Pre-algebra
Skill-Builder # F – 8
Simplifying Complex Fractions

When simplifying complex fractions, simply remember that the fraction bar stands for division. Thus we have for nonzero integers *b* and *d*:

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$$

One can simplify the numerator and denominator separately, or one can multiply both the numerator and denominator by the LCD of all the fractions present. Both methods will be presented.

Examples Simplify.

1) $\dfrac{\frac{1}{2}+\frac{1}{4}}{-\frac{1}{3}-\frac{1}{6}}$

Method A:

$$\frac{\frac{1}{2}+\frac{1}{4}}{-\frac{1}{3}-\frac{1}{6}} = \frac{\frac{1\cdot\mathbf{2}+1}{4}}{\frac{-1\cdot\mathbf{2}-1}{6}}$$

$$= \frac{\frac{2+1}{4}}{\frac{-2-1}{6}}$$

$$= \frac{\frac{3}{4}}{\frac{-3}{6}}$$

$$= \frac{3}{4} \div \left(-\frac{3}{6}\right)$$

$$= -\frac{\cancel{3}}{4} \cdot \frac{6}{\cancel{3}}$$

$$= -\frac{3}{2}$$

Method B: Multiply numerator and denominator by the LCD 12.

$$\frac{\frac{1}{2}+\frac{1}{4}}{-\frac{1}{3}-\frac{1}{6}} = \frac{\mathbf{12}\left(\frac{1}{2}+\frac{1}{4}\right)}{\mathbf{12}\left(-\frac{1}{3}-\frac{1}{6}\right)}$$

$$= \frac{\mathbf{12}\cdot\frac{1}{2}+\mathbf{12}\cdot\frac{1}{4}}{\mathbf{12}\left(-\frac{1}{3}\right)-\mathbf{12}\cdot\frac{1}{6}}$$

$$= \frac{6+3}{-4-2}$$

$$= \frac{9}{-6}$$

$$= -\frac{3}{2}$$

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Simplify.

1) $\dfrac{\frac{1}{4}+\frac{1}{3}}{\frac{1}{8}-\frac{1}{6}}$

2) $\dfrac{\frac{1}{2}-\frac{2}{3}-\frac{3}{4}}{-\frac{5}{6}+\frac{1}{4}}$

3) $\dfrac{\left(\frac{1}{2}\right)^2-\left(\frac{1}{3}\right)^2}{\frac{1}{2}+\frac{1}{3}}$

4) $\dfrac{\frac{1}{5}-\left(\frac{1}{3}-\frac{1}{2}\right)^2}{\left(\frac{1}{5}-\frac{1}{3}\right)^2-\frac{1}{2}}$

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Answer Key:

1) -14

2) $\frac{11}{7}$

3) $\frac{1}{6}$

4) $-\frac{5}{14}$

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