[Aim: 100/100 in Maths]

अभय CLASS 10

REAL NUMBERS

CHAPTER - 1

इस चैनल में
100 100 लेकर
आउंगा/आउंगी।

Regular
Trust &
Follow

HCF and LCM

① 16 and 18

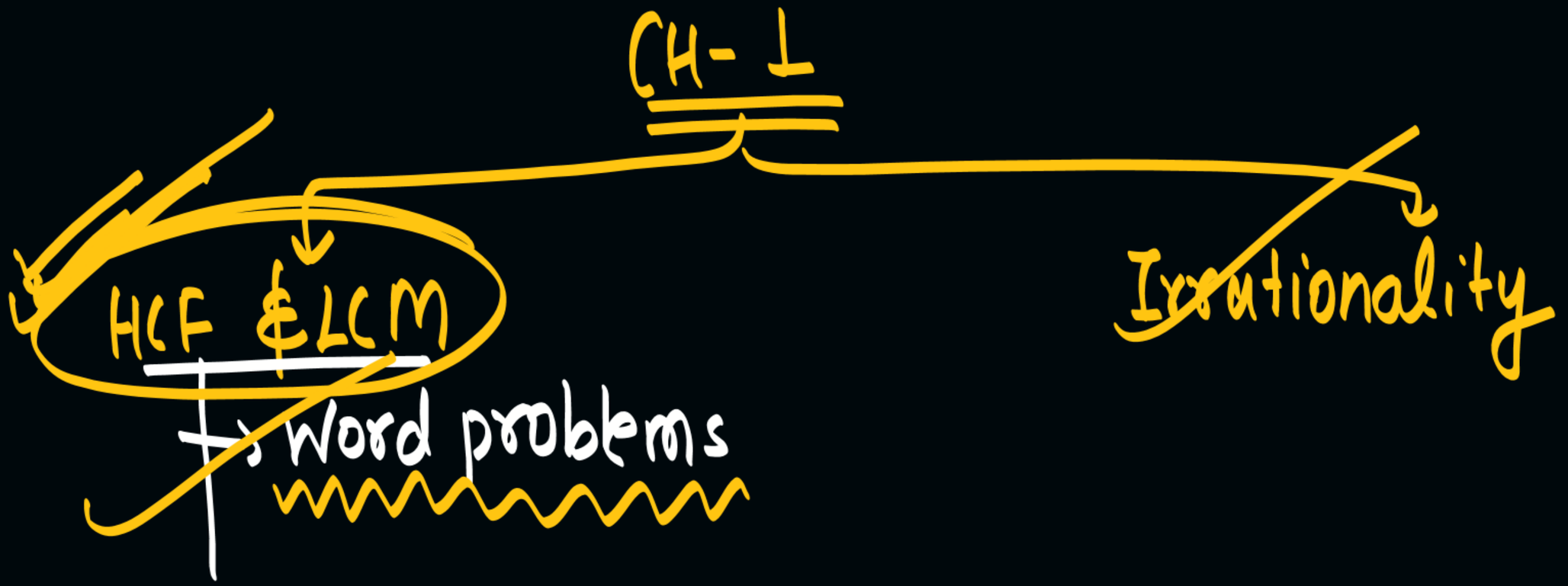
$16 = 2 \times 2 \times 2 \times 2 = 2^4$

[common लेलो] $18 = 2 \times 3 \times 3 = 2 \times 3^2$

[HCF = 2
LCM = $2^4 \times 3^2$]

2	16
2	8
2	4
2	2
	1

2	18
3	9
3	3
	1


CH- 1
HCF & LCM
Word problems
Irrationality

HCF and LCM using prime factorisation method :

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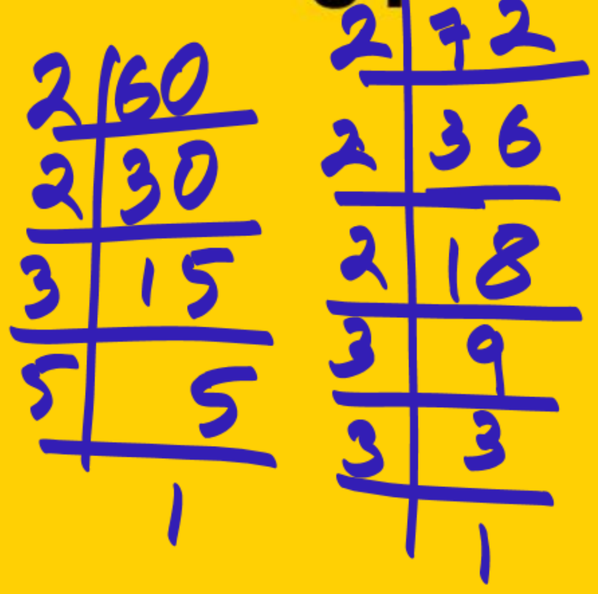
16 and 18



