

WARMUP

Add or subtract:

$$1) \frac{5}{9} \cdot \frac{2}{2} + \frac{1}{18}$$

$$\begin{aligned} 9 &= 3 \cdot 3 \\ 18 &= 3 \cdot 3 \cdot 2 \\ \text{LCD} &= 3 \cdot 3 \cdot 2 = 18 \end{aligned} \quad \frac{10}{18} + \frac{1}{18} = \frac{11}{18}$$

$$2) \frac{3}{14} \cdot \frac{3}{3} - \frac{2}{21} \cdot \frac{2}{2}$$

$$\begin{aligned} 14 &= 7 \cdot 2 \\ 21 &= 7 \cdot 3 \\ \text{LCD} &= 7 \cdot 2 \cdot 3 = 42 \end{aligned} \quad \frac{9}{42} - \frac{4}{42}$$

$$3) \frac{5}{12} \cdot \frac{3}{3} + \frac{7}{18} \cdot \frac{2}{2}$$

$$\begin{aligned} 12 &= 2 \cdot 2 \cdot 3 \\ 18 &= 2 \cdot 3 \cdot 3 \\ \text{LCD} &= 2 \cdot 2 \cdot 3 \cdot 3 = 36 \end{aligned} \quad \frac{15}{36} + \frac{14}{36} = \frac{29}{36}$$

$\frac{10}{15} = \frac{2}{3}$

- 1) Find the LCD
- 2) Rewrite each fraction as an equivalent fraction with that LCD.
- 3) Add (or subtract)
- 4) Simplify

Section 7.4 Continued

$$\text{ex: } \frac{7}{6x^2} \cdot \frac{3}{3} + \frac{2}{9x} \cdot \frac{2x}{2x}$$

$$\begin{aligned} \text{LCD: } 6x^2 &= 2 \cdot 3 \cdot x \cdot x \\ 9x &= 3 \cdot x \cdot 3 \end{aligned}$$
$$\text{LCD} = 2 \cdot 3 \cdot x \cdot x \cdot 3 = 18x^2$$

$$\frac{21}{18x^2} + \frac{4x}{18x^2}$$

$$\frac{21 + 4x}{18x^2}$$

$$\text{ex: } \frac{3}{10x^2} \cdot \frac{3}{3} + \frac{7}{15x} \cdot \frac{2x}{2x}$$

$$\frac{9}{30x^2} + \frac{14x}{30x^2}$$

$$\frac{9+14x}{30x^2}$$

$$10x^2 = 2 \cdot 5 \cdot x \cdot x$$

$$15x = \frac{5 \cdot x \cdot 3}{2 \cdot 5 \cdot x \cdot x \cdot 3}$$

$$\lim_{h \rightarrow 0} \frac{\frac{3}{x+h} - \frac{3}{x}}{h}$$

$$\text{ex: } \frac{3}{x+1} \cdot \frac{5}{x-1}$$

no common factors
in denominators

$$\frac{3(x-1) + 5(x+1)}{(x+1)(x-1)}$$

$$\frac{3x-3+5x+5}{(x+1)(x-1)}$$

$$\frac{8x+2}{(x+1)(x-1)} = \frac{2(4x+1)}{(x+1)(x-1)}$$

$$\frac{3}{7} \cdot \frac{1}{5}$$

$$\frac{3 \cdot 5 - 1 \cdot 7}{7 \cdot 5}$$

$$\frac{15-7}{35} = \frac{8}{35}$$

$$\frac{3}{(x+1)} \cdot \frac{(x-1)}{(x-1)} + \frac{5}{(x-1)} \cdot \frac{(x+1)}{(x+1)}$$

$$\text{ex: } \frac{2}{x+3} \cdot \frac{4}{x-3}$$

$$\frac{2(x-3) + 4(x+3)}{(x+3)(x-3)} = \frac{2x-6+4x+12}{(x+3)(x-3)}$$

$$= \frac{6x+6}{(x+3)(x-3)} = \frac{6(x+1)}{(x+3)(x-3)}$$

$$\begin{aligned}
 \underline{\text{ex:}} \quad \frac{x}{x+3} + 2 &= \frac{x}{x+3} + \frac{2 \cdot \frac{(x+3)}{1}}{\frac{(x+3)}{(x+3)}} \quad \text{LCD} = x+3 \\
 &= \frac{x + 2x + 6}{x+3} \\
 &= \frac{3x + 6}{x+3} \\
 &= \frac{3(x+2)}{x+3}
 \end{aligned}$$

$$\underline{\text{ex:}} \quad \frac{y+2}{4y+16} - \frac{2}{y^2+4y}$$

$$4y+16 = 4(y+4)$$

$$y^2+4y = \frac{(y+4)y}{1}$$

$$\text{LCD} = 4(y+4)y$$

$$\frac{(y+2) \cdot y}{4(y+4)y} - \frac{2 \cdot 4}{y(y+4) \cdot 4}$$

$$\frac{y^2+2y}{4y(y+4)} - \frac{8}{4y(y+4)}$$

$$\frac{y^2+2y-8}{4y(y+4)}$$

$$\begin{array}{r}
 -8 \\
 4 \times -2 \\
 \hline
 2
 \end{array}$$

$$\frac{\cancel{(y+4)}(y-2)}{4y \cancel{(y+4)}} = \frac{y-2}{4y}$$

$$\text{ex: } \frac{5}{y^2 - 5y} - \frac{y}{5y - 25}$$

$$\text{LCD} = y(y-5) \cdot 5$$

$$\frac{5}{y(y-5)} \cdot \frac{5}{5} - \frac{y}{5(y-5)} \cdot \frac{y}{y}$$

$$\frac{25}{5y(y-5)} - \frac{y^2}{5y(y-5)}$$

$$\frac{25 - y^2}{5y(y-5)} = \frac{(5+y)(\overset{-1}{5-y})}{5y(\cancel{y-5})} = \frac{-(5+y)}{5y}$$

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