PRAYAS

JEE 2026

Mathematics

Basic Maths

Lecture - 03

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Topics *to be covered*

A Divisibilty Rules

B Some Important Points

Recap of previous lecture

State True or False

2 is the only even prime

1. Every prime except 2 is odd. (T)
2. Every prime ≥ 5 is of type $6k \pm 1$, $k \in I^+$. (T)
3. Every number of type $6k \pm 1$, $k \in I^+$ 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)

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. $25.\overline{3}$ 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)

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 है

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 ± Even integer = Even Integer
2. Even integer ± 1 = Odd Integer
3. Odd integer ± Odd integer = Even Integer
4. Odd integer ± Even integer = odd Integer
5. Odd integer ± 1 = Even.

Same ± Same = even

Same ± opp = odd.

Homework Discussion

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 $2 \cdot 3 \cdot 5 \cdot p_4 p_6 \cdots p_{20} \Rightarrow$ 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

(c) $2^{2x}-3^{2y}=55$

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

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

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

$x,y\in I^-$

(Not possible)

$(x,y\in I^+)$

$$2^x+3^y=11$$
$$2^x-3^y=5$$
$$2\cdot 2^x=16$$
$$2^x=8$$
$$x=3$$

$$2^3-3^y=5$$
$$2\times2\times2-3^y=5$$
$$8-3^y=5$$
$$3^y=8-5$$
$$3^y=3^1$$
$$y=1$$

OR

$$2^x+3^y=55$$
$$2^x-3^y=1$$
$$2\cdot 2^x=56$$
$$2^x=28$$

N.P for any $x\in I^+$

$\Downarrow$

No integeral soln.