60 and 72

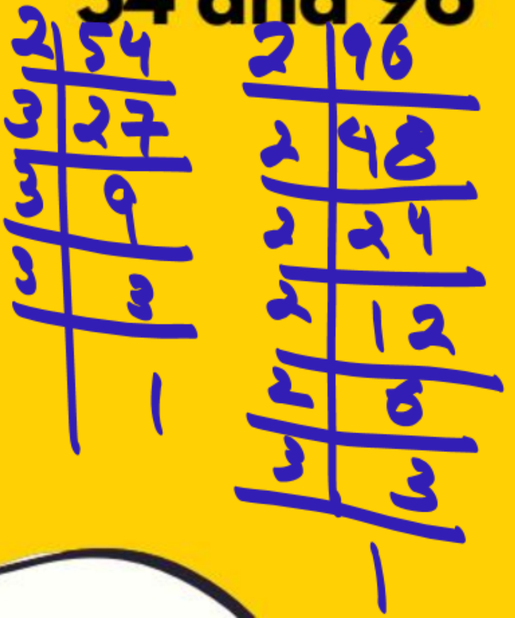
$60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$

$72 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$

$HCF = 2 \times 2 \times 3 = 12$

$LCM = 2^3 \times 3^2 \times 5^1$

54 and 96



300 and 550

$54 = 2 \times 3 \times 3 \times 3 = 2 \times 3^3$

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 2^5 \times 3$

$HCF = 2 \times 3 = 6$

$LCM = 2^5 \times 3^3$

अभय

#LP : P and Q are two positive integers such that $P = p^3q$ and $Q = (pq)^2$, where p and q are prime numbers . What is LCM (P , Q) ?

i. pq

ii. p^2q^2

iii. p^3q^2

iv. p^5q^3

$P = p^3q$

$Q = (pq)^2 = p^2q^2$

$LCM(P, Q) = p^3q^2$

$(xy)^a = x^a y^a$

अभय

#LP : Find the LCM of $x^2 - 4$ and $x^4 - 16$.

$a^2 - b^2 = (a+b)(a-b)$

$x^2 - 4 = (x)^2 - (2)^2 = (x+2)(x-2)$

$x^4 - 16 = (x^2)^2 - (4)^2 = (x^2+4)(x^2-4)$

$a^2 - b^2$

$[a = x^2, \; b = 4]$

$= (x^2+4)((x)^2 - (2)^2)$

$= (x^2+4)(x+2)(x-2)$

$LCM = (x+2)(x-2)(x^2+4)$

[Cbse 2023]

