

PRAAYAS

JEE 2026

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Mathematics

Basic Maths

Lecture - 03

By – Ashish Agarwal Sir
(IIT Kanpur)



Topics *To be covered*



- A** Divisibility Rules
- B** Some Important Points

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Recap *of previous lecture*



State True or False

1. Every prime except 2 is odd. (T)
2. Every prime ≥ 5 is of type $6k \pm 1$, $k \in \mathbb{I}^+$. (T)
3. Every number of type $6k \pm 1$, $k \in \mathbb{I}^+$ is prime. (F)
4. Sum of two primes is also a prime. (F)
5. Every composite number has more than two positive factors. (T)
6. Every natural number is either prime or composite. (F)

2 is the only even prime

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1 is neither prime nor composite

Recap *of previous lecture*



State True or False

7. 1 is the smallest prime. (F)
8. Every irrational number is real. (T)
9. $25.\bar{3}$ is a rational number but not a real number. (F)
10. If x is rational then x^2 is also rational. (T)
11. If x is irrational then x^2 is also irrational. (F)

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Kaam Ki Baat



Math में कोई भी Fact तभी सही होता है जब वह हर जगह सही हो एक भी जगह गलत होने पर उसे गलत ही कहते हैं

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इसलिए अगर हमें कुछ सही prove करना है तो general proof देना पड़ेगा जबकि अगर किसी चीज को गलत proof करना है तो सिर्फ एक ही counter-example काफी है

QUESTION



Fill in the Blanks :

1. Even integer \pm Even integer = Even Integer

2. Even integer \pm 1 = Odd Integer

3. Odd integer \pm Odd integer = Odd Integer

4. Odd integer \pm Even integer = odd Integer

5. Odd integer \pm 1 = Even.

Same \pm Same = even
Same \pm opp = odd.

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Homework Discussion

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QUESTION

KTK 3



Column-I		Column-II	
(A)	A rectangular box has volume 48, and the sum of the length of the twelve edges of the box is 48. The largest integer that could be the length of an edge of the box, is	(P)	1
(B)	The number of zeroes at the end in the product of first 20 prime numbers, is $2 \cdot 3 \cdot 5 \cdot \dots \cdot 101$ \Rightarrow only one zero at end	(Q)	2
(C)	The number of solutions of $2^{2x} - 3^{2y} = 55$, in which x and y are integers, is	(R)	3
		(S)	4
		(T)	6

Ans. (A) T; (B) P; (C) P



$$\textcircled{c} \quad 2^{2x} - 3^{2y} = 55$$

$$(2^x - 3^y)(2^x + 3^y) = 55 = 11 \times 5 = 55 \times 1$$

$$(x, y \in \mathbb{I}^+) \quad \begin{cases} 2^x + 3^y = 11 \\ 2^x - 3^y = 5 \end{cases}$$

$$\text{OR} \quad \begin{cases} 2^x + 3^y = 55 \\ 2^x - 3^y = 1 \end{cases}$$

$$2 \cdot 2^x = 16$$

$$2^x = 8$$

$$x = 3$$

$$2^3 - 3^y = 5$$

$$2 \times 2 \times 2 - 3^y = 5$$

$$8 - 3^y = 5$$

$$3^y = 8 - 5$$

$$3^y = 3^1$$

$$y = 1$$

$$2^x = 28 \quad \text{N.P for any } x \in \mathbb{I}^+$$

⇓

No integral soln.

$$2^{-1} = \frac{1}{2}, \quad 3^{-1} = \frac{1}{3}$$

$$2^{-2} = \frac{1}{4}, \quad 3^{-2} = \frac{1}{9}$$

$$x, y \in \mathbb{I}^-$$

(Not possible)