(A) $V = l \cdot b \cdot h = 48$

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

$l+b+h = 12$

$lbh = 48$

$l = 6$

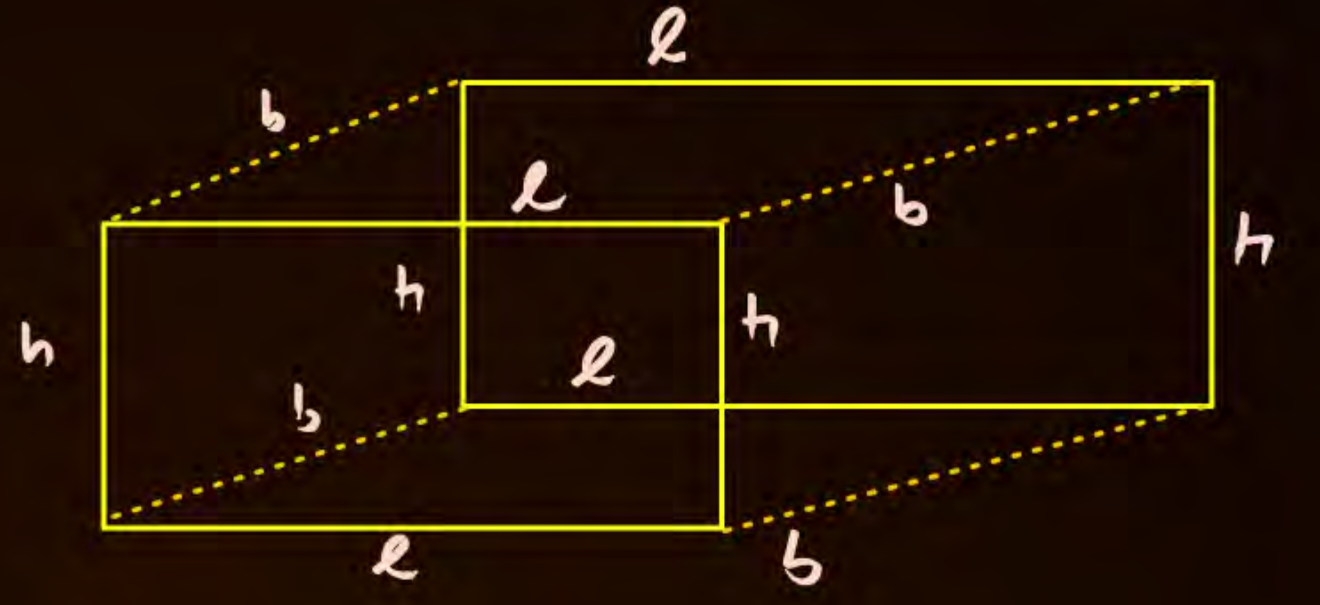
$b = 4$

$h = 2$

$l = 16$ ✗

$l = 12$ ✗

$l = 6$ ✓



Aao Machaay Dhamaal
Deh Swaal pe Deh Swaal

QUESTION

KCLS

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

(A) 1

(B) 2

(C) 3

(D) 4

(E) 6

$x+\frac{1}{x}\geq 2,\ x\in R^+$

$3(x+1/x)\geq 6 \Rightarrow E\geq 6$

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

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

SBS

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

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

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

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

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

$=\dfrac{3t^2\cancel{(2t^2-3)}}{t\cancel{(2t^2-3)}}=3t=3(x+1/x),\ x\in R^+$

$E=3(x+1/x)\geq 3\cdot 2=6$

$E_{min}=6.$

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

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

$2-\sin x$

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

min value $= 2-(-1) = 3$ $\times$

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

★ $(a+b)^3 = a^3+b^3+3ab(a+b)$

$b \longrightarrow -b$

★ $(a-b)^3 = a^3-b^3-3ab(a-b)$

QUESTION

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

Ta h 01

Yaad Rakho

Remaining No: 34 3 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

$1\,3\,3\,1$ ($1\ 2\ 3\ 4$) $3+1 - (1+3) = 0$ divisible by 11

DIVISIBILITY RULES	
11	To find out if a number is divisible by 11, add every even place digit, and call that sum 'x'. Add together the remaining digits, and call that sum 'y'. Take the positive difference of x and y. If the difference is zero or a multiple of eleven, then number is divisible by 11. Repeat the rule if necessary.
13	Delete the last digit from the number and then subtract 9 times the deleted digit from the remaining number. If what is left is divisible by 13, then number is divisible by 13. Repeat the rule if necessary.

2197 $219 - 9\times7 = 219 - 63 = 156$

$15 - 6\times9 = 15 - 54 = -39$ divisible by 13.

Yaad Rakho

For very large NO:8

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.

QUESTION

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

(A) 1078

(B) 3661

(C) 1257

(D) 6986

(A) 1078

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

(B) 3661

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

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

(D) 6986

$698 - 2 \times 6 = 698 - 12 = 686$ Apply test again

$68 - 12 = 56$ divisible by 7

(C) 1257

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

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

QUESTION

Check which of the following is/are divisible by 11

(A) 20449

(B) 39204

(C) 672535

(D) 35545444

20449
1 2 3 4 5

$2+4+9 = 15$
$0+4 = 4$
$15-4 = 11$

39204
1 2 3 4 5.

$3+2+4 = 9$
$9+0 = 9$
$9-9 = 0$

Divisible by 11

$7+5+5 = 17$
$6+2+3 = 12$
5

1 2 3 4 5 6 7 8

$5+4+4+4 = 17$
$3+5+5+4 = 17$
0

QUESTION

Check which of the following is/are divisible by 13

(A) 20449

(B) 24336

(C) 4225

(D) 492804

Test ②

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

$31 - 2\times9 = 31 - 18 = 13$

Test ① 49280④

$= 49280 - 4\times9$

$= 4924④$

$4924 - 9\times4$

$= 488⑧$

$488 - 9\times8$

$= 41⑥$

$41 - 9\times6$

$= -13$ divisible by 13.

$$\begin{array}{r} 4924 \\ 36 \\ \hline 4888 \end{array}$$

Diamond Points to Note

P_1 : $a^2 \geq 0$, $a \in R$

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

Ex: $\underset{\geq 0}{x^2} + 2 \Big|_{min} = 2$

Ex: $\underset{\geq 0}{x^6} - 3 \Big|_{min} = -3$

* $(\text{Any real No.})^{\text{Even No.}} \geq 0$.