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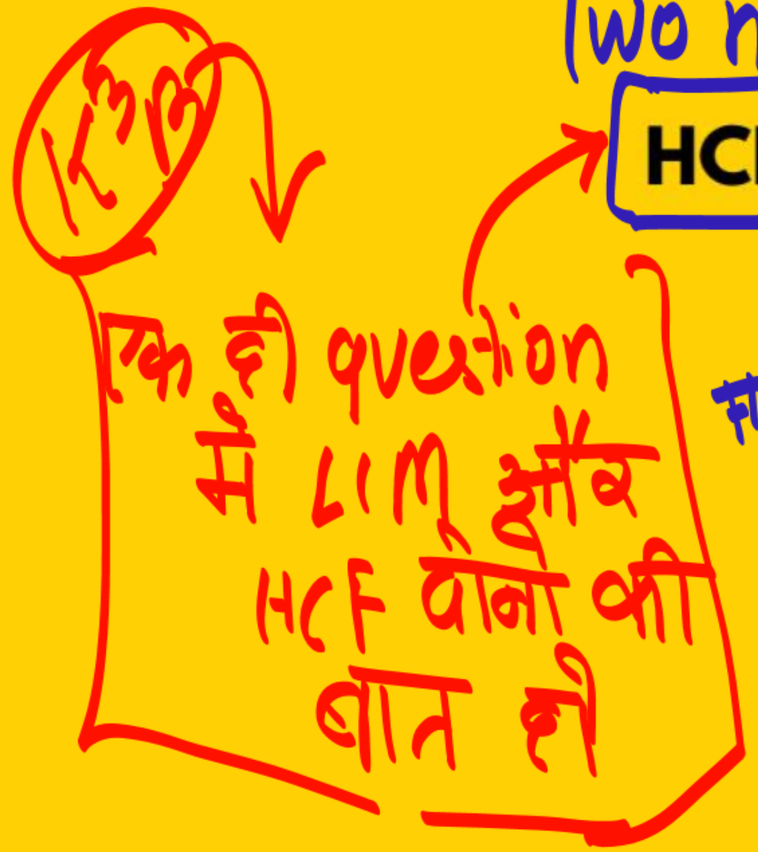
#LP : Relation between HCF and LCM for two numbers :

Two numbers → a & b

HCF (a , b) x LCM (a , b) = a x b



#LP:

HCF = 3
a x b = 6
LCM = ?

H x L = a x b
3 x L = 6
L = 2

Kuch kaam ki baat - $k \cdot k \cdot k \cdot b = k^3 b$ ⇒ Question को Line by line पढ़ो अभय

 # LP: The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.

$L \times H = a \times b$

$40 \times 40 = 280 \times b$

$80 = b$

Ans

ATQ

$L = 14H$

$L = 14 \times 40$

ATQ

$L + H = 600$

$14H + H = 600$

$15H = 600$

$H = \frac{600}{15}40$

$H = 40$

$a = 280$

$b = ??$

अभय

#LP : Two numbers are in the ratio 2 : 3 and their LCM is 180 . What is the HCF of these numbers .

$\frac{a}{b} = \frac{2}{3}$

L = 180

Let $a = 2x = 2 \times x$

$b = 3x = 3 \times x$

HCF = x

$L \times H = a \times b$

$180 \times x = 2x \cdot 3x$

$180 = 6x$

$\frac{180}{6} = x$

$30 = x$

x = 30 = HCF

#LP : The LCM of two numbers is 2400 . Which of the following can not be their HCF .

i. 300 .

ii. 400

iii. 500

iv. 600

K³B ⇒ HCF is always a factor of LCM

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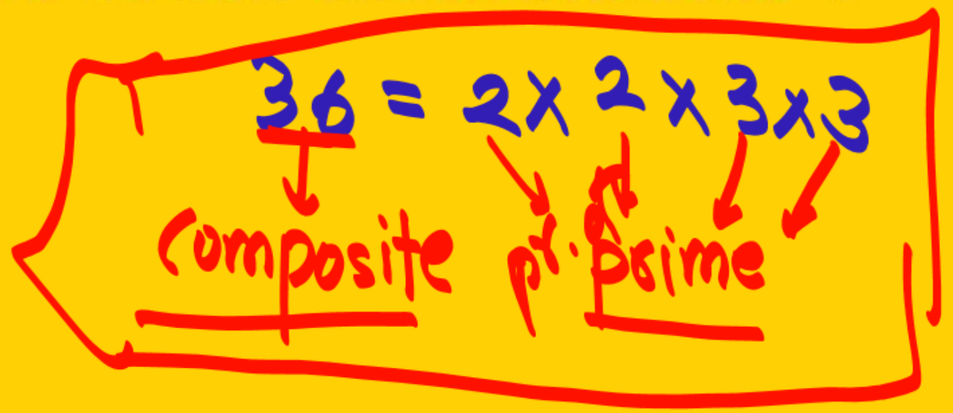
अभय

(Fundamental theorem of Arithmetic) :

Every composite number can be expressed (factorised) as a product of primes and this factorisation is unique , apart from the order in which the prime factor's occur .

The prime factorisation of a natural number is unique , except for the order of its factors .



अभय

#LP : Can the number 6^n, n being a natural number , end with digit 0 ?

