UDAAN

2025

Real Numbers

Mathematics | Lecture - 01

By – Ritik Sir

Topics *to be covered*

1. Fundamental Theorem of Arithmetic
2. HCF and LCM using prime factorisation Method
3. Relation between HCF and LCM


WORK HARD
DREAM BIG
NEVER GIVE UP !!

Simple 5 Step Plan

1. Live Lecture/Recorded Lecture (Notes)
2. DPP/DHA/H.W.
3. In class H.W. (If any)
4. Tests Do
5. Revise Karo

Simple 4 Step Plan

1. Apni Hobbies ko Samay Do
2. Class 10th easy hai, nahi lage toh banadunga, Chill karo
3. Padhai ka load mat lo, Enjoy karo

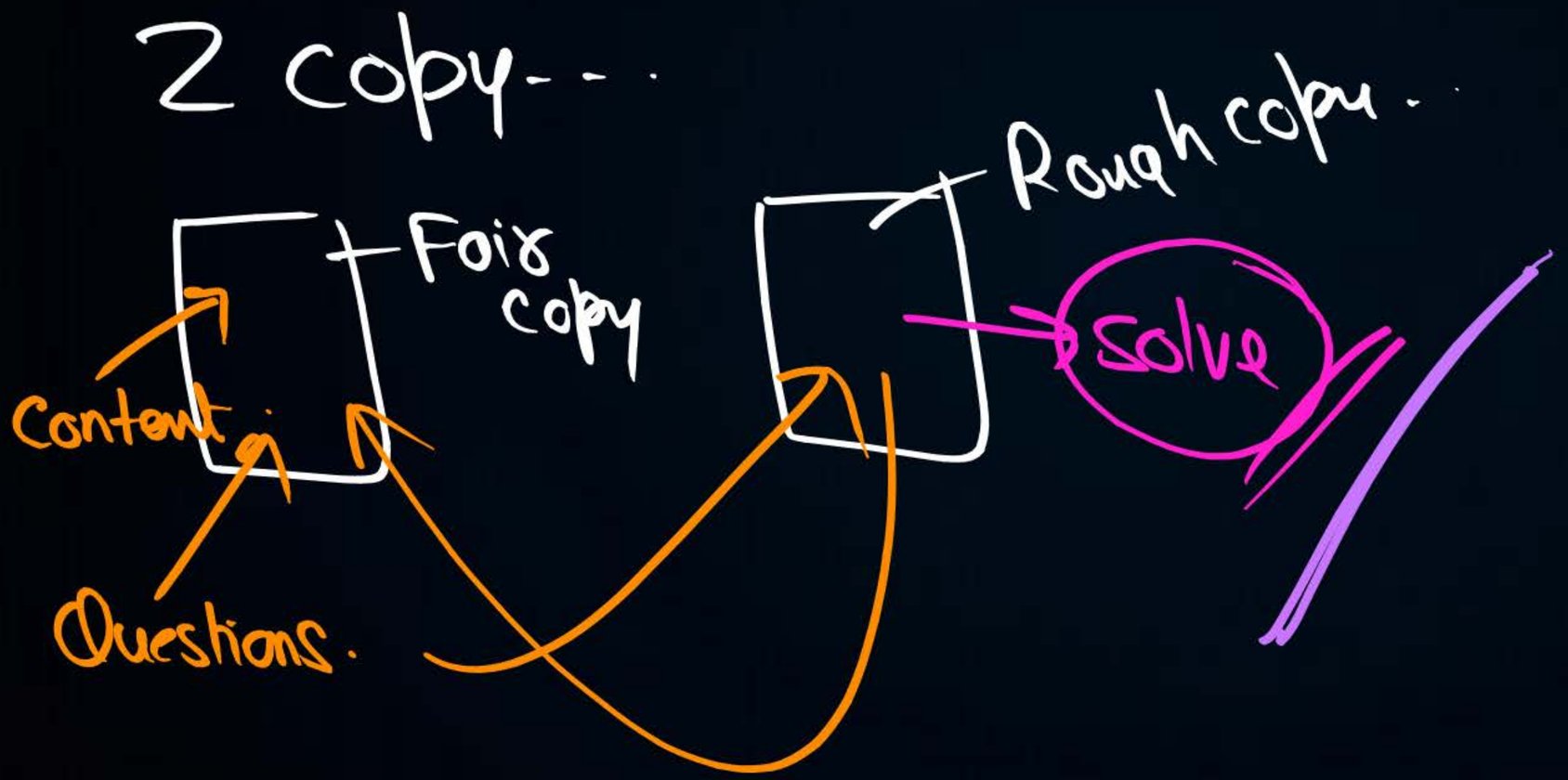
Books Konsi ?

