

# FORMULAE BOOK - SUDHANSHU SIR

## REAL NUMBERS

**1. LCM :** Product of the greatest power of each (ALL ) prime factor, involved in the numbers.

$$P = a^3 b^4 c^5 k^2, \quad Q = a^4 b^2 c^3 d^4 \quad \text{LCM} = a^4 b^4 c^5 k^2 d^4$$

**2. HCF :** Product of the smallest power of each common prime factor in the numbers.

$$P = a^3 b^4 c^5 k^2, \quad Q = a^4 b^2 c^3 d^4 \quad \text{HCF} = a^3 b^2 c^3$$

**3. For any two positive integers a and b,**  
**HCF (a, b) × LCM (a, b) = a × b**

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## REAL NUMBERS

### SOME IMPORTANT FACTS

**IF X, Y AND Z are three numbers and X is a factor of Y. Z is a multiple of Y.**

**HCF (X,Y) = X, HCF(Y,Z) = Y, HCF ( X,Z) = X**  
**HCF (X,Y,Z) = X**

**LCM (X,Y) = Y, LCM(Y,Z) = Z , LCM(X,Z) = Z**  
**LCM (X,Y,Z) = Z**

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**Theorem 1.2 (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 factors occur.**

**1. \*\*\* USED IN proving  $6^n$  or  $(2 \times 3)^n$ ,  $15^n$  or  $\{3 \times 5\}^n$ ,  $4^n$  or  $(2 \times 2)^n$  does not end with the digit 0.**

**2. \*\*\* USED IN PROVING A NUMBER IS COMPOSITE BY TAKING COMMON. (DISTRIBUTIVE PROPERTY)**

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## REAL NUMBERS

**\*\*\* IF 'p' IS PRIME & 'p' DIVIDES  $a^2$  THEN p DIVIDES 'a'**  
( IT IS USED IN PROVING  $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{7}, \sqrt{11}$  SUCH  
NUMBERS AS IRRATIONAL USING CONTRADICTION  
METHOD OF DIVISIBILITY BY CO PRIME NUMBERS.

**\*\*\* In complex  $3\sqrt{2}-6, 2\sqrt{3}, 3+5\sqrt{7}$  it is assumed that the  
square root of the given number is already irrational and  
proved by simple transposing and proving  
LHS  $\neq$  RHS**

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## REAL NUMBERS

- ★ **The sum of rational and irrational number is always irrational.**
- ★ **The difference of rational and irrational number is always irrational.**
- ★ **The product of non zero rational and irrational number is always irrational**
- ★ **The quotient of non zero rational and irrational number is always irrational.**

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## REAL NUMBERS

- ★ **The sum of two irrational numbers can either be rational or irrational.**
- ★ **The difference of two irrational numbers can either be rational or irrational.**
- ★ **The product of two irrational number can either be rational or irrational.**
- ★ **The ratio of two irrational number can either be rational or irrational.**

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## REAL NUMBERS

- ★ If  $a$  and  $b$  are rationals and  $\sqrt{a}$  and  $\sqrt{b}$  are irrationals then  $\sqrt{a+b}$  can be rational or irrational.
- ★ If  $p$  and  $q$  are prime positive integers, then prove that  $\sqrt{p} + \sqrt{q}$  is irrational.
- ★ If  $a$  &  $b$  are two prime numbers of the form  $p$  and  $p+1$ , and  $M = a^a + b^b$ ;  $N = a^b + b^a$ , then  $M$  &  $N$  are primes.
- ★ Find the largest number that divides 515,748 & 897 leaving remainders 11, 13 & 15 respectively.