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$$\textcircled{A} \quad V = l \cdot b \cdot h = 48$$

$$4(l + b + h) = 48$$

$$l + b + h = 12$$

$$lbh = 48$$

$$l = 16 \times$$

$$l = 12 \times$$

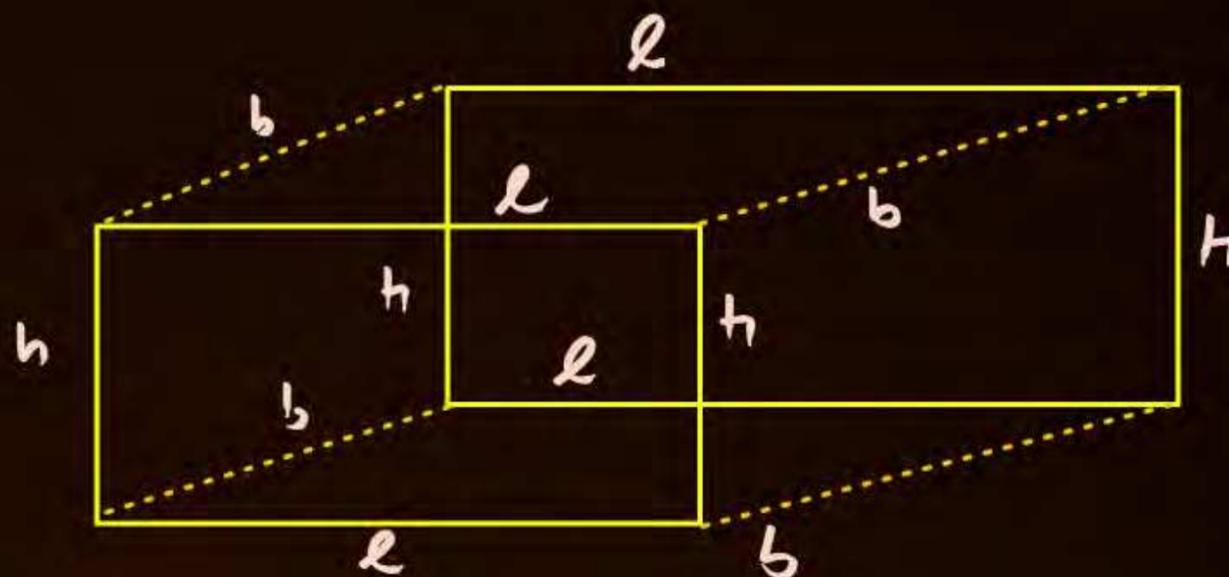
$$l = 6 \simeq$$

$$l = 6$$

$$b = 4$$

$$h = 2$$

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Aao Machaay Dhamaal Deh Swaal pe Deh Swaal

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QUESTION



★★★★★ KCLS ★★★★★

$x + \frac{1}{x} \geq 2, x \in \mathbb{R}^+$
 $3(x + \frac{1}{x}) \geq 6 \Rightarrow E \geq 6$

For each positive number x , let $f(x) = \frac{\left(x + \frac{1}{x}\right)^6 - \left(x^6 + \frac{1}{x^6}\right) - 2}{\left(x + \frac{1}{x}\right)^3 + \left(x^3 + \frac{1}{x^3}\right)}$. The minimum value of $f(x)$ is

- A** 1
- B** 2
- C** 3
- D** 4
- ~~**E** 6~~

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$x + \frac{1}{x} = t \xrightarrow{\text{CBS}} x^3 + \frac{1}{x^3} + 3x \cdot \frac{1}{x} \left(x + \frac{1}{x}\right) = t^3$

$x^3 + \frac{1}{x^3} + 3t = t^3$

$x^3 + \frac{1}{x^3} = t^3 - 3t$

$x^6 + \frac{1}{x^6} + 2 = t^6 + 9t^2 - 6t^4$

$x^6 + \frac{1}{x^6} = t^6 + 9t^2 - 6t^4 - 2$

$E = \frac{t^6 - (t^6 + 9t^2 - 6t^4 - 2) - 2}{t^3 + t^3 - 3t}$

$= \frac{6t^4 - 9t^2}{2t^3 - 3t}$

$= \frac{3t^2(2t^2 - 3)}{t(2t^2 - 3)} = 3t = 3\left(x + \frac{1}{x}\right), x \in \mathbb{R}^+$