$a^{2n} \geq 0$

Diamond Points to Note

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

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

Generalization:

If $a_1 a_2 \ldots a_n \in R$ then $\underset{\geq 0}{a_1^2} + \underset{\geq 0}{a_2^2} + \cdots + \underset{\geq 0}{a_n^2} = 0$ then $a_1 = a_2 = \cdots = a_n = \mathbf{0}$

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

find: $x + y \div 3$

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 — 67%

(B) 6 — 11%

(C) 5/3 — 19%

(D) 4/3 — 4.5%

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

$$\cancel{x+y\div z = 1+2\div 3 = 3\div 3 = 1}$$

Gadho/Gadhiyoo aisaa naa karo

$$x+y\div z = 1+2\div 3 = 1+\frac{2}{3} = 5/3$$

BODMAS

B — Bracket, O — Of, D — Divide, M — multiply, A — Add, S — subtract

ASNC (Ashish Sir's Novel Concepts)

New

HSGH

"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: $y^{x^{x^x}}$

(A) 3^8 — 38%

(B) 3^4 — 22%

(C) 3^{18} — 10%

(D) 3^{16} — 30%

Soln

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

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

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

$y^{x^{x^x}}=3^{2^{2^2}}=3^8$ Gadho | Gadhiyoo aisaa Na karo

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

QUESTION

$x^2 - 2\cdot 3\cdot x$

$4z^2 - 4z + 1$

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

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

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

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

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

$xyz = 3/2$

(A) 3/2

(B) 4

(C) 6

(D) 3

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 $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$.

Tah 02

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

Tah03

QUESTION

Solve in real numbers the system of equations

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

$+$

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

$$4x^2-4x+1+4y^2-4y+1+4v^2-4v+1+4u^2-4u+1+4w^2-4w+1=0$$

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

$$\left.\begin{aligned} 2x-1&=0\\ 2y-1&=0\\ 2v-1&=0\\ 2u-1&=0\\ 2w-1&=0 \end{aligned}\right\} x=y=v=u=w=\frac{1}{2}$$

Diamond Points to Note

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

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

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 %

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

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

$a^2 - a = 0$

$a = 0, 1$

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

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

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

$a = 0, -1$

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

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

$a = 1, -1$

Don’t Forget to

Retry all the class illustrations

Today's KTK

No Selection $\xrightarrow[\text{Apnao IIT Jao}]{\text{TRISHUL}}$ Selection with Good Rank

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

QUESTION

(KTK 2)

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

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) $12\ \text{cm}^2$

(B) $9\sqrt{3}\ \text{cm}^2$

(C) $8\sqrt{3}\ \text{cm}^2$

(D) $12\sqrt{3}\ \text{cm}^2$

Ans. D

Solution to Previous TAH

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

TAH - 01

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

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

$\frac{0}{3} \in W, Q, I$

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

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

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

Rajkanya
From bihar

QUESTION

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

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

Ans. 315

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

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

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

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

$a, b, c \in \mathbb{R}$
$\Rightarrow a^2, b^2, c^2 \geq 0$
$x^2+\frac{1}{x^2} \geq 2$

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

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

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

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

$\boxed{315}$

Takeo2

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

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

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

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

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

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

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

$$= 315$$

PPO K10 5G
SHISH RAJ | 2025.04.23 08:14

Solution to Previous KTKs

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

Ans. C

KTK of

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

$D^r \neq 0$

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

$x-1 \neq 0$

$x \neq 1$

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

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

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

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

$$4x = 16$$

$$x = 4$$

Ans - Only 4 $\cancel{1}$.