$6^n = (2\times3)^n$

$n=1 = 6^1 = (2\times3)^1$

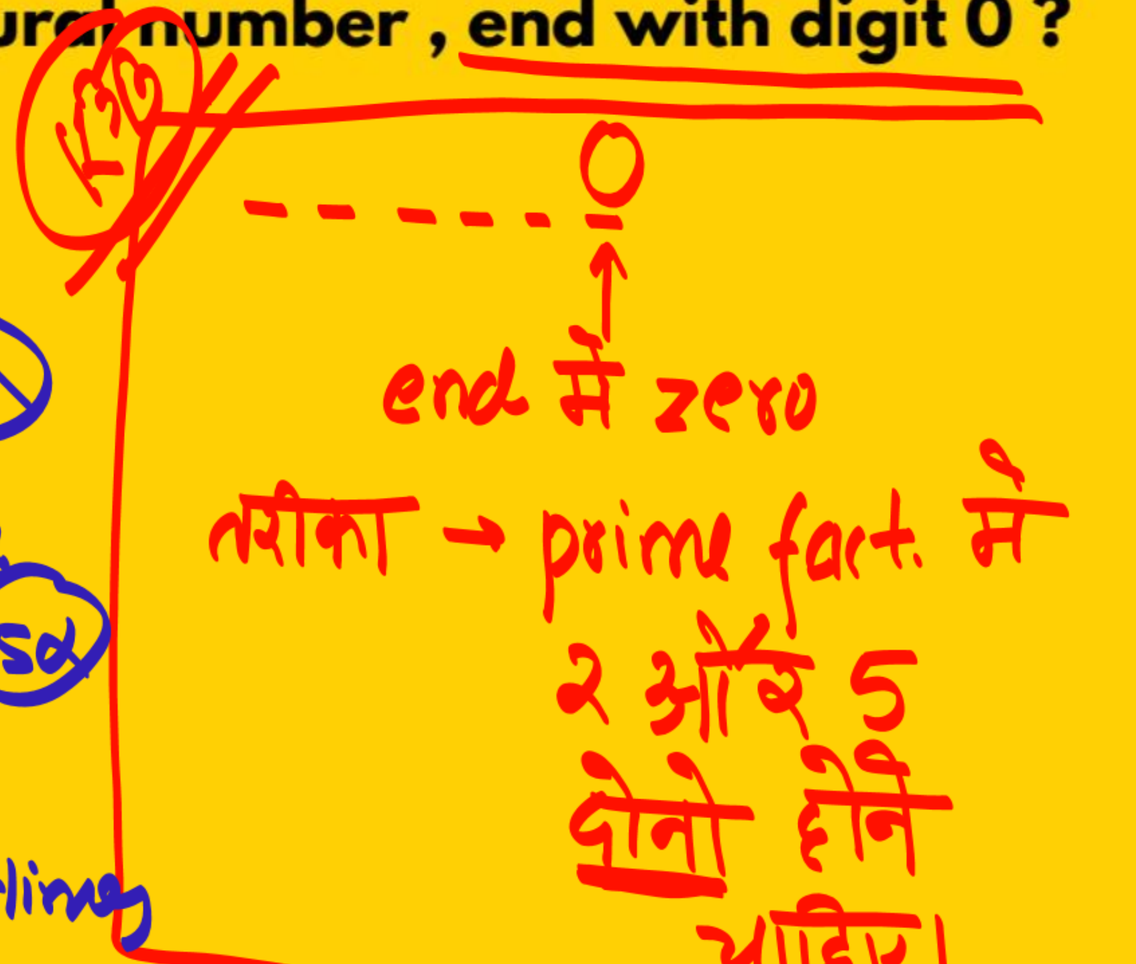
$n=2 = 6^2 = (2\times3)^2 = 2\times3\times2\times3$

$n=3 = 6^3 = (2\times3)^3 = 2\times3\times2\times3\times2\times3$

$n=4 = 6^4 = (2\times3)^4 = 2\times3\times2\times3\times2\times3\times2\times3$

$\vdots$

$n=n = 6^n = (2\times3)^n = 2\times3\times2\times3\times2\times3\cdots$ n times



Since Prime fact. of 6^n doesn't contain 2 & 5 both

$\therefore$ 6^n cannot end with 0.

#LP : Explain why (3 X 5 X 7) + 7 and (7 X 11 X 13) + 13 are composite numbers .

