Fractions Review:

This is a summary of how you convert fractions, add fractions, subtract fractions, multiply fractions, and divide fractions. These are the acceptable methods and procedures for Math 100.

To reduce fractions:

$$\frac{12}{24}$$

1) We first factor the numerator and the denominator:

$$\frac{2 * 2 * 3}{2 * 2 * 2 * 3}$$

2) We then re-write this as four fractions with as many like numerators and denominators as we can:

$$\frac{2}{2} * \frac{2}{2} * \frac{3}{3} * \frac{1}{2}$$

3) Note: the numerator had three factors, and the denominator had four. We added a factor of one to the numerator so we could have four fractions. Why were we able to do this?

4) We can now do some dividing:

$\frac{2}{2} = 1$ and $\frac{3}{3} = 1$ so we can rewrite what we have in step 2 as $1 * 1 * 1 * \frac{1}{2}$.

5) Now we simplify by doing the multiplications, leaving us with:

$$\frac{1}{2}$$

To multiply two fractions:

$$\frac{3}{8} * \frac{7}{3}$$

1) First, we re-write it:

$$\frac{3 * 7}{8 * 3}$$

2) Then we multiply the numerator and the denominator:

$$\frac{21}{24}$$

3) Then we see if the fraction can be reduced. This one cannot, so we move on.

To multiply more than two fractions:

$$\frac{3}{8} * \frac{4}{3} * \frac{6}{5}$$

1) We proceed as we did with two fractions:

$$\frac{3 * 4 * 6}{8 * 3 * 5}$$

2) And then we multiply:

$$\frac{72}{120}$$

3) Now we reduce, first we factor the numerator and denominator:

$$\frac{2 * 2 * 2 * 3 * 3}{2 * 2 * 2 * 3 * 5}$$

4) Then we re-write:

$$\frac{2}{2} * \frac{2}{2} * \frac{2}{2} * \frac{3}{3} * \frac{3}{5}$$

5) Then we divide:

$$1 * 1 * 1 * 1 * \frac{3}{5}$$

6) Last, we simplify to give us:

$$\frac{3}{5}$$

To divide fractions:

$$\frac{4}{5} \div \frac{3}{8}$$

1) We first rewrite the problem (what lets us rewrite them this way?):

$$\frac{4/5}{3/8}$$

2) And then we want to get rid of the fraction in the bottom, to do this, we multiply the top and the bottom by the same number (why do we do this?, what made us pick 8/3?):

$$\frac{4/5}{3/8} * \frac{8/3}{8/3}$$

3) Now we can rewrite this as two multiplications:

$$\frac{4/5 * 8/3}{3/8 * 8/3}$$

4) And we can rewrite this again:

$$\frac{\frac{4 * 8}{5 * 3}}{\frac{3 * 8}{5 * 3}}$$

5) This looks really complicated, but we can reduce the fraction in the denominator:

$$\frac{\frac{4 * 8}{5 * 3}}{1}$$

6) So, we can rewrite again to give us:

$$\frac{4 * 8}{5 * 3}$$

7) And we know what to do with this:

$$\frac{32}{15}$$

8) How could you do this more quickly?

To add fractions:

$$\frac{3}{5} + \frac{2}{9}$$

1) We see that we cannot add these fractions at the moment because they have different denominators. What do the denominators stand for?

2) So, we need to find a way to make the denominators the same. To do this, we need to get a common denominator.

3) To get a common denominator, we first have to multiply each fraction by another fraction that equals one (why is this?):

$$\frac{3}{5}*\frac{9}{9}+\frac{2}{9}*\frac{5}{5}$$

4) We do our multiplication by first rewriting:

$$\frac{3*9}{5*9}+\frac{2*5}{9*5}$$

5) We continue multiplying (do we get the same denominator?):

$$\frac{27}{45}+\frac{10}{45}$$

6) Now we can add the numerators and we leave the denominator alone (why do we leave the denominator alone?):

$$\frac{27+10}{45}$$

7) And we add to get:

$$\frac{37}{45}$$

8) Our last step is to ask ourselves if this can be reduced. In this case, it cannot be reduced.

To subtract fractions:

$$\frac{3}{5}-\frac{2}{9}$$

1) We rewrite this as the addition of a negative sign and see how things go:
$$\frac{3}{5}+\left(-\frac{2}{9}\right)$$

2) We see that we cannot add these fractions at the moment because they have different denominators. What do the denominators stand for?

3) So, we need to find a way to make the denominators the same. To do this, we need to get a common denominator.

4) To get a common denominator, we first have to multiply each fraction by another fraction that equals one (why is this?):

$$\frac{3}{5}*\frac{9}{9}+\left(-\frac{2}{9}*\frac{5}{5}\right)$$

5) We do our multiplication by first rewriting:

$$\frac{3*9}{5*9}+\left(-\frac{2*5}{9*5}\right)$$

6) We continue multiplying (do we get the same denominator?):

$$\frac{27}{45}+\left(-\frac{10}{45}\right)$$

7) Now we can add like we did before. The only thing we need to do is put the negative somewhere. Since we want the denominators to be the same, we attach the negative sign to the numerator of the second fraction and we leave the denominator alone (why do we leave the denominator alone?):

$$\frac{27+(-10)}{45}$$

8) And we can rewrite this to get:

$$\frac{27-10}{45}$$

9) We subtract to get:

$$\frac{17}{45}$$

10) Our last step is to ask ourselves if this can be reduced. In this case, it cannot be reduced.

To convert between mixed numbers and improper fractions:

$$4\frac{7}{9}$$

1) We first realize that we have four wholes and seven-ninths of a whole. Each whole has nine pieces, so we can re-write the four as:

$$\frac{9}{9}+\frac{9}{9}+\frac{9}{9}+\frac{9}{9}=4*\frac{9}{9}=\frac{4}{1}*\frac{9}{9}=\frac{36}{9}$$

2) Now we add this to the seven-ninths that we had:

$$\frac{36}{9}+\frac{7}{9}$$

3) Our last step is to add:

$$\frac{36+7}{9}=\frac{43}{9}$$

To convert between improper fractions and mixed numbers:

$$\frac{43}{9}$$

1) We first remember that the fraction bar is a shorthand way of writing division. So, we can rewrite the problem:

$$43 \div 9$$

2) We then do long division and get:

$$43 \div 9 = 4 \; with \; a \; remainder \; of \; 7$$

3) We take the answer of four and we know it is four wholes, so that is the integer we put out in front. We see that we have seven left over, and our whole is nine. So we can write the mixed number as:

$$4\frac{7}{9}$$

4) This is our answer.