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Group Members:

1. Determine algebraically which fraction is larger.

(a) $\frac{3}{5}$ and $\frac{7}{10}$

$$\frac{3}{5} = \frac{3 \cdot 2}{5 \cdot 2} = \frac{6}{10}$$

$$\text{So } \frac{3}{5} < \frac{7}{10}.$$

(b) $\frac{5}{6}$ and $\frac{3}{4}$

$$\frac{5}{6} = \frac{5 \cdot 2}{6 \cdot 2} = \frac{10}{12}$$

$$\frac{3}{4} = \frac{3 \cdot 3}{4 \cdot 3} = \frac{9}{12}$$

$$\text{So } \frac{5}{6} > \frac{3}{4}.$$

(c) $\frac{8}{9}$ and $\frac{11}{13}$

$$\frac{8}{9} = \frac{8 \cdot 13}{9 \cdot 13} = \frac{104}{117}$$

$$\frac{11}{13} = \frac{11 \cdot 9}{13 \cdot 9} = \frac{99}{117}$$

$$\text{So } \frac{8}{9} > \frac{11}{13}.$$

There is a slick little algorithm to compare two fractions. Let's compare $\frac{4}{5}$ and $\frac{7}{10}$. Here's how it works:

- (i) Multiply the denominator of the second fraction and the numerator of the first
- (ii) Multiply the denominator of the first fraction and the numerator of the second
- (iii) If the number from (i) is bigger, then $\frac{4}{5}$ is bigger than $\frac{7}{10}$, but if the number from (ii) is bigger, then $\frac{7}{10}$ is bigger than $\frac{4}{5}$.

$$\begin{array}{ccc} 40 & & 35 \\ \frac{4}{5} & \times & \frac{7}{10} \end{array}$$

So by the cross multiply algorithm, $\frac{4}{5} > \frac{7}{10}$.

2. Use the cross multiply algorithm to determine which fraction is larger.

(a) $\frac{3}{5}$ and $\frac{7}{10}$

$$\begin{array}{ccc} 30 & & 35 \\ \frac{3}{5} & \times & \frac{7}{10} \end{array}$$

So $\frac{3}{5} < \frac{7}{10}$.

(b) $\frac{5}{6}$ and $\frac{3}{4}$

$$\begin{array}{ccc} 20 & & 18 \\ \frac{5}{6} & \times & \frac{3}{4} \end{array}$$

So $\frac{5}{6} > \frac{3}{4}$.

(c) $\frac{8}{9}$ and $\frac{11}{13}$

$$\begin{array}{ccc} 104 & & 99 \\ \frac{8}{9} & \times & \frac{11}{13} \end{array}$$

So $\frac{8}{9} > \frac{11}{13}$.

3. Did the numbers from the cross multiply algorithm show up when you compared the fractions algebraically? If so, where?
4. For the problems where the numbers from the cross multiply algorithm did not show up, redo the problem so they do appear?

$$\frac{3}{5} = \frac{3 \cdot 10}{5 \cdot 10} = \frac{30}{50}$$

$$\frac{7}{10} = \frac{7 \cdot 5}{10 \cdot 5} = \frac{35}{50}$$

$$\text{So } \frac{3}{5} < \frac{7}{10}.$$

$$\frac{5}{6} = \frac{5 \cdot 4}{6 \cdot 4} = \frac{20}{24}$$

$$\frac{3}{4} = \frac{3 \cdot 6}{4 \cdot 6} = \frac{18}{24}$$

$$\text{So } \frac{5}{6} > \frac{3}{4}.$$

5. Explain why the cross multiply algorithm works.

When comparing two fractions you need to get a common denominator. You can always use the product of the two denominators as your common denominator. The cross multiply algorithm is simply finding the numerators for your fractions if you use this common denominator.

6. Find a number between $\frac{2}{5}$ and $\frac{3}{5}$.

$$\frac{2}{5} = \frac{2 \cdot 2}{5 \cdot 2} = \frac{4}{10}$$

$$\frac{3}{5} = \frac{3 \cdot 2}{5 \cdot 2} = \frac{6}{10}$$

Therefore $\frac{5}{10}$ is between $\frac{2}{5}$ and $\frac{3}{5}$.

7. Find two numbers between $\frac{4}{9}$ and $\frac{5}{9}$.

$$\frac{4}{9} = \frac{4 \cdot 3}{9 \cdot 3} = \frac{12}{27}$$

$$\frac{5}{9} = \frac{5 \cdot 3}{9 \cdot 3} = \frac{15}{27}$$

Therefore $\frac{13}{27}$ and $\frac{14}{27}$ are between $\frac{4}{9}$ and $\frac{5}{9}$.

8. Find four numbers between $\frac{1}{3}$ and $\frac{2}{3}$.

$$\frac{1}{3} = \frac{1 \cdot 5}{3 \cdot 5} = \frac{5}{15}$$

$$\frac{2}{3} = \frac{2 \cdot 5}{3 \cdot 5} = \frac{10}{15}$$

Therefore $\frac{6}{15}$, $\frac{7}{15}$, $\frac{8}{15}$ and $\frac{9}{15}$ are between $\frac{1}{3}$ and $\frac{2}{3}$.

9. In the previous problems, were you able to get your answer using the Fundamental Law only once? If not, redo the problems using Fundamental Law only once in each problem.