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- more than 2 factors
- product of prime

$(3\times5\times7)+7$

$\Rightarrow 7\,[(3\times5)+1]$

$\Rightarrow 7\,(15+1)$

$\Rightarrow 7\times16$

$\Rightarrow 7\times2\times2\times2\times2$

product of prime

so it is a composite no.

[Word Problems for HCF/LCM]

अभय

#LP : A fruit vendor has 990 apples and 945 oranges . He packs them into baskets . Each basket contains only one of the two fruits but in equal numbers . Find the number of fruits to be put in each basket in order to have a minimum number of baskets .

A - 990 O → 945

HCF (990, 945) =

KEY

- Given से बड़ा ans → LCM
- Given से छोटा ans → HCF

#LP : There is a circular path around a sports field . Digraj takes 18 minutes to complete one round of the field , while Prashant takes 12 minutes for the same . Suppose they both start at the same point and at the same time , and go in the same direction . After how many minutes will they meet again at the starting point ?

LCM (18, 12)

ঘড়া → LCM

अभय

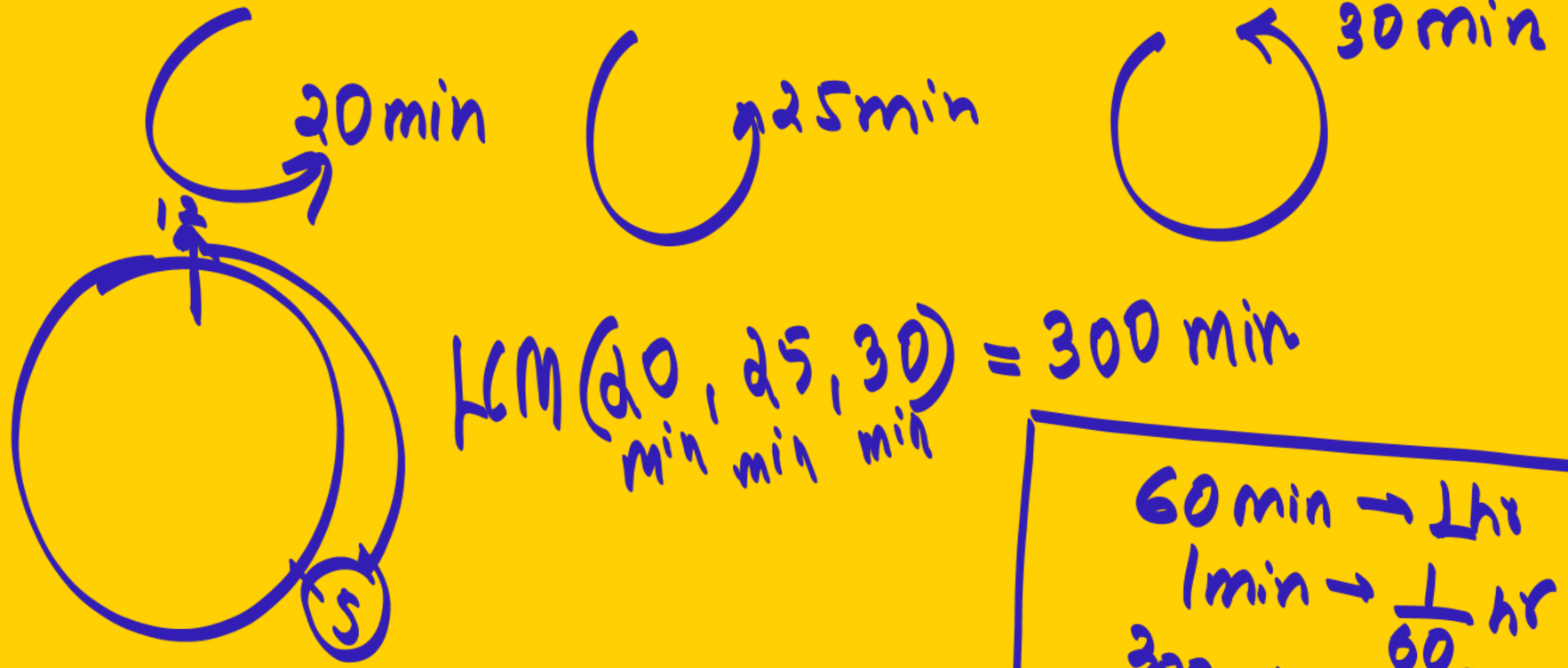
#LP : Three alarm clocks ring their alarms at regular intervals of 20 min , 25 min and 30 min respectively . If they first beep together at 12 noon , at what time will they beep again for the first time ?

