
UDAAN
2026
REAL NUMBERS
MATHS
LECTURE-6
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Topics *to be covered*

- **A** Fundamentals Theorem of Arithmetic
- **B** Miscellaneous Questions

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#Q. If sum of two numbers is 1215 and their HCF is 81 the possible number of pairs of such numbers are

A 2

B 3

C 4

D 5

Let the no.s be 81x and 81y, where x and y are coprimes.

$$\boxed{81x+81y=1215}$$

$$81(x+y)=1215$$

$$x+y=\frac{\cancel{1215}\ 15}{\cancel{81}\ 1}$$

$$\boxed{x+y=15}$$

(1, 14), (2, 13), (3, 12), (4, 11), (5, 10), (6, 9), (7, 8).

$\bigcirc = 2 \times 9$

$\bigcirc = 2 \times 7$

coprimes.

HCF = 2

$\bigcirc = 15 \times x$

$\bigcirc = 15 \times y$

coprime.

HCF = 15

$\bigcirc = 91\, x$

$\bigcirc = 91\, y$

coprime.

HCF = 91

#Q. Find the number of possible pairs of the product of two numbers and HCF are 4500 and 15 respectively.

A 1

B 2

C 3

D 4

$15x, 15y$

Coprimes.

$15x \times 15y = 4500$

$x \times y = \frac{\cancel{4500}^{\cancel{300}\,20}}{\cancel{15}_1 \times \cancel{15}_1}$

$\boxed{x \times y = 20}$

(1, 20), (4, 5), (2, 10)

$\bigcirc \times \bigcirc = 4500.$

HCF = 15.

#Q. The sum of two positive numbers is 240 and their HCF is 15. Find the number of pairs of numbers satisfying the given condition.

$15x, 15y$

coprimes.

$15x + 15y = 240$

$15(x+y) = 240$

$x+y = \frac{\cancel{240}^{16}}{\cancel{15}_{1}}$

$\boxed{x+y=16}$

$(1,15), (2,14), (3,13), (4,12), (5,11), (6,10), (7,9), (8,8)$

$\bigcirc + \bigcirc = 240$

HCF = 15

Ans = 4

Theorem 1

Fundamental Theorem of Arithmetic:

Every composite number can be expressed (factorised) as a product of primes, and this factorization is unique except for the order in which the prime factors occur.

Fundamental Theorem of Arithmetic

2	82
41	41
	1

2	144
2	72
2	36
2	18
3	9
3	3
	1

Unique

Composite numbers = Product of Primes

2	40
2	20
2	10
5	5
	1

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

$82 = 2^1 \times 41^1$

$$\boxed{144 = 2^4 \times 3^2}$$

#Q. Prove that there is no natural number n for which 4^n ends with the digit zero.

4^n

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

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

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

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

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

$= (2^2)^n$

$4^n = 2^{2n}$

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

#Q. Show that 12^n cannot ends with digit 0 or 5 for any natural number n.

Sol. Expressing 12 as the product of primes, we obtain

$$12 = 2^2 \times 3 \Rightarrow 12^n = (2^2 \times 3)^n = (2^2)^n \times 3^n = (2)^{2n} \times 3^n$$

So, only primes in the factorization of 12^n are 2 and 3 and, not 5.

Hence 12^n cannot end with digit 0 or 5.

$$12^n = (2^2 \times 3^1)^n$$

$$= (2^2)^n \times (3^1)^n$$

$$12^n = \boxed{2^{2n} \times 3^n}$$

62^n

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

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$$62^n = (2 \times 31)^n$$

$$= \boxed{2^n \times 31^n}$$

natural no.

$$\begin{array}{r|l} 2 & 62 \\ \hline 31 & 31 \\ & 1 \end{array}$$

$$(72)^n = (2^3 \times 3^2)^n$$

$$= (2^3)^n \times (3^2)^n$$

$$= \boxed{2^{3n} \times 3^{2n}}$$

2	72
2	36
2	18
3	9
3	3
	1

#Q. Find the greatest number of 6 digit exactly divisible by 24, 15 and 36.

$$\begin{array}{r|l} 2 & 24, 15, 36 \\ \hline 3 & 12, 15, 18 \\ 5 & 4, 5, 6 \\ 2 & 4, 1, 6 \\ 2 & 2, 1, 3 \\ 3 & 1, 1, 3 \\ & 1, 1, 1 \end{array}$$

$\boxed{LCM = 360}$

$$\begin{array}{r|l} & 2777 \\ \hline 360 & 999999 \\ & 720 \\ \hline & 2799 \\ & 2520 \\ \hline & 02799 \\ & 2520 \\ \hline & 02799 \\ & 2520 \\ \hline & 0\boxed{279} \end{array}$$

$999999 - 279$

$= \boxed{999720}$

999720 is the greatest 6 digit no. divisible by 24, 15, 36.