$E = 3\left(x + \frac{1}{x}\right) \geq 3 \cdot 2 = 6$

$E_{\min} = 6$



$$2t^2 - 3 \neq 0 \quad \text{b'coz } 2t^2 - 3 = 2\left(x + \frac{1}{x}\right)^2 - 3$$

$$= 2\left(x^2 + \frac{1}{x^2} + 2\right) - 3$$

$$= 2\left(x^2 + \frac{1}{x^2}\right) + 4 - 3$$

$$= 2\left(x^2 + \frac{1}{x^2}\right) + 1 \quad \text{is +ve.}$$

$$2 - 8mx$$

$$\text{min value} = 2 - (-1) = 3 \quad \times$$

$$\star (a+b)^3 = a^3 + b^3 + 3ab(a+b)$$

$$\star (a-b)^3 = a^3 - b^3 - 3ab(a-b)$$

$b \rightarrow -b$

QUESTION



If a, b, c are distinct real numbers such that $a^2 - b = b^2 - c = c^2 - a$, then
 $(a + b)(b + c)(c + a) =$ _____

Tahoi

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Yaad Rakho



Remaining NO: 343 last digit
 $34 - 2 \times 3 = 34 - 6 = 28$ divisible by 7

DIVISIBILITY RULES

- | | |
|----|--|
| 2 | If the last digit of a number is even, then the number is divisible by 2. |
| 3 | If the sum of all the digits in a number is divisible by 3, then the number is divisible by 3. |
| 4 | If the last two digits of a number are divisible by 4, then the number is divisible by 4. |
| 5 | If the last digit of a number is 0 or 5, then the number is divisible by 5. |
| 6 | If a number is divisible by both 2 and 3, then the number is divisible by 6. |
| 7 | If the last digit of a number is doubled and then subtracted from the rest of the number, and the answer is 0 or is divisible by 7, then the number is divisible by 7. |
| 8 | If the last three digits of a number are divisible by 8, then the number is divisible by 8. |
| 9 | If the sum of all the digits in a number is divisible by 9, then the number is divisible by 9. |
| 10 | If the last digit of a number is 0, then the number is divisible by 10. |



Yaad Rakho



FOR very large NO:s

For 7, 11 & 13

If the positive difference of the last three digit and the rest of the digits is divisible by 7, 11, or 13, then the number is divisibly by 7, 11, or 13, respectively.

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QUESTION

Check which of the following is/are divisible by 7.

~~A~~ 1078

A 107 8

$107 - 2 \times 8 = 107 - 16 = 107 - 16 = 91$ divisible by 7

~~B~~ 3661

B 366 1

$366 - 2 \times 1 = 364$ Apply test again.

$36 - 2 \times 4 = 36 - 8 = 28$ divisible by 7

~~C~~ 1257

D 698 6

$698 - 2 \times 6 = 698 - 12 = 686$

Apply test again

$68 - 12 = 56$ divisible by 7

~~D~~ 6986

C 125 7

$125 - 2 \times 7 = 125 - 14 = 111$

$11 - 2 \times 1 = 9$ Not divisible by 7

QUESTION



Check which of the following is/are divisible by 13

~~A~~ 20449

~~B~~ 24336

~~C~~ 4225

~~D~~ 492804

Test ① 49280 ④

$$= 49280 - 4 \times 9$$

$$= 4924④$$

$$4924 - 9 \times 4$$

$$= 488⑧$$

$$488 - 9 \times 8$$

$$= 41⑥$$

$$41 - 9 \times 6$$

$$= -13 \text{ divisible by } 13.$$

Test ②

$$\begin{array}{r} 804 \\ 492 \\ \hline 312 \end{array}$$

$$31 - 2 \times 9 = 31 - 18 = 13$$

$$\begin{array}{r} 4924 \\ 36 \\ \hline 488 \end{array}$$

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Diamond Points to Note



$$P_1: a^2 \geq 0, \quad a \in \mathbb{R}$$

❖ Square of any Real number or an expression is "NEVER NEGATIVE"

$$\text{Ex: } x^2 + 2 \Big|_{\min} = 2$$

$$\text{Ex: } x^6 - 3 \Big|_{\min} = -3$$

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* (Any real NO:) ≥ 0 .
Even NO:

$$\downarrow$$

$$a^{2n} \geq 0$$



Diamond Points to Note



P₂: If $x, y \in \mathbb{R}$ & $x^2 + y^2 = 0 \Rightarrow x=0$ & $y=0$

$x^2 + y^2 = 0$ only possible if $x=0, y=0$
 $\geq 0 \geq 0$

Generalization:

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If $a_1, a_2, \dots, a_n \in \mathbb{R}$ then $a_1^2 + a_2^2 + \dots + a_n^2 = 0$ then $a_1 = a_2 = \dots = a_n = 0$

Ex: $(x-1)^2 + (y-2)^2 + (z-3)^2 = 0$

find: $x+y+z$

proof: $(x-1)^2 + (y-2)^2 + (z-3)^2 = 0$

$x-1=0, y-2=0, z-3=0$
 $x=1, y=2, z=3$

(A) $1 \sim 67.1$

(B) $6 \sim 11.1$

~~(C)~~ $5/3 \sim 19.1$

(D) $4/3 \sim 4.5.1$



$$x=1, y=2, z=3$$

~~$$x+y \div z = 1+2 \div 3$$

$$= 3 \div 3 = 1$$~~

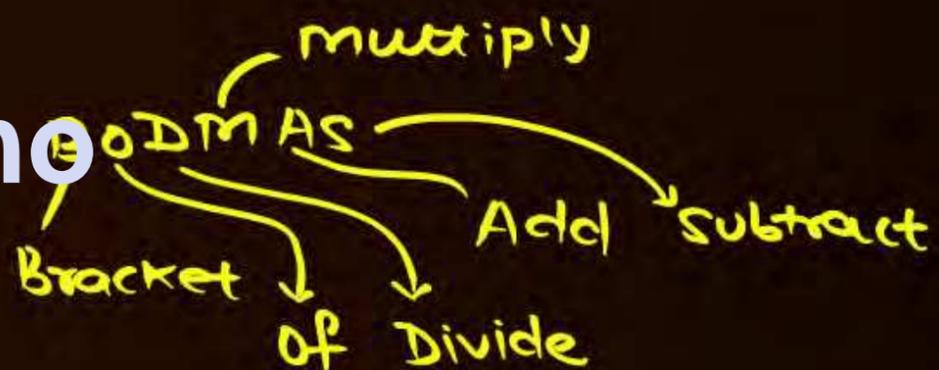
Gadho/Gadhiyoo
aigaa naa kano

$$x+y \div z = 1+2/3$$

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

$$= \frac{5}{3}$$

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ASNC (Ashish Sir's Novel Concepts)



HSGH

New

"Whenever an equation consist of two or more variables always try to make perfect squares"

Ex: $x^2 + y^2 - 4x - 6y + 13 = 0$

find: $y^{x^{x^x}}$

Soln

$$x^2 + y^2 - 4x - 6y + 13 = 0$$

$$x^2 - 4x + 4 + y^2 - 6y + 9 = 0$$

$$(x-2)^2 + (y-3)^2 = 0 \Rightarrow x=2, y=3$$

$$y^{x^{x^x}} = 3^{2^{2^2}} = 3^8 \text{ Gadho / Gadhiyoo aisa Na Karo}$$

$$y^{x^{x^x}} = 3^{2^{2^2}} = 3^{2^4} = 3^{16}$$

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- (A) $3^8 - 38\%$
- (B) $3 - 22\%$

(C) $3^{18} - 10\%$

(D) $3^{16} - 30\%$

QUESTION



$$x^2 = 2 \cdot 3 \cdot x$$

If $x^2 + y^2 + 4z^2 - 6x - 2y - 4z + 11 = 0$ then xyz equals

~~A~~ $3/2$

B 4

C 6

D 3

$$x^2 - 6x + 9 + y^2 - 2y + 1 + 4z^2 - 4z + 1 = 0$$

$$(x-3)^2 + (y-1)^2 + (2z-1)^2 = 0$$

$$x=3, y=1, z=1/2$$

$$xyz = 3/2$$

$$4z^2 - 4z + 1$$

$$(2z)^2 - 2 \cdot 2z \cdot 1 + 1^2$$

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QUESTION



If x , y & z are three real numbers such that $x^2 + 4y^2 + 9z^2 - 2x - 4y - 6z + 3 = 0$ then find the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$.