NOTES

- NCERT
- NCERT EXEMPLAR.
- RD Sharma / RS Aggarwal.
- Market -

Notes Kese Banane Hain?

2 copy...



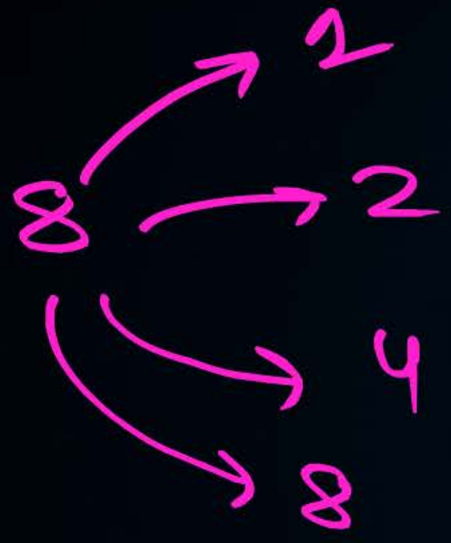
Rules

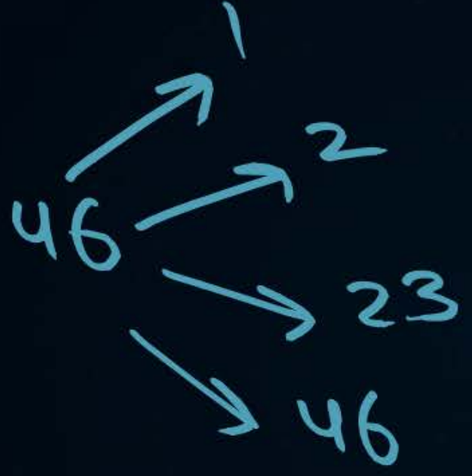
- Ratna nahi hai
- Concept Samajhna hai
- Pen Chalana Hai
- Backlog nahi banne dena hai
- Tum impatient hoge, main sabh sabh sabh sambhal lunga

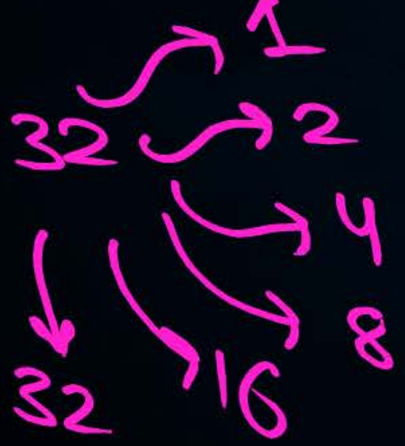
Real Numbers

- Rational
  - Integers $\{\infty \ldots -2, -1, 0, 1, 2, 3 \ldots \infty\}$
  - Natural nos. $\{1, 2, 3, 4, 5 \ldots \infty\}$
  - whole nos. $\{0, 1, 2, 3 \ldots \infty\}$
- Irrational.

Factors







Multiples

8 → 8, 16, 24, 32, 40 .....

12 → 12, 24, 36, 48 .....