#Q. 1245 is a factor of the number p and q.

Which of the following will always has 1245 as a factor?

(i) $p + q$ (ii) $p \times q$ (iii) $p \div q$

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#GPK

A Only (ii)

B Only (i) and (ii)

C Only (iii)

D All – (i), (ii) and (iii)

#Q. Find the smallest number which leaves remainders 8 amd 12 when divided by 28 and 32 respectively.

$28 \div \bigcirc \longrightarrow R = 8$

$32 \div \bigcirc \longrightarrow R = 12$

$\boxed{\text{Smallest no. divisible by 28 \& 32 is their LCM.}}$

$LCM(28, 32) = \boxed{224}$

$224 - 28 = 196$

$224 - 32 = 192$

$196 + 8 = 204$

$192 + 12 = 204$

Ans.

Real Numbers

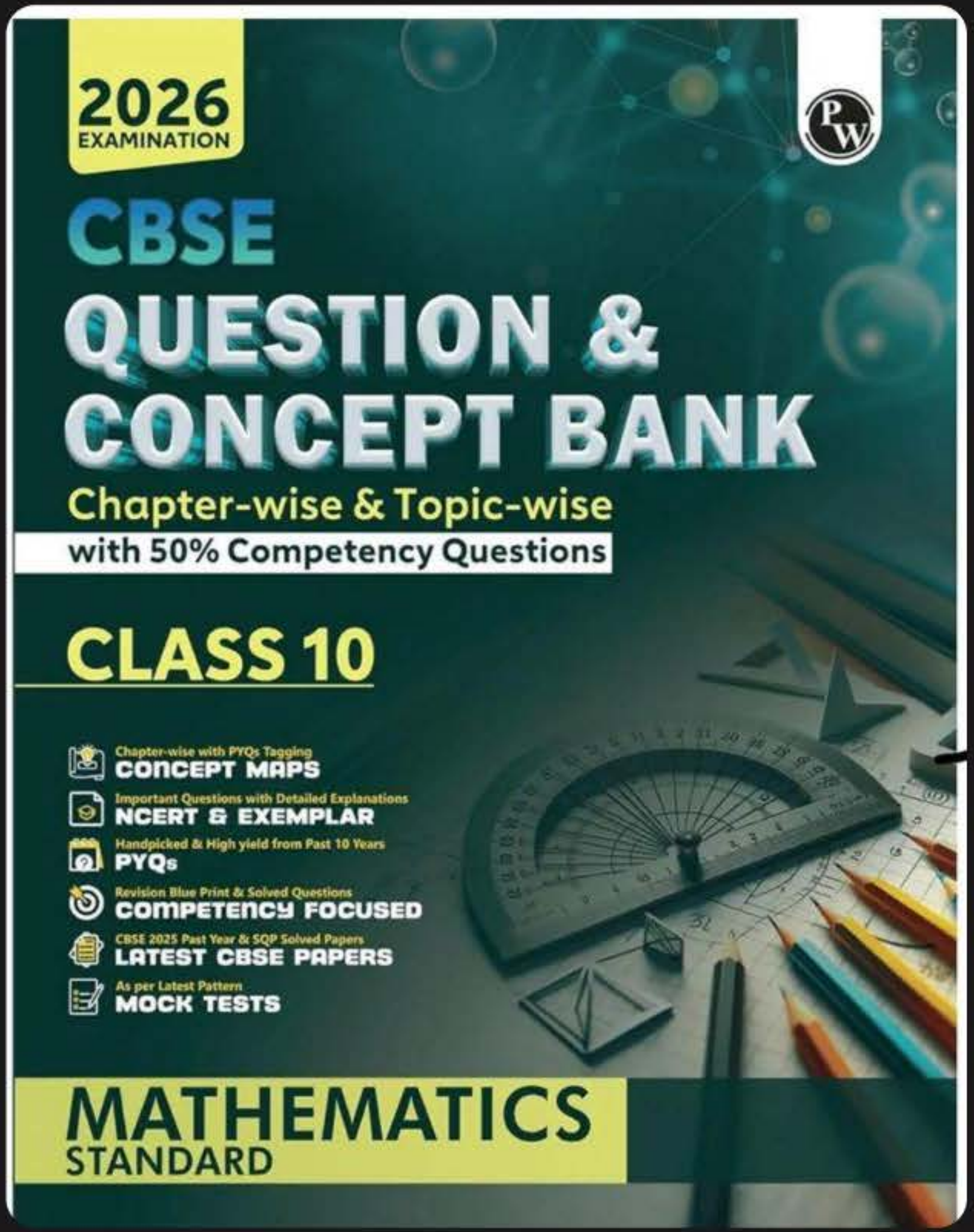
Fundamental Theorem of Arithmetic

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

Word Problems on HCF and LCM

Relation b/w HCF and LCM for two positive integers

Proof of irrationality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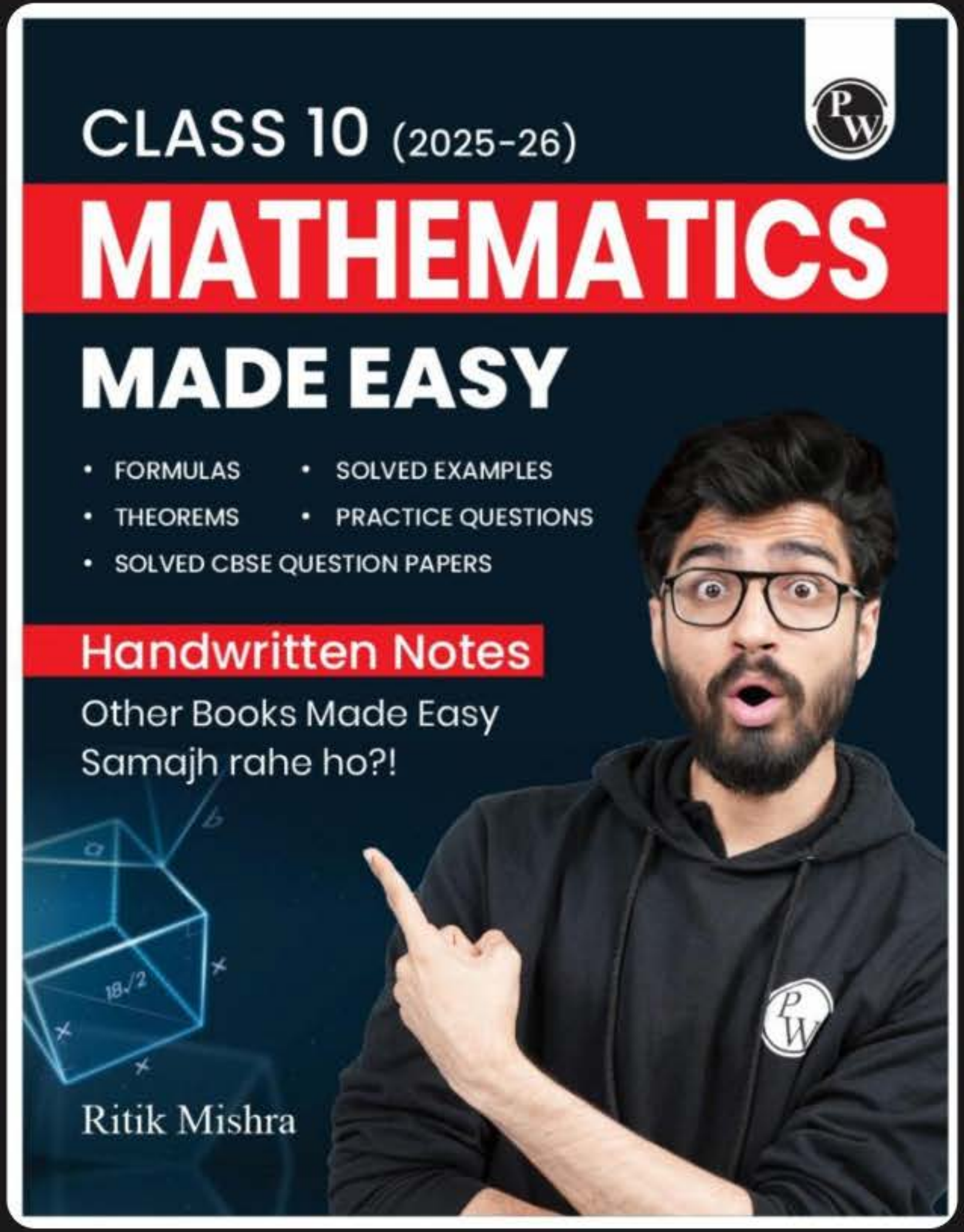
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