Unit 1: Lesson 06 *Putting it all together with fractions

When **adding or subtracting** fractions, find a **common denominator**.

Example 1: Simplify $3\left(\frac{3x}{4} - \frac{x}{3}\right)$

$3\left(\frac{3x}{4}\frac{3}{3} - \frac{x}{3}\frac{4}{4}\right) = 3\left(\frac{9x}{12} - \frac{4x}{12}\right) = 3\left(\frac{5x}{12}\right)$

$= \frac{15x}{12} = \boxed{\frac{5x}{4}}$

When **multiplying** fractions, **multiply numerators** to produce the new numerator. **Multiply denominators** to produce the new denominator.

$$\frac{a}{b}\frac{c}{d} = \frac{ac}{bd}$$

Example 2: $-\frac{4}{5}\left(\frac{3}{8}x - \frac{5}{6}y\right)$

$-\frac{4}{5}\left(\frac{3}{8}\frac{x}{1} - \frac{5}{6}\frac{y}{1}\right) = \frac{-12x}{40} + \frac{20y}{30} = \boxed{\frac{-3x}{10} + \frac{2y}{3}}$

When **dividing** by a fraction, multiply the numerator by the **reciprocal** of that fraction.

Example 3: Simplify $\frac{3x/(5y)}{4a/(20b)}$

$\frac{\frac{3x}{5y}}{\frac{4a}{20b}} = \frac{3x}{5y}\frac{20b}{4a} = \frac{60xb}{20ay} = \boxed{\frac{3xb}{ay}}$

***Example 4:** Combine like terms in 4[(3/4)x + (2/5)x – 2] and evaluate at x = 3.

$$4\left[\frac{3}{4}\frac{x}{1}+\frac{2}{5}\frac{x}{1}-2\right]=4\left[\frac{3x}{4}+\frac{2x}{5}-2\right]$$

$$=4\left[\frac{3x}{4}\frac{5}{5}+\frac{2x}{5}\frac{4}{4}-2\right]$$

$$=4\left[\frac{15x}{20}+\frac{8x}{20}-2\right]=\frac{4}{1}\left[\frac{23x}{20}-2\right]$$

$$=\frac{92x}{20}-8=\frac{23x}{5}-8=\frac{23\cdot 3}{5}-\frac{8}{1}\frac{5}{5}=\frac{69-40}{5}=\boxed{\frac{29}{5}}$$

Example 5: Simplify (11x – (5/4)x)/(2/3)

$$\left(\frac{11x}{1}-\frac{5}{4}\frac{x}{1}\right)\frac{3}{2}=\left(\frac{11x}{1}\frac{4}{4}-\frac{5x}{4}\right)3/2$$

$$=\left(\frac{44x}{4}-\frac{5x}{4}\right)\frac{3}{2}=\frac{39x}{4}\frac{3}{2}=\boxed{\frac{117x}{8}}$$

See **Calculator Appendix B** (and an associated video) for how to handle the grouping of numerators and denominators on a graphing calculator. Common pitfalls are discussed.

Assignment:

1. Simplify $\frac{7}{8} + \frac{2}{3}$

2. Simplify $\frac{2}{7}\ \frac{3}{4} \div \frac{2}{3}$

3. Simplify $-\frac{5}{3}\left(\frac{1}{7}m - \frac{2}{3}n\right)$

4. Simplify $\left(\frac{2x}{5} - \frac{x}{4}\right)$

5. Simplify $-\left(\frac{2x}{5} - \frac{x}{3}\right) + 4x$

6. Combine like terms in 5[(3/4)y + (5/3)y – 1] and evaluate at y = –3.

7. Simplify (11q – (7/3)q)/(-8)

8. Simplify $\frac{3x}{7} - \frac{1}{5} + \frac{2x}{3}$ and evaluate when x = –1.

*9. Simplify (2/3) { –[1/5 – 1/2] + 2|1/3 + 2| }

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*10. Combine like terms in $\frac{-4}{5x} - \frac{3}{2x} + 1$ and then evaluate at x = 2.