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QUESTION



Let a , b , c are real numbers and satisfy $a = 8 - b$ and $c^2 = ab - 16$, then $\frac{a}{b}$ is equal to

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QUESTION



Solve in real numbers the system of equations

$$\begin{cases} y^2 + u^2 + v^2 + w^2 = 4x - 1 \\ x^2 + u^2 + v^2 + w^2 = 4y - 1 \\ x^2 + y^2 + v^2 + w^2 = 4u - 1 \\ x^2 + y^2 + u^2 + w^2 = 4v - 1 \\ x^2 + y^2 + u^2 + v^2 = 4w - 1 \end{cases}$$



$$4x^2 + 4y^2 + 4u^2 + 4v^2 + 4w^2 = 4x + 4y + 4u + 4v + 4w - 5$$

$$4x^2 - 4x + 1 + 4y^2 - 4y + 1 + 4v^2 - 4v + 1$$

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$$+ 4u^2 - 4u + 1 + 4w^2 - 4w + 1 = 0$$

$$(2x-1)^2 + (2y-1)^2 + (2v-1)^2 + (2u-1)^2 + (2w-1)^2 = 0$$

$$2x-1=0$$

$$2y-1=0$$

$$2v-1=0$$

$$2u-1=0$$

$$2w-1=0$$

$$x=y=v=u=w=\frac{1}{2}$$



Diamond Points to Note



$$P_3: k^4 + k^2 + 1 = (k^2 + k + 1)(k^2 - k + 1)$$

$$k^4 + k^2 + 1 = k^4 + 2k^2 + 1 - k^2$$
$$= (k^2 + 1)^2 - k^2$$

$$= (k^2 + 1 + k)(k^2 + 1 - k)$$

$$= (k^2 - k + 1)(k^2 + k + 1)$$

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QUESTION



If $a \in I$ and $a^4 + a^2 + 1$ is prime. The number of possible values of a is

A 0 — 28 %

B 1 — 34 %

~~**C**~~ 2 — 29 %

D 3 — 8 %

$$a^4 + a^2 + 1 = (a^2 - a + 1)(a^2 + a + 1) \in \text{prime}$$

$$a^2 - a + 1 = 1 \ \& \ a^2 + a + 1 = \text{prime}$$

$$a^2 - a = 0$$

$$a = 0, 1$$

$$\text{@ } a = 0 \times \ a^2 + a + 1 = 1 \notin \text{prime}$$

$$\text{@ } a = 1 \ \ a^2 + a + 1 = 3 \in \text{prime}$$

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$$a^2 + a + 1 = 1 \ \& \ a^2 - a + 1 = \text{prime}$$

$$a = 0, -1$$

$$\text{@ } a = 0$$

$$a^2 - a + 1 = 1 \notin \text{prime}$$

$$\text{@ } a = -1$$

$$a^2 - a + 1 = 3 \in \text{prime}$$

$$a = 1, -1$$

**Don't Forget to
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Retry all the class illustrations**



Today's KTK



No Selection TRISHUL Selection with Good Rank
Apnao IIT Jao



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QUESTION

(KTK 1)



a, b, c are reals such that $a + b + c = 3$ and $\frac{1}{a+b} + \frac{1}{b+c} + \frac{1}{c+a} = \frac{10}{3}$.

The value $E = \frac{a}{b+c} + \frac{b}{c+a} + \frac{c}{a+b}$ is

A 9

B 7

C 5

D 3

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QUESTION

(KTK 2)



Solve the equations :
$$\begin{cases} 2^x + 3^y = 41 \\ 2^{x+2} + 3^{y+2} = 209 \end{cases}$$

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Ans. $x = 5$ and $y = 2$

QUESTION

(KTK 3)



What is the area of an equilateral triangle inscribed in a circle of radius 4 cm?

- A** 12 cm^2
- B** $9\sqrt{3} \text{ cm}^2$
- C** $8\sqrt{3} \text{ cm}^2$
- D** $12\sqrt{3} \text{ cm}^2$

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Ans. D



Solution to Previous TAH

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QUESTION



Indicate which numbers in the given sets are (a) Natural numbers (b) Whole numbers (c) Integers (d) Rational numbers (e) Irrational numbers.