i. 4 : 00 pm

ii. 4 : 30 pm

iii. 5 : 00 pm

iv. 5 : 30 pm



[Irrationality]

अभय

#LP : Prove that $\sqrt{5}$ is irrational . ← [contradiction method]

[let $\sqrt{5}$ is rational]

$\sqrt{5} = \frac{p}{q}$ (p & q doesn't have any common factor)

squaring both sides

$(\sqrt{5})^2 = \frac{p^2}{q^2}$

$5 = \frac{p^2}{q^2}$

$q^2 = \frac{p^2}{5}$ — (1)

5 divides p^2

∴ 5 will divide p also

(let) $n = \frac{p}{5}$

$p = 5n$

$q^2 = \frac{(5n)^2}{5}$

$q^2 = \frac{5 \times 5 n^2}{5}$

$q^2 = 5n^2$

$\frac{q^2}{5} = n^2$

5 divides q^2

∴ 5 divide 'q' also.

(let) $m = \frac{q}{5}$

$q = 5m$

$\frac{p}{q} = \frac{5n}{5m}$

common factor

this contradiction is because of our wrong assumption. that $\sqrt{5}$ is rational

Hence, $\sqrt{5}$ is irrational.

Concept

if p divides a^2

then p will divide a also.

if $\frac{a^2}{p}$

then $\frac{a}{p}$ ✓

if $\frac{(4)^2}{2}$

then $\frac{4}{2}$ ✓

$\frac{16}{4}$ ✓

K3B →

R + Ir
R - Ir
R x Ir
R / Ir
} → Ir

R + R
R - R
R x R
R / R
} → R

Ir + Ir
Ir - Ir
Ir x Ir
Ir / Ir
} connor say

K³B → if this is not given in question → then first proove it irr. then follow same steps.

#LP : ~~If $\sqrt{3}$ is irrational~~ proove that $2 - \sqrt{3}$ is also irrational.

given $\sqrt{3}$ → irrational

↳ contradiction

let $2-\sqrt{3}$ is rational

$\therefore 2-\sqrt{3} = \frac{p}{q}$ (p & q doesn't have common factor)

$2 - \frac{p}{q} = \sqrt{3}$

R − R = I

R ≠ I

this contradiction is due to wrong assumption.

Hence, $2-\sqrt{3}$ is irr.

अभय

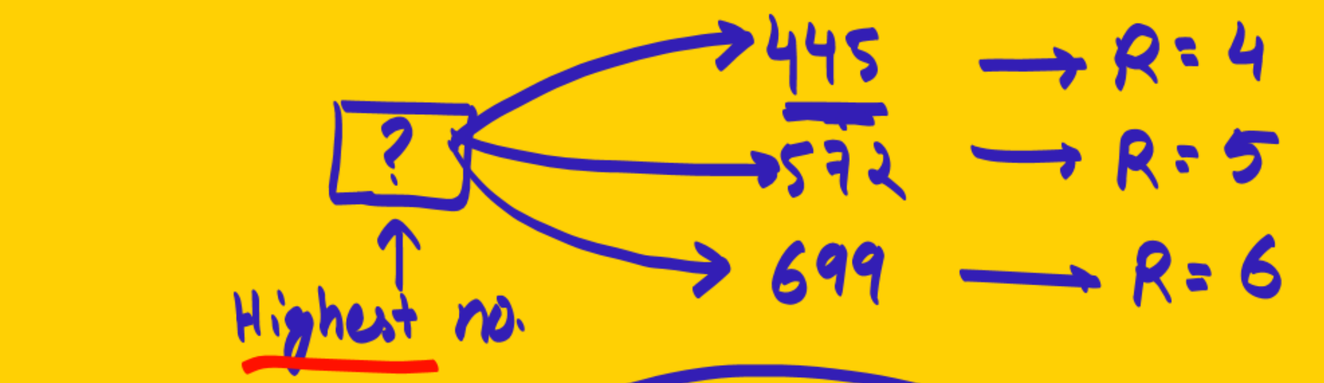
#LP : Find the greatest number that divide 445 , 572 and 699 leaving remainder 4 , 5 and 6 respectively .