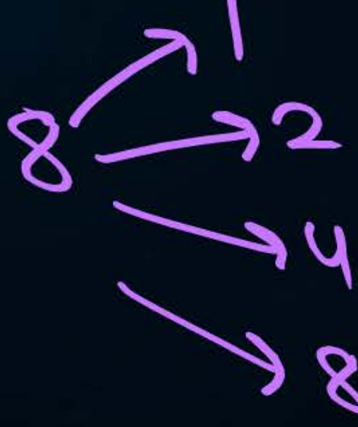
Prime no.

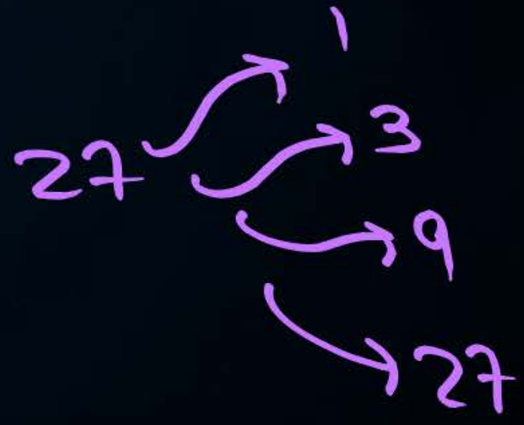
2, 3, 5, 7, 11, 13, 17, 19, 23 - - -

only two Factors

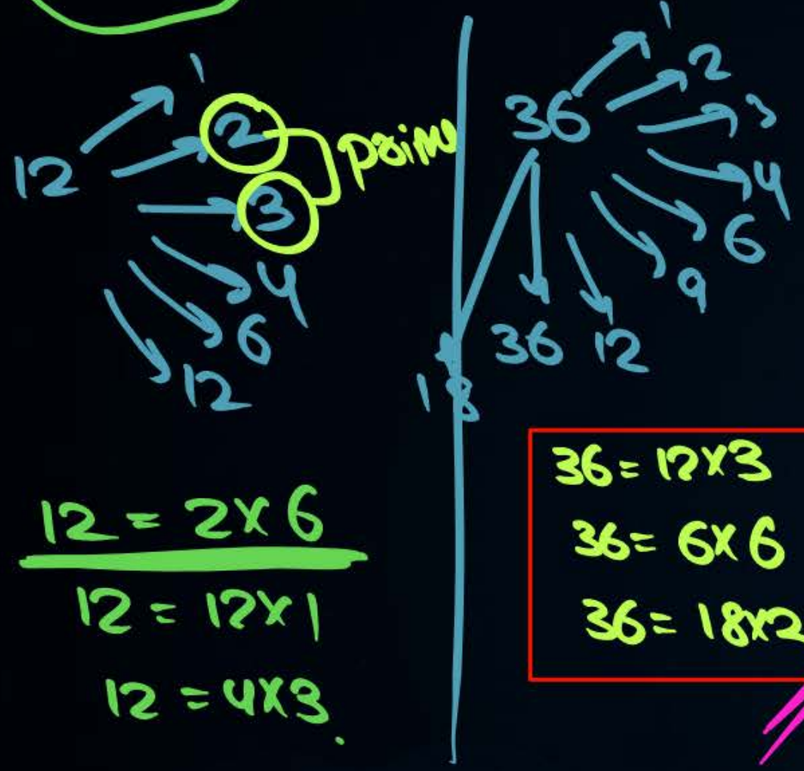
Composite no.

More than 2 Factors





Factorisation



$12 = 2 \times 6$

$12 = 12 \times 1$

$12 = 4 \times 3$

$36 = 12 \times 3$

$36 = 6 \times 6$

$36 = 18 \times 2$

★ 2. 1 → Prime & Composite.

Ans: 1 is neither prime nor composite.

1 → (1)

2	36
2	18
3	9
3	3
	1

Prime Factorisation

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

$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

Theorem 1

49 = 7 × 7

Composite no.

7	49
7	7
	1

(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.

