

Directions for Rational Expressions

What to do

1. Reduce

$$\frac{X^2 + 2X}{X^2 - 3X}$$

$$\frac{\cancel{X}(X + 2)}{\cancel{X}(X - 3)} = \frac{X + 2}{X - 3}$$

Factor and then divide numerator and denominator by like factors.

2. Multiply

$$\frac{X + 3}{X^2 - 2X - 15} \cdot \frac{X - 2}{1}$$

$$\frac{\cancel{(X + 3)}(X - 2)}{(X - 5)\cancel{(X + 3)}} = \frac{X - 2}{X - 5}$$

Factor and then divide numerator and denominator by like factors.

3. Divide

$$\frac{2}{X + 3} \div \frac{8}{27X + 81}$$

$$\frac{\cancel{2}}{\cancel{X + 3}} \cdot \frac{27\cancel{(X + 3)}}{8 \cdot 4} = \frac{27}{4}$$

Multiply by the reciprocal of the divisor and reduce.

4. Add or subtract

$$\frac{2}{X^2 - 7X + 12} - \frac{5}{X^2 - 9}$$

$$\frac{2}{(X - 4)(X - 3)} - \frac{5}{(X - 3)(X + 3)} =$$

$$\frac{2(X + 3)}{(X - 4)(X - 3)(X + 3)} - \frac{5(X - 4)}{(X - 4)(X - 3)(X + 3)} =$$

$$\frac{2X + 6 - 5X + 20}{(X - 4)(X - 3)(X + 3)} = \frac{-3X + 26}{(X - 4)(X - 3)(X + 3)}$$

Factor the denominators to find the LCD. Multiply the numerator and denominator of each fraction by the same factors, so that all fractions have the same denominator. Add (or subtract) the numerators and **keep** the denominator.

$$\text{LCD} = (X - 4)(X - 3)(X + 3)$$

5. Solve

$$\frac{1}{6} = \frac{10}{X} - \frac{1}{2}$$

Multiply both sides of the equation by the LCD. Reduce each fraction (to clear the denominators) and solve.

$$(\cancel{6}X)\frac{1}{\cancel{6}} = (6\cancel{X})\frac{10}{\cancel{X}} - (\cancel{3}X)\frac{1}{\cancel{2}}$$

$$X = 60 - 3X$$

$$4X = 60$$

$$X = 15$$

$$\text{LCD} = 6X$$