## **SOME IMPORTANT MULTIPLES :**

$$**7 X 13 = 91**$$

$$**11 X 13 = 143**$$

$$**13 X 17 = 221**$$

$$**13 X 19 = 247**$$

$$**13 X 23 = 299**$$

$$**13 X 29 = 377**$$

$$**13 X 31 = 403**$$

$$**17 X 19 = 323**$$

$$**17 X 23 = 391**$$

$$**17 X 29 = 493**$$

$$**17 X 31 = 527**$$

$$**19 X 23 = 437**$$

$$**19 X 29 = 551**$$

$$**19 X 31 = 589**$$

$$**23 X 29 = 667**$$

$$**23 X 31 = 713**$$

$$**29 X 31 = 899**$$

$$**13 X 17 X 19 = 4199**$$

$$**17 X 19 X 23 = 7429**$$

$$**7 X 11 X 13 = 1001**$$



## REAL NUMBERS

▶ **2 IS THE ONLY EVEN PRIME NUMBER**

▶ **2 & 3 ARE THE ONLY CONSECUTIVE PRIME NUMBERS (OF THE FORM  $N, N+1$ )**

▶ **4 IS THE LEAST COMPOSITE NUMBER**

▶ **9 IS THE HIGHEST ONE DIGIT COMPOSITE NUMBER**

▶ **The product of 3 consecutive integers is divisible by 6.**

▶ **10 IS THE LOWEST TWO DIGIT COMPOSITE NUMBER**

▶  **$m^2 - 1$  is divisible by 8 if  $m$  is an odd number**

▶ **THE TOTAL NUMBERS BETWEEN TWO NUMBERS 'A' & 'B' =  $B - A - 1$**

▶ **THE TOTAL NUMBERS FROM A TO B =  $B - A + 1$**

**FORMULAE BOOK - SUDHANSHU SIR  
QUESTIONS ON HCF**

**FIND THE LARGEST LENGTH WHICH CAN EXACTLY MEASURE THE GIVEN LENGTH = HCF**

**FIND THE MINIMUM NUMBER OF SQUARE TILES REQUIRED TO COVER THE RECTANGULAR FLOOR.**

**FIND THE NUMBER OF CHAIRS REQUIRED IF THE NUMBER OF TEACHERS ON EACH CHAIR OF DIFFERENT SUBJECT SHOULD BE SAME.**

**FIND THE NUMBER OF SHELF REQUIRED TO KEEP THE BOOKS OF DIFFERENT SUBJECT IF THE BOOKS IN EACH SHELF HAS TO BE SAME.**

**FORMULAE BOOK - SUDHANSHU SIR  
QUESTIONS ON LCM**

**FIND THE TIME WHEN THE BELL WILL RING AGAIN  
SIMULTANEOUSLY AND HOW MANY TIMES**

**FIND THE TIME WHEN THE THREE DIFFERENT  
RUNNER WILL STEP TOGETHER AGAIN**

**FIND THE NUMBER OF SHELF REQUIRED TO KEEP THE  
BOOKS OF DIFFERENT SUBJECT IF THE BOOKS IN  
EACH SHELF HAS TO BE SAME.**

**A library buys 36 English books, 48 Science books & 72 Mathematics books. The thickness of each book is the same. Now, the Librarian wants the books to be placed in stacks, such that each stack has books of the same subject, and the height of each stack is the same. Also, the librarian wants as few stacks as possible. How many books will there be in each stack? How many stacks of books will there be?**

**Ann has swimming lessons every fifth day and diving lessons every third day. If she has a swimming lesson and a diving lesson today, after how many days will she once again have both swimming and diving lessons. ?**

**Find the largest dimensions of the square tiles which can be used to floor a hall of dimension 416 m x 234 m completely.**

**Shelly wants to tile a rectangular floor that measures 132m x 150m using square tiles that are all of the same size, with no overlap and no squares hanging over the edge.**

**What is the measurement of the largest square tiles she can use?**

**Two buckets contain 54 & 90 ltrs of water respectively. Find the maximum capacity of a jug which can measure the water of either bucket an exact number of times.**