(i) $\left\{-10, -\sqrt{2}, -\frac{3}{4}, 0, \frac{4}{5}, \sqrt{4}, \pi, 7, \frac{18}{2}, 100\right\}$

(ii) $\left\{-\sqrt[3]{8}, \frac{0}{3}, \sqrt[3]{7}, \sqrt{\frac{4}{9}}, 1.\overline{126}\right\}$

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TAH-01

(ii) $\left\{ -\sqrt[3]{8}, \frac{0}{3}, \sqrt[3]{7}, \sqrt{\frac{4}{9}}, 1.\overline{126} \right\}$

$$-\sqrt[3]{8} \in \mathbb{I}, \mathbb{Q}$$

$$\frac{0}{3} \in \mathbb{N}, \mathbb{Q}, \mathbb{I}$$

$$\sqrt[3]{7} \in \mathbb{R} - \mathbb{Q}$$

$$\sqrt{\frac{4}{9}} \in \mathbb{Q}, \mathbb{Q}$$

$$1.\overline{126} \in \mathbb{Q}$$

**Rajkanya
From bihar**

QUESTION



If a, b, c are non-zero real numbers, then the minimum value of expression

$$\left(\frac{(a^4 + 3a^2 + 1)(b^4 + 5b^2 + 1)(c^4 + 7c^2 + 1)}{a^2b^2c^2} \right) \text{ is}$$

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Ans. 315



Ques a, b, c non-zero real no.'s,
 min value of $\frac{(a^4 + 3a^2 + 1)(b^4 + 5b^2 + 1)(c^4 + 7c^2 + 1)}{a^2 b^2 c^2}$

$$a^4 + 3a^2 + 1 \Rightarrow a^2 \left(a^2 + 3 + \frac{1}{a^2} \right) \Rightarrow a^2 \left(a^2 + \frac{1}{a^2} + 3 \right)$$

$$b^4 + 5b^2 + 1 \Rightarrow b^2 \left(b^2 + \frac{1}{b^2} + 5 \right)$$

$a, b, c \in \mathbb{Q}$
 $\Rightarrow a^2, b^2, c^2 \geq 0$

$$c^4 + 7c^2 + 1 \Rightarrow c^2 \left(c^2 + \frac{1}{c^2} + 7 \right)$$

$$x^2 + \frac{1}{x^2} \geq 2$$

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$$\frac{a^2 b^2 c^2}{a^2 b^2 c^2} \left(a^2 + \frac{1}{a^2} + 3 \right) \left(b^2 + \frac{1}{b^2} + 5 \right) \left(c^2 + \frac{1}{c^2} + 7 \right)$$

$$\left(a^2 + \frac{1}{a^2} + 3 \right) \left(b^2 + \frac{1}{b^2} + 5 \right) \left(c^2 + \frac{1}{c^2} + 7 \right)$$

$$(2+3) (2+5) (2+7)$$

$$5 \times 7 \times 9 \Rightarrow 35 \times 9$$

$$\boxed{315}$$



Tahoz

if a, b, c are non-zero real no. then the minimum value of exp.

$$\left(\frac{(a^4 + 3a^2 + 1)(b^4 + 5b^2 + 1)(c^4 + 7c^2 + 1)}{a^2 b^2 c^2} \right) \text{ is}$$

$$\therefore \left(\frac{a^4 + 3a^2 + 1}{a^2} \right) \left(\frac{b^4 + 5b^2 + 1}{b^2} \right) \left(\frac{c^4 + 7c^2 + 1}{c^2} \right)$$

$$= \left(a^2 + \frac{1}{a^2} + 3 \right) \left(b^2 + \frac{1}{b^2} + 5 \right) \left(c^2 + \frac{1}{c^2} + 7 \right)$$

\downarrow min = 2 \downarrow min = 2 \downarrow min = 2

Let $a, b, c \in \{R - 0\}$

$$\therefore x^2 + \frac{1}{x^2} \geq 2$$

$$= (5) (7) (9)$$

$$= 315$$



Solution to Previous KTKs

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QUESTION

KTK 1



The equation $\frac{2x^2}{x-1} - \frac{2x+7}{3} + \frac{4-6x}{x-1} + 1 = 0$ has the roots-

