Preparation For Adding & Subtracting Algebraic Fractions (which we'll be doing tomorrow).

Today, we will only learn how to ① figure out what the common denominator (c.d.) will be, and ② how to make equivalent fractions.

Reminder:

$\frac{1}{2} + \frac{1}{3}$ c.d. = Lowest common multiple = 6

When we add or subtract fractions, we must have equivalent fractions (i.e. need common denominator)

$\frac{1}{2} \cdot 3 + \frac{1}{3} \cdot 2$ ← Add tops only

$\frac{1}{2} \cdot 3 \quad \frac{1}{3} \cdot 2$

equivalent fractions → $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ ← bottom stays C.D.

Rules for Figuring Out what the c.d. is in the case of algebraic fractions:

Rule 1: Any terms present in one or more of the denominators must be in the common denominator.

e.g. $\frac{1}{x} + \frac{1}{y}$

C.D. xy

E.F. $\frac{1y}{xy} + \frac{1x}{xy}$

e.g. $\dfrac{1}{(a+1)} + \dfrac{1}{(a+1)(a+3)}$

C.D. $(a+3)(a+1)$

E.F. $\dfrac{1(a+3)}{(a+1)(a+3)} + \dfrac{1}{(a+1)(a+3)}$

e.g. $\dfrac{1}{(a-1)(a+2)} + \dfrac{1}{(a+2)x} + \dfrac{1}{(a-1)(a+2)x}$

(CD) $(a-1)x(a+2)$

(EF) $\dfrac{1\,x}{(a-1)(a+2)x} + \dfrac{1(a-1)}{(a+2)x(a-1)} + \dfrac{1}{(a-1)(a+2)x}$

Rule 2 : If there are exponents present on any given term, use the largest exponent.

e.g. $\dfrac{1(m+1)}{(m+1)(m+1)(m+3)} + \dfrac{1(m+3)}{(m+1)^2(m+3)}$

C.D. $(m+1)^2(m+3)$

e.g. $\dfrac{1}{x^5y(a-8)^2} + \dfrac{1}{xy^3(a-8)}$

C.D. $(a-8)^2x^5y^3$

$$\frac{1y^2}{y^2x^5y(a-8)^2} + \frac{1x^4(a-8)}{x^4xy^3(a-8)}$$

$$\frac{y^2}{\text{C.D.}} + \frac{x^4(a-8)}{\text{C.D.}}$$

Rule 3 : If there are whole numbers, use the lowest common multiple of them.

e.g. $\frac{1}{2d(m+3)}$, $\frac{1}{4xd^2(m+3)}$, $\frac{1}{5x(m+3)^2}$

(CD) $20d^2x(m+3)^2$

(EF) $\frac{(m+3)(10)dx}{(10)2d(m+3)dx(m+3)}$, $\frac{1(5)(m+3)}{4xd^2(m+3)(5)(m+3)}$, $\frac{1(4d^2)}{5x(m+3)^2 \; 4d^2}$

OR

$\frac{10dx(m+3)}{C.D.}$, $\frac{5(m+3)}{C.D.}$, $\frac{4d^2}{C.D.}$

e.g.

$$\frac{1}{4m(a+1)(c-3)} + \frac{1}{8(a+1)(c-3)} + \frac{1}{2(a+1)(c-3)m}$$

C.D. $8m(a+1)(c-3)$

EF $\frac{2}{\text{C.D.}} + \frac{m}{\text{C.D.}} + \frac{4}{\text{C.D.}}$