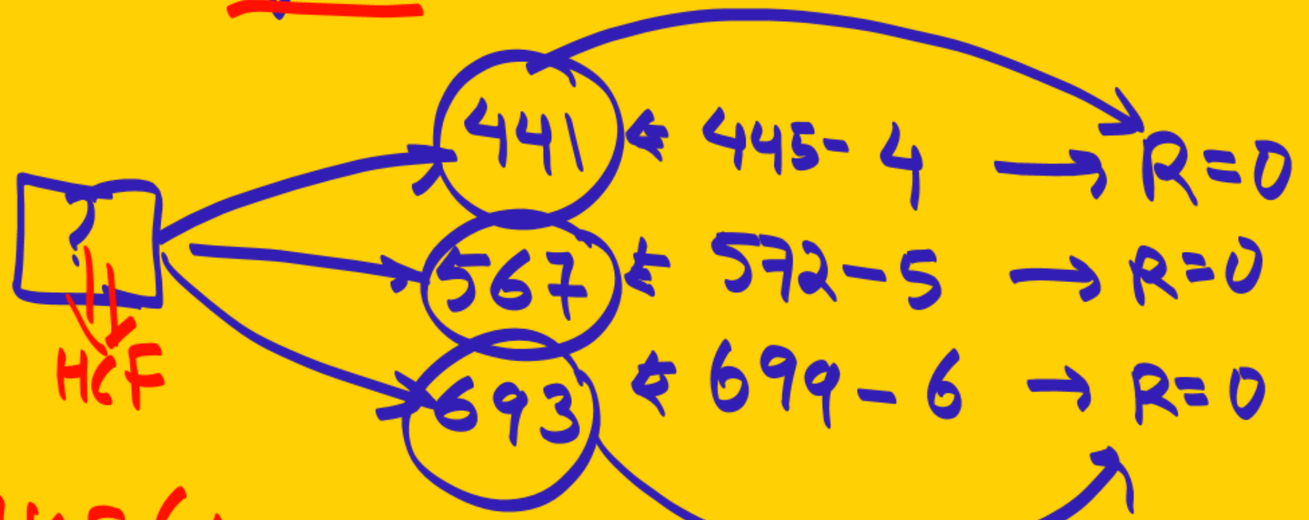
i. 63

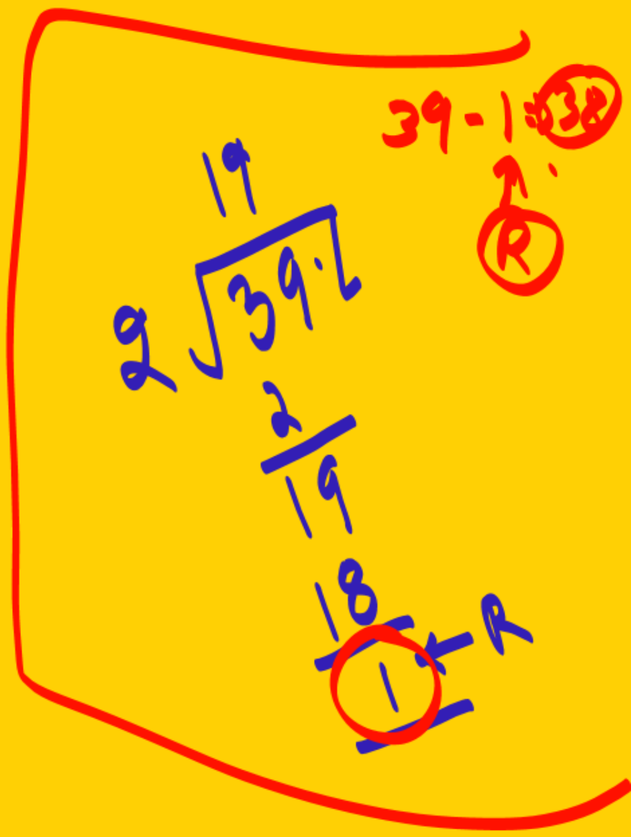
ii. 65

iii. 67

iv. 69







THANK YOU

COODIES 🥰