)

Q) The least number that should be added to 2055 so that the sum is exactly divisible by 27 :

(a) 24 (b) 27 (c) 31 (d) 28

Q) The least number that should be added to 2055 so that the sum is exactly divisible by 27 :

(a) 24 (b) 27 (c) 31 (d) 28

Ans: (a)

Q) Let x be the least number, which when divided by 5, 6, 7 and 8 leaves a remainder 3 in each case but when divided by 9 leaves no remainder. The sum of digits of x is

(a) 22 (b) 21 (c) 18 (d) 24

Q) Let x be the least number, which when divided by 5, 6, 7 and 8 leaves a remainder 3 in each case but when divided by 9 leaves no remainder. The sum of digits of x is

(a) 22 (b) 21 (c) 18 (d) 24

Ans: (c)

Q) I have a certain number of beads which lie between 600 and 900. If 2 beads are taken away the remainder can be equally divided among 3, 4, 5, 6, 7 or 12 boys. The number of beads I have

(a) 729 (b) 842 (c) 576 (d) 961

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(a) 729 (b) 842 (c) 576 (d) 961

Ans: (b)

Q) A hall is 13 metres 53 cm long and 8 metres 61 cm broad is to be paved with minimum number of square tiles. The number of tiles required is:

(a) 123 (b) 77 (c) 99 (d) 57

Q) A hall is 13 metres 53 cm long and 8 metres 61 cm broad is to be paved with minimum number of square tiles. The number of tiles required is:

(a) 123 (b) 77 (c) 99 (d) 57

Ans: (b)

Q) Three wheels can complete respectively 60,36,24 revolutions per minute. There is a red spot on each wheel that touches the ground at time zero. After how much time, all these spots will simultaneously touch the ground again?

(a) 5/2 seconds

(b) 5/3 seconds

(c) 5 seconds

(d) 7.5 seconds

Q) Three wheels can complete respectively 60,36,24 revolutions per minute. There is a red spot on each wheel that touches the ground at time zero. After how much time, all these spots will simultaneously touch the ground again?

(a) 5/2 seconds
(b) 5/3 seconds
(c) 5 seconds
(d) 7.5 seconds

Ans: (c)

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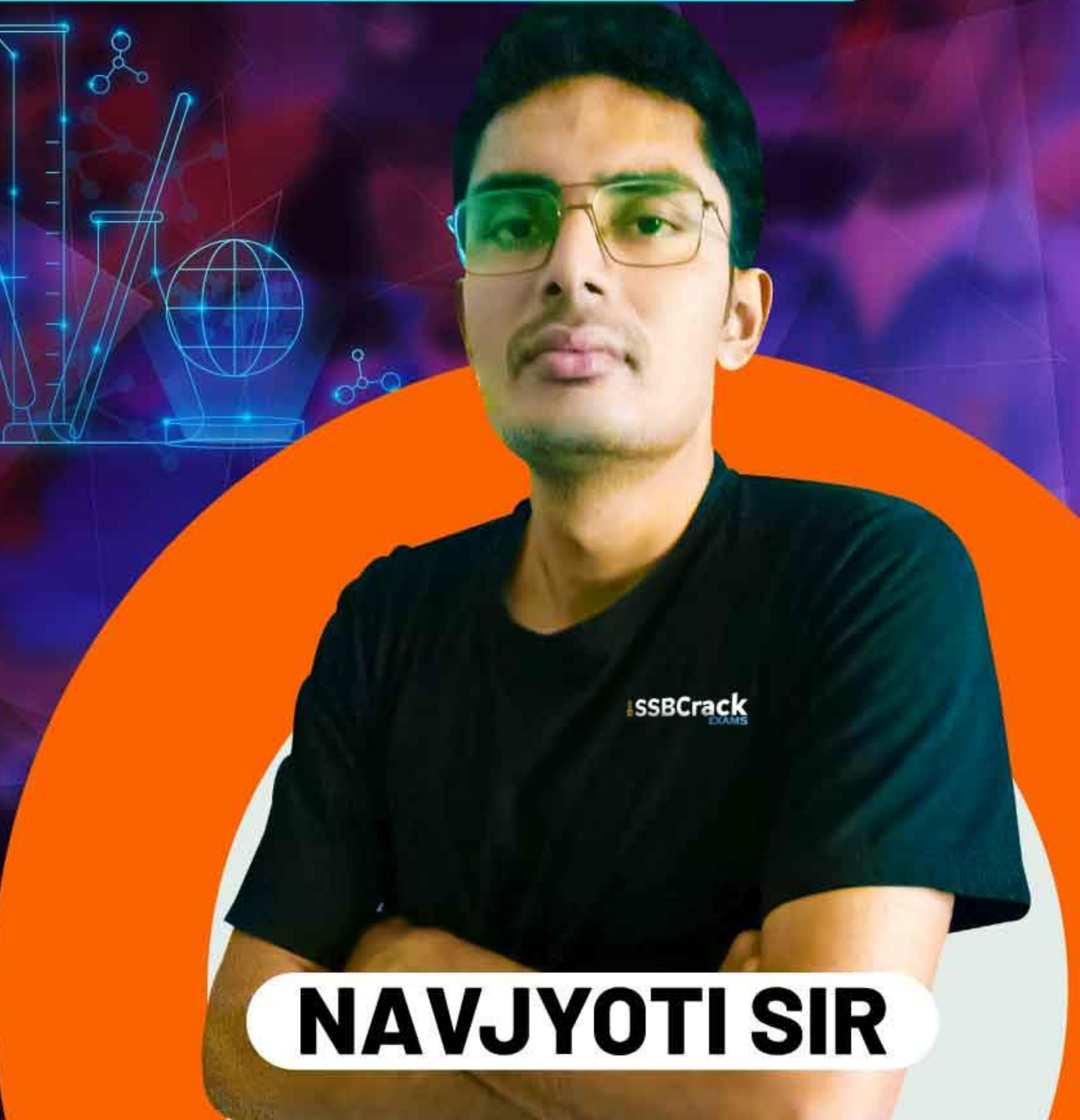
SSBCrack EXAMS

LIVE ●

MATHS

ALGEBRA

CLASS 3



NAVJYOTI SIR