QUESTION

KTK 2

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

A $\dfrac{\tan x}{\sec x}$

B $\dfrac{\sin x}{\sec^2 x - \tan^2 x}$

C $\dfrac{\sin^2 x \sec x}{\tan x}$

D All reduce to sin x

Ans. D

KTK

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

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

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

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

(d) All reduce to $\sin x$

$\therefore$ 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

KTK:-03

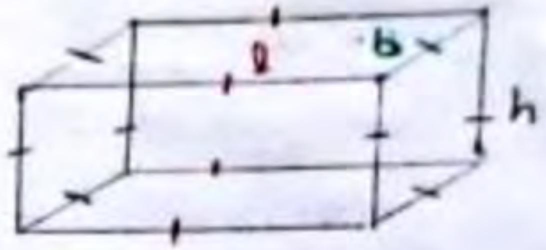
Q. (A) A rectangular box has volume 48, and the sum of the length of the twelve edges of the box is 48. The largest integer that could be the length of an edges of the box, is

Given, $V = \boxed{l \times b \times h = 48}$

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

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

$\boxed{l+b+h = 12}$



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

$l = 2 \times 2 = 4$
$b = 2 \times 3 = 6$
$h = 2 = 2$) should be 12

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

∴ $\boxed{l = 6}$ Ans

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

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

Take Product me zero are ke liye find How many times comes 2 & 5 ll 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 Ans

(C) The number of solution of $2^{2x} - 3^{2y} = 55$, in which x and y are integer, is

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

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

$2 \cdot 2^x = 16$

$2^{x+1} = 16$

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

$x + 1 = 4$

$\boxed{x = 3}$, $\boxed{3^y = -3}$

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

$2^{x+1} = 16$ | $8 + 3^y = 11$

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

$x + 1 = 4$ | $\boxed{y = 1}$

$\boxed{x = 3}$

~~Hence~~ Accepted

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

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

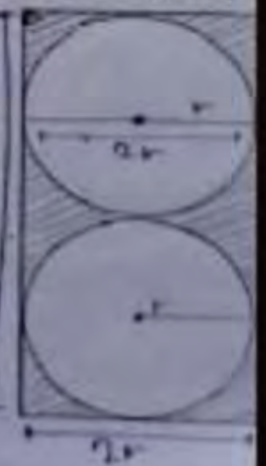
$2 \cdot 2^x = 56$

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

The only integer solution is $(x, y) = (3, 1)$ Ans.

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)

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

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

$\therefore \dfrac{8r^2}{2r^2(4-\pi)} = \dfrac{4}{4-\pi}$ Ans is Ratio of total area to the shaded area.

QUESTION

KTK 4

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

(A) $\frac{2}{\pi}$

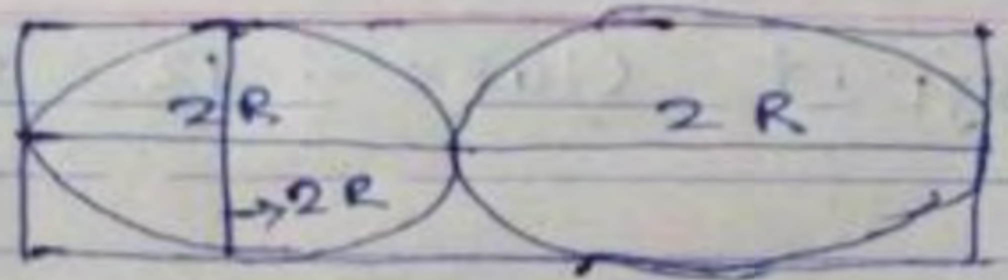
(B) $\frac{4}{4-\pi}$

(C) $\frac{4-\pi}{\pi}$

(D) $\frac{\pi}{4}$

Ans. B

Question-



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

Area of rectangle $= 4R \times 2R$

$= 8R^2$

shaded area $= 8R^2 - 2\pi R^2$

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

Ratio $= \dfrac{48R^2}{2R^2(4-\pi)}$

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

THANK YOU