Composite no. = Product of primes.

36 = 2 × 2 × 3 × 3

32 = 2 × 2 × 2 × 2 × 2 = 2^5

4^5 = 3 × 3 × 5

2	32
2	16
2	8
2	4
2	2
	1

Topic : Fundamental Theorem of Arithmetic

#Q. Check whether 4^n can end with the digit 0 for any natural number n.

[Board Term – I, 2015]

4^n → n natural no.

$n = 1, 2, 3, 4 \ldots\ldots \infty$

$n=1, \quad 4^1 = 4$

$n=2, \quad 4^2 = 16$

$n=3, \quad 4^3 = 64$

$n=4, \quad 4^4 = 256$

2	90
3	45
3	15
5	5
	1

$90 = 2^1 \times 3^2 \times 5^1$

2	120
2	60
2	30
3	15
5	5
	1

$120 = 2^3 \times 3^1 \times 5^1$

☆ koi bhi no. jo zero se end hoga, uske P.F main, 2 aur 5 pakke se hoga

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

$= 2^n \times 2^n$

Since 4^n does not contain 5 as its factor, $\therefore 4^n$ cannot end with the digit 0.

$n=1 \rightarrow = 2^1 \times 2^1$

$n=50 \rightarrow = 2^{50} \times 2^{50}$

$n=1000 \rightarrow = 2^{1000} \times 2^{1000}$

Q. $12^n \rightarrow$ 0 ?

$12 = (2\times2\times3)^n$

Solution :

If the number 4^n, for any natural number n, were to end with the digit zero, then it would be divisible by 5 and 2.

That is, the prime factorization of 4^n would contain the prime 5 and 2. This is not possible because $4^n = (2)^{2n}$; So, the only prime in the factorization of 4^n is 2. So, the uniqueness of the Fundamental Theorem of Arithmetic guarantees that there are no other primes in the factorization of 4^n. So, there is no natural number n for which 4^n ends with the digit zero.

HCF:

Product of the smallest power of each common prime factor in the numbers.

LCM:

Product of the greatest power of prime factor, involved in the number.

Topic : H.C.F. and L.C.M. using prime Factorisation Method

H.C.F = Highest Common Factor

L.C.M = Least Common Multiple

8, 12

8 → 1, 2, 4, 8

12 → 1, 2, 3, 4, 6, 12

HCF = 4

LCM = 24

4 × 24 = 8 × 12

96 = 96

8 = 8, 16, 24, 32, 40, 48, 56, 64, 72 - - - -

12 = 12, 24, 36, 48, 60, 72 - - - -

LCM (8, 12) = 24

Topic : HCF and LCM

#Q. Find the LCM and HCF of 80 and 300 by prime factorization method.