- A** 4 and 1
- B** only 1
- C** only 4
- D** neither 4 nor 1

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Ans. C



$$\frac{2x^2}{x-1} - \frac{2x+7}{3} + \frac{4-6x}{x-1} + 1 = 0$$

$$2x \neq 0$$

$$\frac{2x^2 - 6x + 4}{x-1} - \frac{2x+7}{3} + 1 = 0$$

$$x-1 \neq 0$$

$$x \neq 1$$

$$\frac{2(x^2 - 3x + 2)}{(x-1)} - \frac{2x+7}{3} + 1 = 0$$

$$\frac{2(x-2)(x-1)}{(x-1)} - \frac{2x+7}{3} + 1 = 0$$

$$2x - 4 + 1 - \frac{2x+7}{3} = 0$$

$$\frac{6x - 9 + 7 - 2x}{3} = 0$$

$$4x = 16$$

$$x = 4$$

- Ans - Only 4 ✓

QUESTION

KTK 2



Which one of the following does not reduce to $\sin x$ for every x , wherever defined, is

- A** $\frac{\tan x}{\sec x}$
- B** $\frac{\sin x}{\sec^2 x - \tan^2 x}$
- C** $\frac{\sin^2 x \sec x}{\tan x}$
- D** All reduce to $\sin x$

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Ans. D



(2)

KTK
2) Which one of following does not reduce to $\sin x$ for every x , wherever defined, is

(a) $\frac{\tan x}{\sec x}$; $\frac{\sin x \cdot \cos x}{\cos x} = \sin x$ (✓)

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(b) $\frac{\sin x}{\sec^2 x - \tan^2 x}$; $\frac{\sin x}{1} = \sin x$ (✓)

(c) $\frac{\sin^2 x \sec x}{\tan x}$; $\frac{\sin^2 x \sec x}{\sin x \cdot \sec x} = \sin x$ (✓)

(d) All reduce to $\sin x$

∴ All reduce to $\sin x$ (✓)

QUESTION

KTK 3



Column-I		Column-II	
(A)	A rectangular box has volume 48, and the sum of the length of the twelve edges of the box is 48. The largest integer that could be the length of an edge of the box, is	(P)	1
(B)	The number of zeroes at the end in the product of first 20 prime numbers, is	(Q)	2
(C)	The number of solutions of $2^{2x} - 3^{2y} = 55$, in which x and y are integers, is	(R)	3
		(S)	4
		(T)	6

Ans. (A) T; (B) P; (C) P



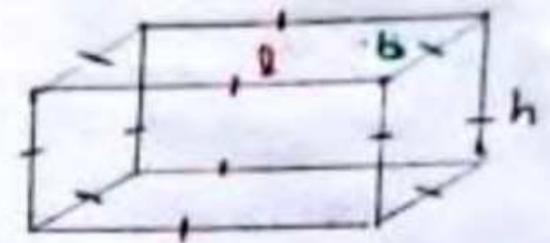
Q (A) A rectangular box has volume 48, and the sum of the length of the twelve edges of the box is 48. The largest integer that could be the length of an edge of the box, is

Given, $V = l \times b \times h = 48$

Sum of the length of the twelve edges of the box is

$$4(l+b+h) = 48$$

$$l+b+h = 12$$



$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$\begin{matrix} l = 2 \times 2 = 4 \\ b = 2 \times 3 = 6 \\ h = 2 \end{matrix} \rightarrow \text{should be } 12$$

∴ Given, The largest integer that could be the length of an edge of the box

∴ $l = 6$ ✓

(B) The number of zero's at the end in the product of first 20 prime numbers, is

First Prime No. → 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71

In the product the zero are the by find how many times comes 2 & 5 or multiple of 2 & 5

∴ The number 2 appears once.

The number 5 appears once.

Hence There is only one pair of 2 and 5.

∴ No. of zero = Multiple of 2 × Multiple of 5

∴ Number of zero is 1 ✓

of $2^{2x} - 3^{2y} = 55$, in which x and y are integers, is

$$(2^x)^2 - (3^y)^2 = 55$$

$$(2^x + 3^y)(2^x - 3^y) = 55$$

↓
5 × 11

The integer factor pairs of 55 are :- (5, 11)

- (11, 5)
- (1, 55)
- (55, 1)

Case - I: $2^x + 3^y = 5$ and $2^x - 3^y = 11$

adding the equation

$$2 \cdot 2^x = 16$$

$$2^{x+1} = 16$$

$$2^{x+1} = 2^4$$

$$x+1 = 4$$

$$x = 3, \quad 3^y = -3$$

Hence, There is no integer solution for y in this case.

