

### 6.3 FINDING THE LEAST COMMON DENOMINATOR

$$\text{LCD}(20, 50) = 100$$

LCD IS A SPECIAL CASE OF THE LCM.

THE LCM (LEAST COMMON MULTIPLE) IS THE  
SMALLEST NUMBER THAT DIVIDES EVENLY  
BY THE NUMBERS IN QUESTION


Ex. 1

a.)  $3 = \frac{? \leftarrow 36}{12}$        $\frac{36}{12} = 3$

b.)  $\frac{3}{w} = \frac{3x}{wx}$

c.)  $\frac{2}{3y^3} = \frac{8y^5}{12y^8}$

Ex. 2

$$\begin{aligned} \text{a.) } \frac{7}{3x-3y} &= \frac{14}{6x-6y} \\ \frac{7}{\underline{3(x-y)}} &= \frac{2 \cdot 7}{\underline{2 \cdot 3(x-y)}} \end{aligned}$$


$$\begin{aligned} \text{b.) } \frac{x-2}{\underline{x+2}} &= \frac{(x-2)(x+6)}{x^2+8x+12} = \frac{x^2+4x-12}{x^2+8x+12} \\ & \quad \underline{(x+2)(x+6)} \end{aligned}$$

Ex. 3

$$b) \text{ LCM}(x^3 y z^2, x^5 y^2 z, x y z^5) = x^5 y^2 z^5$$

IF THESE WERE DENOMINATORS OF RATIONAL EXPRESSIONS, THE LEAST COMMON DENOMINATOR WOULD BE THIS LCM.

$$\begin{aligned} c.) \text{ LCM}(a^2 + 5a + 6, a^2 + 4a + 4) \\ (a+2)(a+3), (a+2)(a+2) \\ = \underline{(a+2)(a+2)(a+3)} = a^3 + 7a^2 + 16a + 12 \end{aligned}$$

Ex. 4

a)  $\frac{4}{9xy}, \frac{2}{15xz}$

$3 \cdot 3 \cdot x \cdot y$       $3 \cdot 5 \cdot x \cdot z$

$3 \cdot 3 \cdot 5 \cdot x \cdot y \cdot z = 45xyz$

$5z$

$3y$

$4 \cdot 5z$	$2 \cdot 3y$
$\frac{20z}{45xyz}$	$\frac{6y}{45xyz}$

Ex 4

b)

5

$6x^2$

$2 \cdot 3 \cdot x \cdot x$

$2 \cdot 2 \cdot x \cdot y \cdot y$

-1

$8x^3y$

$2 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot y$

$3y$

3

$4y^2$

$2 \cdot 2 \cdot y \cdot y$

$2 \cdot 3 \cdot x^3$

$$2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x \cdot y \cdot y = 24x^3y^2$$

$$\frac{20xy^2}{24x^3y^2}$$

$$\frac{3y}{24x^3y^2}$$

$$\frac{18x^3}{24x^3y^2}$$

Ex. 5

$$\frac{5x}{x^2-4} \quad \text{and} \quad \frac{3}{x^2+x-6}$$
$$(x+2)(x-2) \quad (x+3)(x-2)$$

$$\text{LCD: } \boxed{(x+2)(x-2)(x+3)}$$

$$\frac{5x(x+3)}{(x+2)(x-2)(x+3)} \quad \text{and} \quad \frac{3(x+2)}{(x+3)(x-2)(x+2)}$$

## 6.4 ADDITION & SUBTRACTION

If  $b \neq 0$

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \quad \text{and} \quad \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

Ex. 1

$$\text{a.) } \frac{1}{12} + \frac{7}{12} = \frac{8}{12} = \frac{2}{3} \quad \text{b.) } \frac{1}{4} - \frac{3}{4} = \frac{-2}{4} = -\frac{1}{2}$$



