

## IMPORTANT FACTS AND FORMULAE

**1. FACTORS AND MULTIPLES:** If a number 'a' divides another number 'b' exactly, then 'a' is a factor of 'b'. In this case, 'b' is called a multiple of 'a'.

**Example:** Find the total number of factors of 240.

**Solution:**  $240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$

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

$$\text{total factors} = 4+1 \times 1+1 \times 1+1=20$$

**2. HCF (Highest common Factor):** The HCF of two or more than two numbers is the greatest number that divides each of them exactly.

**Example:** HCF of 36, 72, 108

**Solution:**  $36 = 2^2 \times 3^2$

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

$$108 = 2^2 \times 3^3$$

$$\text{HCF} = 2^2 \times 3^2 = 36$$

**3. LCM (Lowest Common Multiple):** The least number which is exactly divisible by each one of the given numbers is called their LCM

**Example:** LCM of 87 and 145

**Solution:**  $87 = 3 \times 29$

$$145 = 5 \times 29$$

$$\text{LCM} = 3 \times 5 \times 29 = 435$$

**4. Product of two numbers =** Products of their HCF and LCM and LCM is always divisible by HCF.

**Example:** The sum and difference of the LCM and HCF of two numbers are 112 and 72 respectively. If the one of the numbers is 46, find the 2<sup>nd</sup> number.

दो संख्याओं के LCM और HCF का योग और अंतर क्रमशः 112 और 72 है. यदि एक संख्या 76 है तो दूसरी संख्या बताएं.

**Solution:**

$$L+H = 112$$

$$L-H = 72$$

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$$2H = 40$$

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$$H = 20$$

$$L+20 = 112$$

$$L = 92$$

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1<sup>st</sup> number = 46

Let the 2<sup>nd</sup> No. = x

$$46 \times x = 92 \times 20$$

$$x = 40$$

### 5. HCF and LCM of fractions:

$$\text{HCF} = \frac{\text{HCF of Numerators}}{\text{LCM of Denominators}} = \frac{2,3,6}{4,8,2} = \frac{1}{8}$$

$$\text{LCM} = \frac{\text{LCM of Numerators}}{\text{HCF of Denominators}} = \frac{2,3,6}{4,8,2} = \frac{6}{2}$$

**Example:** The L.C.M. of  $\frac{2}{3}, \frac{3}{4}, \frac{4}{7}, \frac{9}{13}$  is

$\frac{2}{3}, \frac{3}{4}, \frac{4}{7}, \frac{9}{13}$  का लघुत्तम समापवर्त्य होगा

**Solution:** LCM of  $\frac{2}{3}, \frac{3}{4}, \frac{4}{7}, \frac{9}{13}$

$$= \frac{\text{LCM of } 2,3,4,9}{\text{HCF of } 3,4,7,13}$$

$$\text{LCM} = \frac{36}{1} = 36$$

**6. HCF of two numbers** = HCF of sum of the numbers and their LCM.

**7. Decimal fraction:** Fraction in which denominators are power of 10 are known as decimal fractions

**Example:**  $\frac{1}{10} = 1 \text{ tenth}$ ,  $\frac{1}{100} = 1 \text{ hundredth}$

**8. Recurring Decimal:** If in a decimal fraction, a figure or a set of figures is repeated continuously, then such a number is called a recurring decimal.

**Example:**  $\frac{1}{3} = 0.333$ ,  $\frac{22}{7} = 3.142857$

**Example:** Express as vulgar fraction:  $0.1\bar{8} + 0:16\bar{25}$

साधारण भिन्न के रूप में व्यक्त करें:  $0.1\bar{8} + 0:16\bar{25}$

**Solution:**  $0.1\bar{8} + 0.16\bar{25}$

$$0.1\bar{8} = \frac{18-1}{90} = \frac{17}{90}$$

$$0.16\bar{25} = \frac{1625-16}{9900} = \frac{1609}{9900}$$

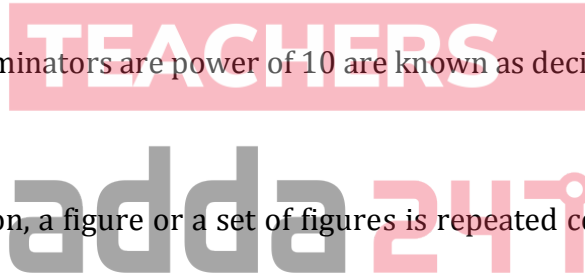
$$\text{So, } \frac{17}{90} + \frac{1609}{9900}$$

$$= \frac{1870+1609}{9900}$$

$$= \frac{3479}{9900}$$

### 9. Basic formulae:

1.  $(a+b)(a-b) = (a^2-b^2)$
2.  $(a-b)^2 = a^2+b^2-2ab$
3.  $(a+b)^2 = a^2+b^2+2ab$



**Example:**  $(x+y)=21$  and  $xy=108$ , then what is the value of  $x^2+y^2$  ?

$(x+y)=21$  और  $xy=108$ , तो  $x^2+y^2$  का मान ज्ञात करें?

