Basic Mathematics: Section 2

HCF & LCM

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HCF (Highest Common Factor)

Definition: HCF or GCD

The **Highest Common Factor (HCF)** or **Greatest Common Divisor (GCD)** of two or more integers is the largest positive integer that divides each of the integers without a remainder.

Examples: Find the HCF

1. HCF(18, 54) =
2. HCF(12, 9) =
3. HCF(21, 55) =
4. HCF(14, 70) =
5. HCF(12, 16, 30) =

More HCF Examples

Find the HCF

- $\mathrm{HCF}(4^1, 4^2, 4^3, 4^4) =$
- $\mathrm{HCF}(a, a^2, a^3) =$
- $\mathrm{HCF}(x, x^2 + 1) =$
- $\mathrm{HCF}(x^2 - 1, x + 1) =$
- $\mathrm{HCF}(x^3 - 8, x - 2) =$

Method: HCF by Prime Factorisation

Example 1

Find HCF(180, 252)

Example 2

Find HCF(120, 144, 168)

LCM (Lowest Common Multiple)

Definition: LCM / LCD

The **Lowest Common Multiple (LCM)** or **Lowest Common Divisor (LCD)** of two or more integers is the smallest positive integer that is a multiple of all the integers.

Examples: Find the LCM

1. LCM(10, 15) =
2. LCM(4, 8) =
3. LCM(12, 16) =
4. LCM(5, 7) =
5. LCM(16, 10) =

More LCM Examples

Find the LCM

- $\text{LCM}(x^3(x+1), x^2(x+1)^4, x(x+1)^2) =$
- $\text{LCM}(x^3(x+1), (x+1)^2, x(x+1)) =$
- $\text{LCM}(x^4(x-1)^{10}(x+2)^{99}, (x-1)^{11}(x+2)^{67}, x^2(x+1)^2(x+2)^{101}) =$

Method: LCM by Prime Factorisation

Example 1

Find LCM(45, 60)

Example 2

Find LCM(900, 350)

Practice Questions

Question 1

Find the HCF of $2^3 \times 3^2 \times 5$ and $2^2 \times 3^3 \times 7$.

Question 2

Find the LCM of $2^4 \times 3^2 \times 5$, $2^3 \times 3^3 \times 7$, and $2^2 \times 5^2 \times 7^2$.

Question:1 Simplify

$$\frac{3}{4a^2b} - \frac{7}{6ab^5} - \frac{5}{2ab^2}$$

Question:2 Simplify

$$\frac{7}{r-3} - \frac{r}{2r+6} - \frac{r-1}{2r^2-6r}$$

Question:3 Simplify

$$\frac{a-2}{a+2}+\frac{4a+4}{a^2+4a+4}-\frac{a}{a-2}$$

Question:4 Simplify

$$\frac{4}{x^2-4x+3}-\frac{2}{x^2-x-6}+\frac{1}{x^2+2x-3}$$

LCM and HCF of Fractions

$$\text{LCM}\left(\frac{a}{b}, \frac{c}{d}\right) = \frac{\text{LCM}(a, c)}{\text{HCF}(b, d)}$$

$$\text{HCF}\left(\frac{a}{b}, \frac{c}{d}\right) = \frac{\text{HCF}(a, c)}{\text{LCM}(b, d)}$$

Examples

1: Find the LCM of $\frac{3}{4}$ and $\frac{5}{6}$.

2: Find the HCF of $\frac{3}{4}$ and $\frac{5}{6}$.

Brain Teaser Question — Ans:8

If $(x-1)(y-1) = 14$ where $x, y \in \mathbb{Z}$ (integers), then number of pairs of (x, y) are.

Brain Teaser Question — Ans:2

If $n = \frac{27}{x} - x$ where $n, x \in \mathbb{N}$ (natural numbers), then number of pairs of (n, x) are.

Brain Teaser Question — Ans:1

Find the number of integer solutions (x, y) for the equation:

$$2^{2x} - 3^{2y} = 55$$

where x and y are integers.