Ex. 2

$$a) \frac{3}{20} + \frac{7}{12} = \frac{3 \cdot 3}{60} + \frac{7 \cdot 5}{60} = \frac{9}{60} + \frac{35}{60} = \frac{44}{60} = \frac{11}{15}$$

$$b) \frac{1}{6} - \frac{4}{15} = \frac{5}{30} - \frac{8}{30} = \frac{-3}{30} = -\frac{1}{10}$$

Ex. 3

$$a.) \frac{2}{3y} + \frac{4}{3y} = \frac{6}{3y} = \frac{2}{y}$$

$$b.) \frac{2x}{x+2} + \frac{4}{x+2} = \frac{2x+4}{x+2} = \frac{2(x+2)}{(x+2)} = 2$$

$$c.) \frac{x^2 + 2x}{(x-1)(x+3)} - \frac{2x+1}{(x-1)(x+3)} = \frac{x^2 - 1}{(x-1)(x+3)}$$
$$= \frac{(x-1)(x+1)}{(x-1)(x+3)} = \frac{x+1}{x+3}$$

Ex. 4

$$a) \frac{5}{2x} + \frac{2}{3} = \frac{15}{6x} + \frac{4x}{6x} = \frac{4x+15}{6x}$$

$$b) \frac{4}{x^3y} + \frac{2}{xy^3} = \frac{4y^2}{x^3y^3} + \frac{2x^2}{x^3y^3} = \frac{4y^2+2x^2}{x^3y^3}$$

$$c) \frac{a+1}{6} - \frac{a-2}{8} = \frac{4(a+1)}{24} - \frac{3(a-2)}{24}$$
$$= \frac{4a+4-3a+6}{24} = \frac{a+10}{24}$$

Ex. 5

$$a.) \frac{1}{x^2-9} + \frac{2}{x^2+3x} = \frac{1}{(x+3)(x-3)} + \frac{2}{x(x+3)}$$

$$= \frac{x}{x(x+3)(x-3)} + \frac{2(x-3)}{x(x+3)(x-3)}$$

$$= \frac{x + 2x - 6}{x(x+3)(x-3)} = \frac{3x-6}{x(x+3)(x-3)} = \frac{3(x-2)}{x(x+3)(x-3)}$$

EITHER OF THESE  
IS CORRECT.

Ex. 5

$$b) \frac{4}{5-a} - \frac{2}{a-5} = \frac{4}{-1(a-5)} - \frac{2}{(a-5)}$$

$$= \frac{4}{-1(a-5)} - \frac{-2}{-1(a-5)} = \frac{6}{-(a-5)}$$

$$= \frac{6}{5-a} = -\frac{6}{a-5}$$

Ex. 6

$$\frac{x+1}{x^2+2x} + \frac{2x+1}{6x+12} - \frac{1}{6}$$

$$= \frac{x+1}{x(x+2)} + \frac{2x+1}{6(x+2)} - \frac{1}{6}$$

$$= \frac{6(x+1)}{6x(x+2)} + \frac{x(2x+1)}{6x(x+2)} - \frac{x(x+2)}{6x(x+2)}$$

$$= \frac{\underline{6x} + \underline{6} + \underline{2x^2} + \underline{x} - \underline{x^2} - \underline{2x}}{6x(x+2)}$$

$$= \frac{x^2 + 5x + 6}{6x(x+2)} = \frac{(x+3)\cancel{(x+2)}}{6x\cancel{(x+2)}} = \frac{x+3}{6x}$$

Ex. 7    WORK PROBLEMS

	RATE	TIME	WORK
LUCY	$\frac{1}{x} \frac{\text{msp}}{\text{hr}}$	3	$\frac{3}{x}$
HARRY	$\frac{1}{2x} \frac{\text{msp}}{\text{hr}}$	3	$\frac{3}{2x}$

$$\frac{3}{x} + \frac{3}{2x} = \frac{6}{2x} + \frac{3}{2x} = \frac{9}{2x}$$