$80 = 2^4 \times 5^1 \times 3^0$

$300 = 2^2 \times 5^2 \times 3^1$

$HCF = 2^2 \times 5^1 \times 3^0 = \boxed{20}$

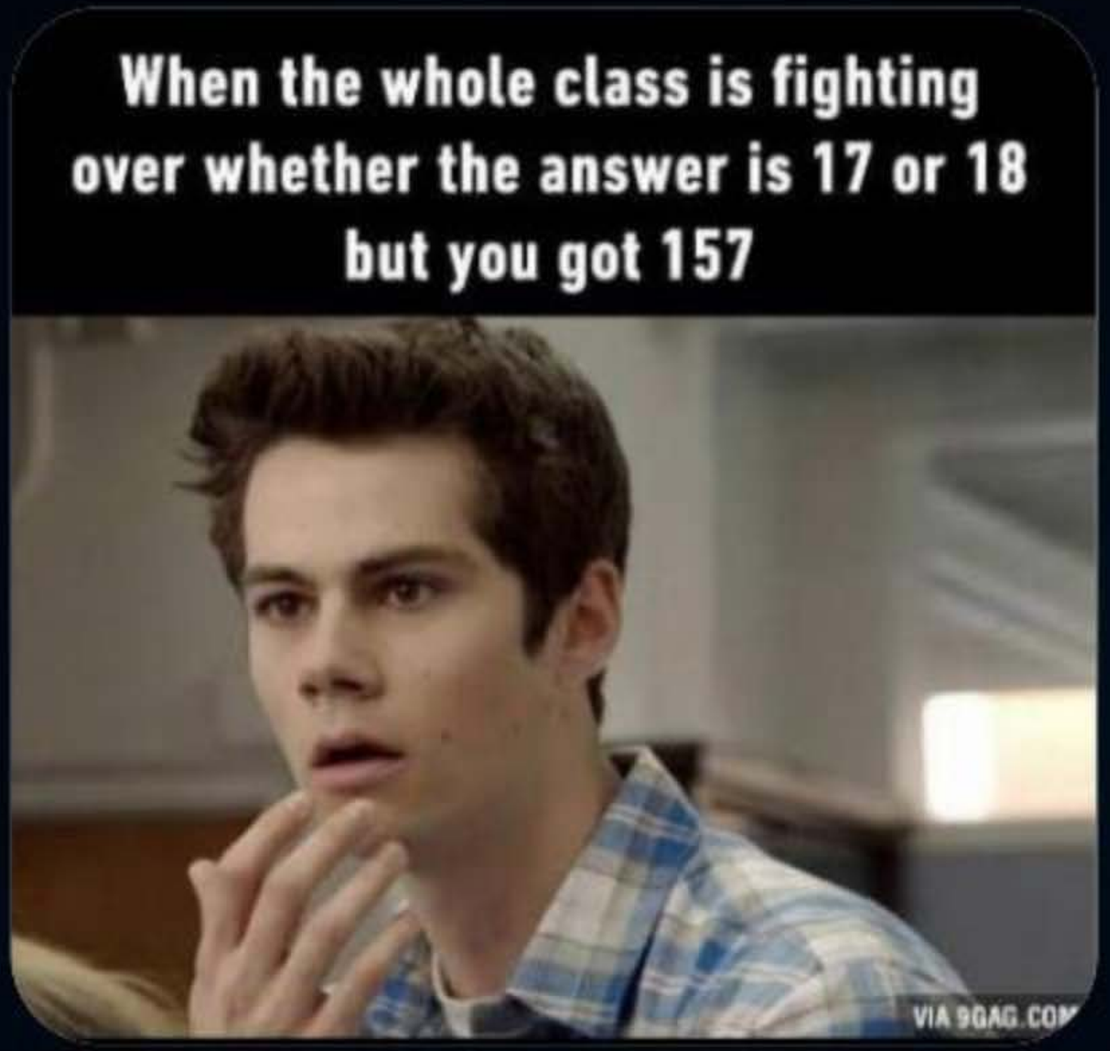
$LCM = 2^4 \times 5^2 \times 3^1 = \boxed{1200}$

$20 \times 1200 = 80 \times 300$

$\boxed{24000 = 24000}$

2	80
2	40
2	20
2	10
5	5
	1

2	300
2	150
5	75
5	15
3	3
	1


When the whole class is fighting
over whether the answer is 17 or 18
but you got 157
VIA 9GAG.COM

Topic : HCF and LCM

#Q. Find the LCM of 40, 36 and 126 by applying the prime factorization method.

$126 = 2^1 \times 3^2 \times 7^1 \times 5^0$

$40 = 2^3 \times 5^1 \times 3^0 \times 7^0$

$36 = 2^2 \times 3^2 \times 5^0 \times 7^0$

2	126
3	63
3	21
7	7
	1

2	40
2	20
2	10
5	5
	1

2	36
2	18
3	9
3	3
	1

$HCF = 2^1 \times 3^0 \times 5^0 \times 7^0$

$= \boxed{2}$

$LCM = 2^3 \times 5^1 \times 3^2 \times 7^1$

$= \boxed{2520}$

Topic : HCF and LCM

#Q. Find the HCF and LCM of 30, 72 and 432 using the prime factorization method.