**A juice seller has 1120ml of orange juice, 1400ml of grape juice and 1680ml of watermelon juice. he packs each kind of juice in small jars of equal capacity. What is the maximum capacity of each of the small jars such that no juice is left over.**

**How many jars will be required to pack the three different types of juice?**

**An Army contingent of 1000 members is to march behind army band of 56 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march.**

**The Traffic lights at three different road crossings change after every 75 seconds, 100 seconds, & 150 seconds respectively. If they all change simultaneously at 09:10:00 Hrs, at what time will they again change simultaneously?**

**Boxes of height 15 cm are stacked next to boxes of height 24 cm each. What is the shortest height at which the two stacks will be of the same height?**

**The HCF of two numbers is 18 and their LCM is 324. If one of the numbers is 162, find the other number.**

**If  $p$  and  $q$  are two coprime numbers, then find the HCF and LCM of  $p$  and  $q$ .**

**If  $l$  and  $m$  are two numbers such that  $l$  is a factor of  $m$ , find the HCF and LCM of  $l$  and  $m$ .**

**In a school there are two Sections A and B of class X. There are 48 students in Section A and 60 students in Section B. Determine the least number of books required for the library of the school so that the books can be distributed equally among all students of each section.**

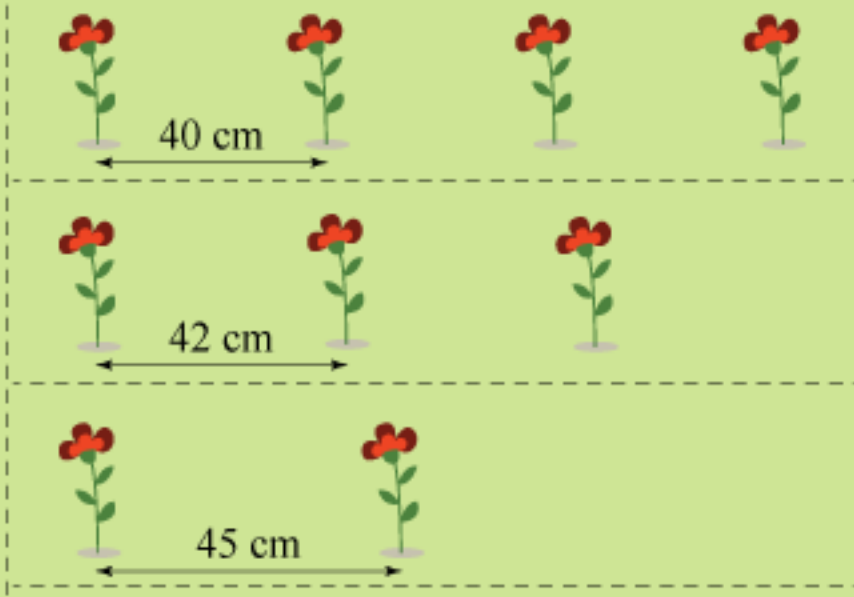


**Find the least number of square tiles by which the floor of a room of dimensions 16.58m and 8.32m can be covered completely.**

**The sum of the two numbers is 588 and their HCF is 49. How many such pairs of numbers can be formed?**

**Find the largest number  
which divides 92 & 74  
leaving 2 as remainder.**

**The Traffic lights at three different road crossings change after every 48 seconds, 72 seconds, & 108 seconds respectively. If they all change simultaneously at 08:20:00 Hrs, at what time will they again change simultaneously?**



**Meher is planting saplings in her garden. In one part of the garden, she makes three parallel rows. Starting from the left end of each row, she plants saplings at equal distances. In the first row, the distance between adjacent saplings is 40cm. This distance is 42 cm in the second row, and 45cm in the third row. Meher observes that the leftmost saplings in the three rows are aligned. At what distance from the left end will he again find aligned saplings?**

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

**The ratio of HCF to LCM of the least composite number and the least prime number is**

**The LCM of the smallest 2 digit number and smallest composite number is :**