Case - II: $2^x + 3^y = 11$ and $2^x - 3^y = 5$

adding the equation

$$2 \cdot 2^x = 16 \quad | \quad 2 + 3^y = 11$$

$$2^{x+1} = 2^4 \quad | \quad 3^y = 9$$

$$x+1 = 4$$

$$x = 3$$

$$y = 1$$

Hence, Accepted ✓

Adding the equation

$$2 \cdot 2^x = 56$$

$$2^{1+x} = 56$$

Since, 56 is not a power of 2, there is no integer solution for x in this case.

Case - IV: $2^x + 3^y = 55$ and $2^x - 3^y = 1$

Adding the equation

$$2 \cdot 2^x = 56$$

Since 56 is not a power of 2, there is no integer solution for x in this case.

The only integer solution is

is $(x, y) = (3, 1)$ ✓

KTK: -04

Q. The ratio of total area of the rectangle to the total shaded area.

Length of rectangle → 4r

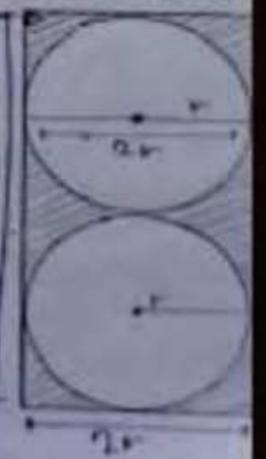
Width of rectangle → 2r

Shaded Area = Area of rectangle - 2(Area of circle)

$$= 8r^2 - 2(\pi r^2)$$

$$= 2r^2(4 - \pi)$$

$$\therefore \frac{8r^2}{2r^2(4 - \pi)} = 4$$



is Ratio of total area

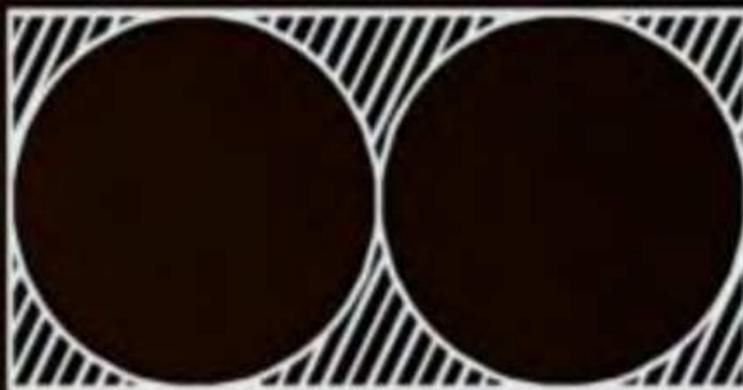
QUESTION

KTK 4



The ratio of total area of the rectangle to the total shaded area

- A** $\frac{2}{\pi}$
- B** $\frac{4}{4 - \pi}$
- C** $\frac{4 - \pi}{\pi}$
- D** $\frac{\pi}{4}$

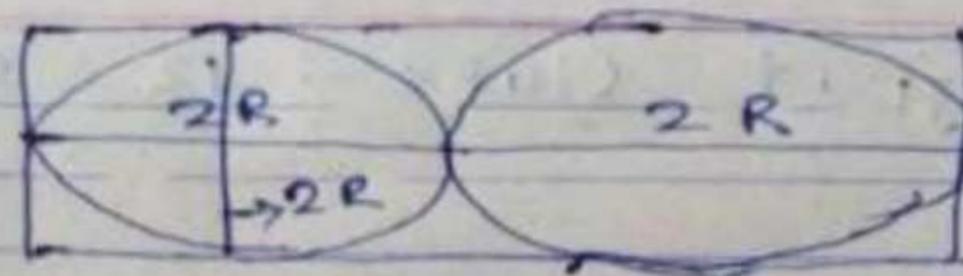


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Ans. B



Question -



$$l = 4R, \quad b = 2R$$

$$\text{Area of rectangle} = 4R \times 2R$$

$$= 8R^2$$

$$\text{shaded area} = 8R^2 - 2\pi R^2$$

$$= 2R^2(4 - \pi)$$

$$\text{Ratio} = \frac{4R^2}{2R^2(4 - \pi)}$$

$$\boxed{\text{Ratio} = \frac{4}{(4 - \pi)}}$$



THANK
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YOU