2	30
3	15
5	5
	1

2	72
2	36
2	18
3	9
3	3
	1

2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

H.W

$30 = 2^1 \times 3^1 \times 5^1$

$72 = 2^3 \times 3^2 \times 5^0$

$432 = 2^4 \times 3^3 \times 5^0$

$HCF = 2^1 \times 3^1 \times 5^0 = 6$

$LCM = 2^4 \times 3^3 \times 5^1 = 2160$

Relation b/w HCF and LCM for two positive integers

a, b

For any two positive integers a and b

HCF (a, b) × LCM (a, b) = a × b

$$HCF(a,b) \times LCM(a,b) = a \times b$$

Topic : HCF and LCM

#Q. If HCF(336, 54) = 6, find LCM(336, 54).

$$HCF(a,b) \times LCM(a,b) = a \times b.$$

$$6 \times LCM = 336 \times 54$$

$$LCM = \frac{336 \times 54}{6}$$

$$LCM = 3024$$

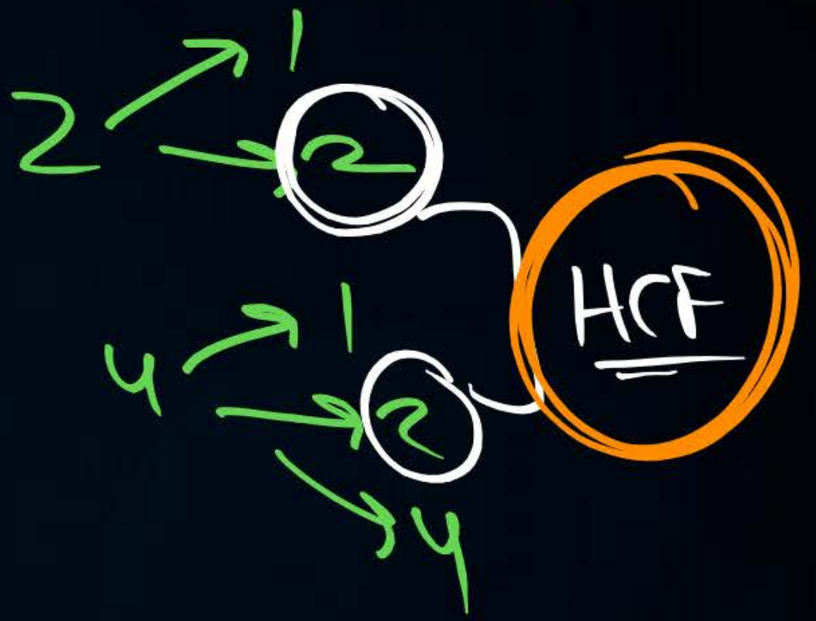
$3x = 2$

Topic : HCF and LCM

#Q. What is the HCF of smallest prime number and the smallest composite number?

Smallest prime no. = 2

" composite no. = 4



Topic : HCF and LCM

{1, 2, 3, 4, 5 ..... ∞}

#Q. 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)? [CBSE Q.B., 2021-22]

