

Objective: To find the GCF and LCM of integers and monomials.

The **Least Common Multiple** of two or more integers or monomials is the least positive integer or monomial that has each of the integers or monomials as factors.

Strategy:

- 1) Factor each integer or monomial into its prime factorization (where each factor is a product of prime numbers).
- 2) Take the greatest power of each prime factor (for variables take the variables with the largest exponent).

Ex 1) Find the prime factorization of 180.

$$\begin{array}{cc} 10 \cdot 18 & \\ \wedge & \wedge \\ 2 \cdot 5 & 2 \cdot 9 \\ & \wedge \\ & 3 \cdot 3 \end{array}$$

$$2^2 \cdot 3^2 \cdot 5$$

Ex 2) Find the prime factorization of: $84x^2y^3z^4$

$$\begin{array}{c} 84 \cdot x^2 \cdot y^3 \cdot z^4 \\ \wedge \\ 4 \cdot 21 \\ \wedge \quad \wedge \\ 2 \cdot 2 \cdot 3 \cdot 7 \\ \hline 2^2 \cdot 3 \cdot 7 \cdot x^2 \cdot y^3 \cdot z^4 \end{array}$$

Ex 3) Find the LCM of 4, 12, and 45.

4	12	45
\wedge	\wedge	\wedge
2 · 2	4 · 3	9 · 5
\wedge	\wedge	\wedge
2 · 2	2 · 2	3 · 3
2^2	$2^2 \cdot 3$	$3^2 \cdot 5$

$$\text{LCM: } 2^2 \cdot 3^2 \cdot 5$$

$$4 \cdot 9 \cdot 5$$

$$\textcircled{180}$$

Ex 4) Find the LCM of:

$$48x^2y^3z^4 \text{ and } 60xy^2z^6$$

$$\begin{array}{l} 48x^2y^3z^4 \\ \wedge \\ 8 \cdot 6 \\ \wedge \quad \wedge \\ 2 \cdot 4 \quad 2 \cdot 3 \\ \wedge \\ 2 \cdot 2 \end{array} \quad \begin{array}{l} 60xy^2z^6 \\ \wedge \\ 6 \cdot 10 \\ \wedge \quad \wedge \\ 2 \cdot 3 \cdot 2 \cdot 5 \end{array}$$

$$2^4 \cdot 3 \cdot x^2 \cdot y^3 \cdot z^4 \quad 2^2 \cdot 3 \cdot 5 \cdot x \cdot y^2 \cdot z^6$$

$$\text{LCM: } 2^4 \cdot 3 \cdot 5 \cdot x^2 \cdot y^3 \cdot z^6$$

$$16 \cdot 3 \cdot 5 \cdot x^2 y^3 z^6$$

$$\boxed{240x^2y^3z^6}$$