SM3-A HANDOUT 4-1 Add and Subtract Rational Expressions

What are "like terms" ?

Adding Fractions
$$+\frac{4}{3}$$

We can add "like fractions"

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

Combine the numerator over a <u>common</u> denominator.

$$=\frac{2+1+4}{3} = \frac{7}{3}$$

Identity Property of Multiplication

The numeral <u>"one"</u> multiplied by any number does not change the "value" of the number (the product will have an "equivalent" value).

Used for:

Obtaining Common Denominators:

$$\frac{2}{3} + \frac{3}{5} = \frac{3}{5} \left(\frac{3}{3} \right) + \frac{2}{3} \left(\frac{5}{5} \right) = \frac{10}{15} + \frac{9}{15}$$

Rationalizing Denominators:

$$\frac{2}{\sqrt{3}} * \left(\frac{\sqrt{3}}{\sqrt{3}} \right) = \frac{2\sqrt{3}}{3}$$

Least Common Multiple: The smallest number that two other numbers divide evenly.

Used for:

<u>Obtaining Least Common Denominators</u>: $\frac{1}{30} + \frac{1}{42} = \underbrace{\frac{1}{6*5}}_{6*5} + \underbrace{\frac{1}{6*7}}_{6*7} = \underbrace{\frac{1}{6*5}}_{6*5} + \underbrace{\frac{7}{7}}_{6*7} + \underbrace{\frac{1}{6*7}}_{5} + \underbrace{\frac{5}{5}}_{5}$

Both denominators have a common factor of 6.

Left denominator has an uncommon factor of 5 Multiply $\frac{1}{42}$ by "one" in the form of $\frac{5}{5}$ right denominator has an uncommon factor of 7 Multiply $\frac{1}{30}$ by "one" in the form of $\frac{7}{7}$

Find the LCD

$$\frac{2}{15} + \frac{3}{20} \qquad \qquad \frac{1}{60} + \frac{1}{48}$$

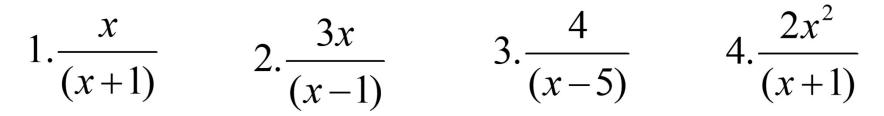
rational numbers

rational expressions

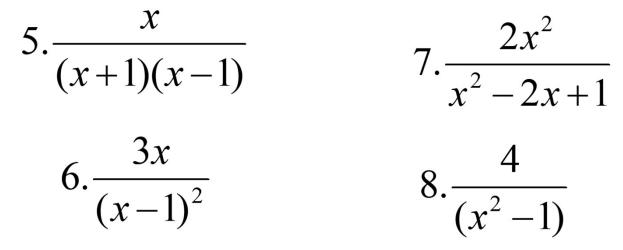
Excluded Value: the value for 'x' that results in division by zero

What type of <u>rational expressions</u> can you combine together using addition or subtraction?

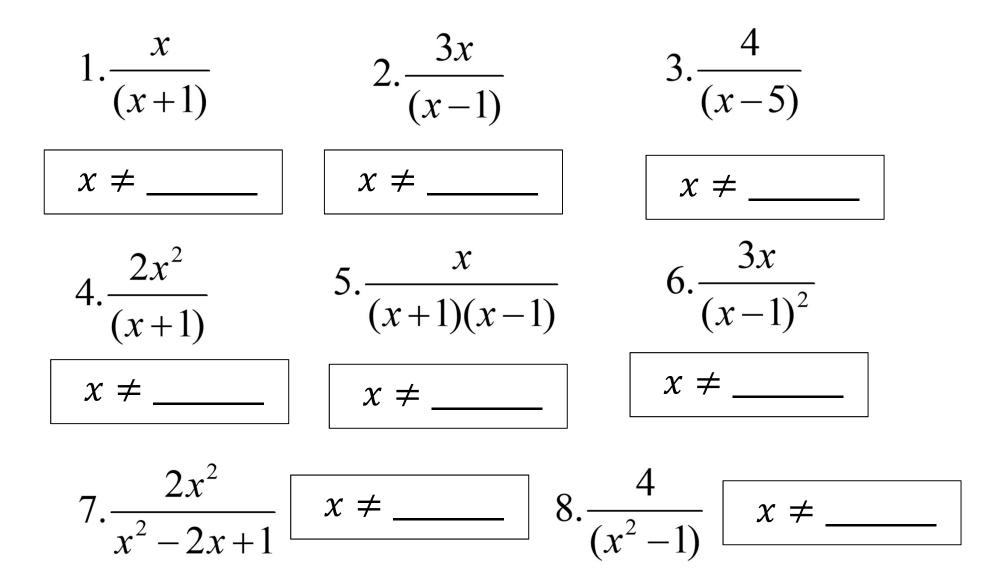
Which of these expressions are "like expressions"?



Which of these expressions are "like expressions"?



What is the excluded value for each expression?



Simplifying Fractions

You must FACTOR the fractions.

32	4*8	$x^2 - 4$ _	(x-2)(x+2)
44	4*11	$\frac{1}{x^2 - 3x + 2}$	(x-2)(x-1)

Break them apart into the product of fractions.

$$=\frac{4}{4}*\frac{8}{11} = \frac{(x-2)}{(x-2)}*\frac{(x+2)}{(x-1)}$$

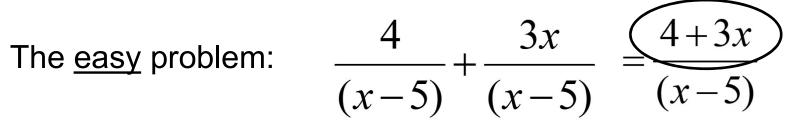
Notice the fractions that equal '1'

$$=1*\frac{8}{11} = \frac{8}{11} = 1*\frac{(x+2)}{(x-1)} = \frac{(x+2)}{(x-1)}$$

Adding/Subtraction Rational Expressions

The easy problem:
$$\frac{2}{7} + \frac{3}{7} = \frac{2+3}{7} = \frac{5}{7}$$

Combine the numerator over a <u>common</u> denominator.



Combine the numerator over a common denominator.

Can you combine 4 and 3x ?

Why not?

Your turn: add/subtract

$$\frac{x+2}{2x^2} + \frac{x-4}{2x^2}$$

What property are we using?

Can you do it this way?

$$\frac{x+2}{2x^2} + \frac{x-4}{2x^2} = \frac{x+2}{2^*x} + \frac{x-(2^*2)}{2^*x} = \frac{1}{x} + \frac{-2}{x}$$

Why not?

Your turn: add/subtract

$$\frac{x+2}{2x^2} + \frac{x-4}{2x^2}$$

I <u>will not</u> allow you to simplify using the Inverse Property of Multiplication until you have factored it into two fractions.

Only then will you be able to see how the Inverse Property of Multiplication changes the rational expression into <u>multiplication</u> by one.

Your turn: add/subtract

$$\frac{(2x-7)}{x^2+2} - \frac{(x-4)}{x^2+2}$$