(A) pq

(B) p^2q^2

(C) p^3q^2

(D) p^5q^3

$P = p^3q = p^3 \times q^1$

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

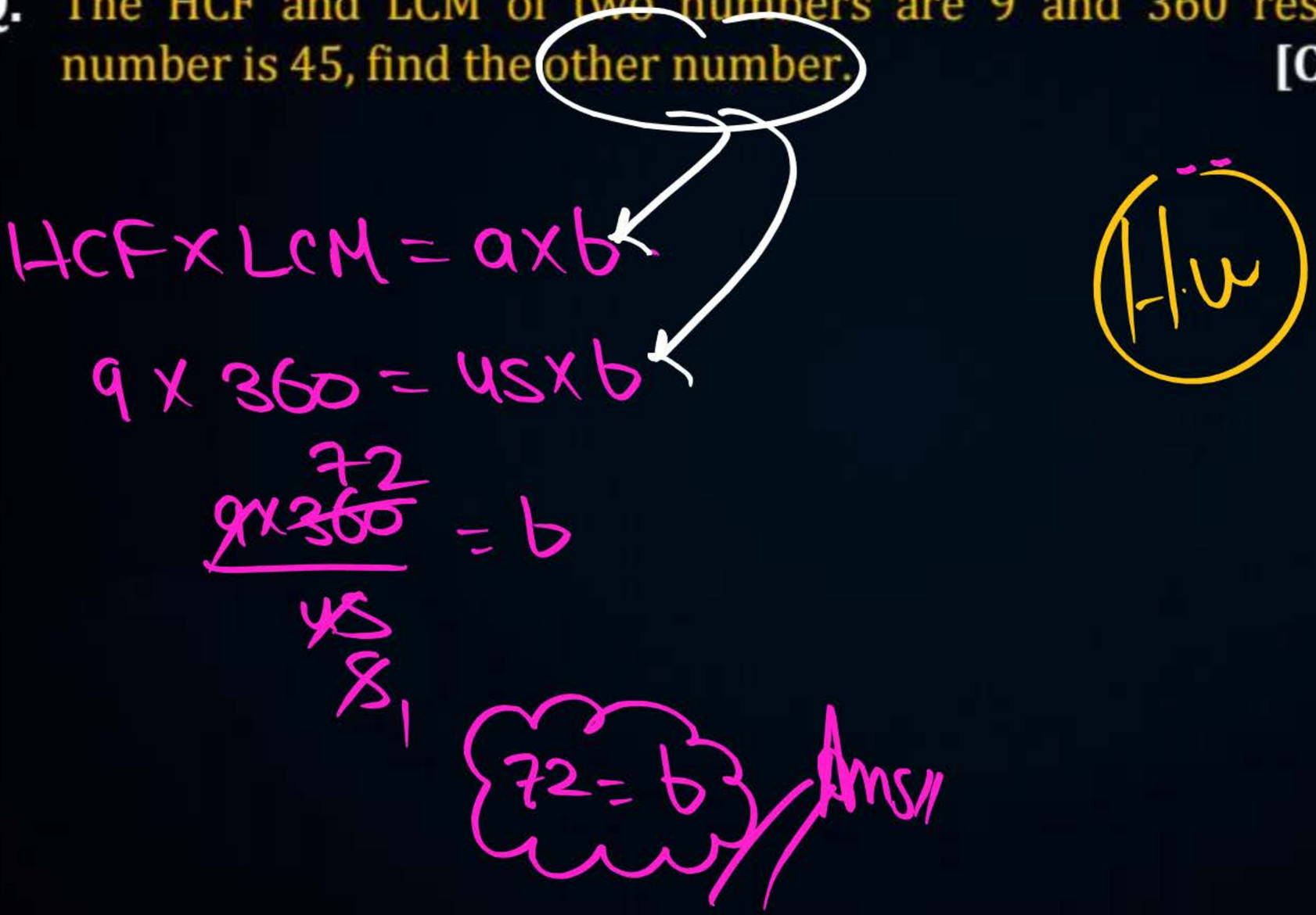
$(ab)^n = a^n \times b^n$

LCM = $p^3 \times q^2$

$= p^3q^2$

Topic : HCF and LCM

#Q. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, find the other number. [CBSE SQP 2019]



Topic : HCF and LCM

#Q. If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$, x, y are prime numbers, then HCF (a, b) is: [NCERT Exemplar]

A xy

B xy^2

C x^3y^3

D x^2y^2

$a = x^3 \times y^2$

$b = x^1 \times y^3$

HW

$HCF(a,b) = x^1 \times y^2$

$= xy^2$

Ans//

THANK YOU