**Solution:**  $x+y= 21$

$xy= 108$

$$(x+y)^2 = x^2+y^2+2xy$$

$$(21)^2 = x^2+y^2+2 \times 108$$

$$441 = x^2+y^2+216$$

$$x^2+y^2 = 225$$

$$1. (a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$$

$$2. (a^3+b^3) = (a+b) (a^2+b^2-ab)$$

**Example:** Simplify:  $\frac{(6434 \times 6434 \times 6434) + (2964 \times 2964 \times 2964)}{(6434)^2 - (6434 \times 2964) + (2964 \times 2964)}$

सरलीकरण करें:  $\frac{(6434 \times 6434 \times 6434) + (2964 \times 2964 \times 2964)}{(6434)^2 - (6434 \times 2964) + (2964 \times 2964)}$

**Solution:**  $\frac{(6434 \times 6434 \times 6434) + (2964 \times 2964 \times 2964)}{(6434)^2 - (6434 \times 2964) + (2964 \times 2964)}$

$$= \frac{a^3+b^3}{a^2-ab+b^2}$$

$$= (a^3+b^3) = (a+b) (a^2-ab+b^2)$$

$$= \frac{(a+b)(a^2-ab+b^2)}{(a^2-ab+b^2)}$$

$$= (a+b) = (6434+2964)$$

$$= 9398$$

$$1. (a^3-b^3) = (a-b) (a^2+b^2+ab)$$

**Example:** If  $a= 21$ , and  $b=24$ , then the value of  $\frac{a^3+b^3}{(a+b)(a^2+b^2-ab)}$

यदि  $a= 21$ , और  $b=24$ , तो  $\frac{a^3+b^3}{(a+b)(a^2+b^2-ab)}$  का मान होगा:

**Solution:**  $\frac{a^3+b^3}{(a+b)(a^2+b^2-ab)}$

$$= \frac{(a+b)(a^2+b^2-ab)}{(a+b)(a^2+b^2-ab)}$$

$$= 1$$

$$2. (a^3+b^3+c^3-3abc) = (a+b+c) (a^2+b^2+c^2-ab-bc-ca)$$

$$3. \text{When } a+b+c = 0, \text{ then } a^3+b^3+c^3 = 3abc$$

$$4. (a+b)^2+(a-b)^2 = 2(a^2+b^2)$$

$$5. (a-b)^3 = a^3-b^3-3ab(a-b)$$

$$6. (a+b)^2-(a-b)^2 = 4ab$$

**Example:** Find the value of  $\frac{(241+124)^2-(241-124)^2}{241 \times 124}$

**Solution:**  $\frac{(241+124)^2-(241-124)^2}{241 \times 124}$  ( $a= 241, b= 124$ )

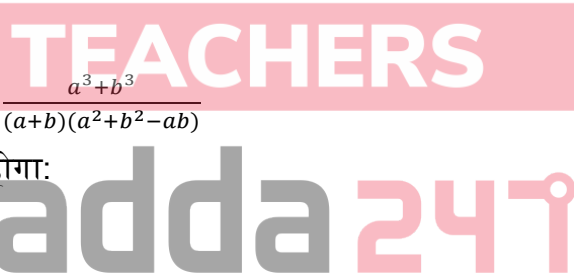
$$= \frac{(a+b)^2-(a-b)^2}{ab}$$

$$= \frac{a^2+b^2+2ab-(a^2+b^2-2ab)}{ab}$$

$$= \frac{a^2+b^2+2ab-a^2-b^2+2ab}{ab}$$

$$= \frac{4ab}{ab}$$

$$= 4$$



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**10. BODMAS Rule:** The rule depicts the correct sequence in which operations are to be executed, so as to find out the value of given expression.

**Example:** 'B' for Bracket, 'O' for of, 'D' for Division, 'M' for Multiplication, 'A' or Addition and 'S' for Subtraction.

**Example:** The value of  $(6.5 \times 7.25 + 8.5 \times 19.5 + 4.5 - 8.5)$

**Solution:**  $(6.5 \times 7.25 + 8.5 \times 19.5 + 4.5 - 8.5)$

$$= 47.125 + 165.75 + 4.5 - 8.5$$

$$= 217.375 - 8.5$$

$$= 208.875$$

**11. Square Roots:** If  $x^2 = y$ , we say that the square root of  $y$  is  $x$ , and  $\sqrt{y} = x$

**Example:**  $\sqrt{9} = 3, \sqrt{169} = 13$

**Example:**  $a = \frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} - \sqrt{5}}, b = \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}$ , then the value of  $(a+b)^2$

$a = \frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} - \sqrt{5}}, b = \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}$ , तो  $(a+b)^2$  का मान होगा:

**Solution:**  $a = \frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} - \sqrt{5}} \times \frac{\sqrt{7} + \sqrt{5}}{\sqrt{7} + \sqrt{5}}$

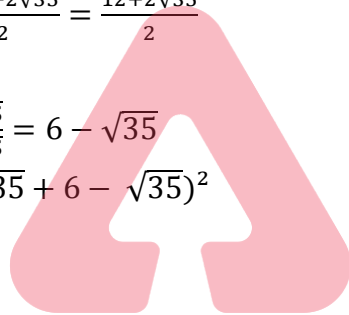
$$= \frac{(\sqrt{7} + \sqrt{5})^2}{2} = \frac{7 + 5 + 2\sqrt{35}}{2} = \frac{12 + 2\sqrt{35}}{2}$$


$$= 6 + \sqrt{35}$$


$$b = \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}} \times \frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} - \sqrt{5}} = 6 - \sqrt{35}$$

$$(a+b)^2 = (6 + \sqrt{35} + 6 - \sqrt{35})^2$$

$$= (12)^2 = 144$$



  
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