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Date: _____

Math 10/11 Honors Section 5.1 p2 Multiplying, Dividing, Adding/Subtracting Rational Expressions

1. Unscramble the words to complete the following sentence:

When adding or subtracting two fractions, they must have a "moncmo tmaenodnior"

2. When multiplying or dividing rational expression, do you need to have a common denominator?

3. Given the three rational expressions, what is the common denominator?
- $\frac{1}{2x}$
- ,
- $\frac{1}{x+2}$
- ,
- $\frac{1}{x-2}$

4. Multiply or Divide each of the following rational :

a) $\frac{8x}{9} \times \frac{27y}{24x^3}$	b) $\frac{14a^2}{2b} \times \frac{8b^3}{21a}$	c) $\frac{14x^2y}{6xy} \times \frac{(4xy)^2}{8xy}$
d) $\frac{-6x}{14} \div \frac{12x^2}{35x}$	e) $\frac{-15xy}{9y^3} \div \frac{9x^2}{-16xy}$	f) $\frac{2x+1}{15y^2} \div \frac{12xy}{27y^3} \div \frac{8x+4}{9xy}$
g) $\frac{8x-4}{x-3} \times \frac{2x+6}{3x-6}$	h) $\frac{5x^2-10}{3x-y} \times \frac{27x-9y}{4x^2-8}$	i) $\frac{3x+6}{3x-4} \times \frac{6x^2-8x}{4x+8}$

5. Factor and simplify. Then state all the NPV's:

a) $\frac{(2x)^2}{5y} \times \frac{10x}{8y} \div \frac{15x}{(4y)^2}$ NPV's:	b) $\frac{3(3x-4)}{8} \times \frac{6x}{12(3x-4)}$ NPV's:	c) $\frac{2x-3}{x+2} \div \frac{3x+4}{x^2-9}$ NPV's:
d) $\frac{15x}{2x+6} \div \frac{10x}{3x+9}$ NPV's:	e) $\frac{(x+1)(x-1)}{(2x+1)} \times \frac{8x+4}{x^2+2x+1}$ NPV's:	f) $\frac{8x^3-2x}{5x(x^4-13x^2+36)}$ NPV's:
g) $\frac{x+14}{x^2-16} \div \frac{x^2-5x-14}{x^2-2x-8}$ NPV's:	h) $\frac{(x+1)^2}{x^2-1} \times \frac{x^2-4}{x^2+3x+2}$ NPV's:	i) $\frac{x^2+5x+6}{x^2-5x+6} \div \frac{x^2-x-6}{x^2+x-6}$ NPV's:

j) $\frac{x^2 - 16y^2}{6x^2y} \div \frac{x^2 + xy - 20y^2}{4x^3y^2}$	k) $\frac{x^2 + 4x - 5}{3x - 6} \times \frac{x - 2}{1 - x}$	l) $\frac{m^2 - 9mn + 14n^2}{m^2 + 7mn + 12n^2} \div \frac{3m^2 - 21mn}{4m^3 + 16m^2n}$
NPV's:	NPV's:	NPV's:
m) $\frac{3x^2 + 3x - 6}{x^2y - 7xy} \times \frac{x^2y - 13xy + 42y}{6x^2 + 12x}$	n) $\frac{x + 2y}{x - 3y} \times \frac{x^2 - 9y^2}{x^2 - 4y^2} \div \frac{x + 3y}{x - 2y}$	o) $\frac{(3a + 7b)^2}{2a - 5b} \times \frac{4a^2 - 25b^2}{9a^2 - 49b^2} \div \frac{2a + 5b}{3a - 7b}$
NPV's:	NPV's:	NPV's:

6. A student simplifies the following expressions shown below. Indicate all the mistakes shown:

$s1: \frac{x-5}{5-x}$ $s2 := \frac{x-\cancel{5}}{\cancel{5}-x}$ $s3 := \frac{\cancel{x}}{-\cancel{x}}$ $s4 := \frac{1}{-1}$ $s5 := -1$	$s1: \frac{a^2 + 6a + 8}{a^2 + 8}$ $s2 := \frac{a^2 + 6a + \cancel{8}}{a^2 + \cancel{8}}$ $s3 := \frac{a^2 + 6a}{a^2}$ $s4 := \frac{a(a+6)}{a^2}$ $s5 := \frac{a+6}{a}$	$s1: \frac{24a}{7b} \div \frac{13b}{21ab^3} \times \frac{3a}{b^2}$ $s2 := \frac{24a}{7b} \times \frac{21ab^3}{13b} \times \frac{b^2}{3a}$ $s3 := \frac{24a}{\cancel{7b}} \times \frac{\cancel{21ab^3}}{13b} \times \frac{b^2}{\cancel{3a}}$ $s4 := \frac{24ab^2}{13}$
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$s1: \frac{a^2 - 16}{a + 7} \div \frac{a^2 + 16}{a - 7}$ $s2 := \frac{a + 7}{a^2 - 16} \times \frac{a^2 + 16}{a - 7}$ $s3 := \frac{\cancel{a + 7}}{a^2 - 16} \times \frac{a^2 + 16}{\cancel{a - 7}}$ $s4 := \frac{1}{(a - 4)(\cancel{a + 4})} \times \frac{(\cancel{a + 4})(a + 4)}{-1}$ $s5 := -\frac{\cancel{a + 4}}{\cancel{a - 4}} = -1$	$s1: \frac{x^2 - 6}{x + 3} \div \frac{x^2 - 9}{x - 3}$ $s2 := \frac{(x + \sqrt{6})(x - \sqrt{6})}{x + 3} \times \frac{x - 3}{x^2 - 9}$ $s3 := \frac{(x + \sqrt{6})(x - \sqrt{6})}{\cancel{x + 3}} \times \frac{\cancel{x - 3}}{(\cancel{x - 3})(x + 3)}$ $s4 := (x + \sqrt{6})(x - \sqrt{6})$
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7. What are the NPV's of the following rational expression? $\frac{2x}{3x^2 + 9} \times \frac{3x^2}{25x^2 - 1} \div \frac{10x^2 - 31x + 15}{21x^2 + 22x - 8}$

8. Simplify each of the following rational expressions and indicate the NPV

a) $\frac{\frac{2}{3x} + 4}{5 - \frac{2}{x}}$	b) $\frac{\frac{1}{3} + 6x}{\frac{1}{9} - 3x}$	c) $\frac{\frac{1}{4x} + 7x}{\frac{1}{6} - \frac{3}{2x}}$
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9. Add or Subtract each of the following rational expressions:

a) $\frac{x}{2} - \frac{8}{3x}$	b) $\frac{5}{x} - \frac{2}{x + 1}$	c) $\frac{3}{x + 1} + \frac{2}{x - 1}$
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d) $\frac{2}{x+5} + \frac{3}{x^2+5x}$	e) $\frac{5x}{2} + \frac{3}{x} - \frac{4x}{3}$	f) $\frac{4}{x+8} - \frac{3}{x} + \frac{2}{3}$
g) $\frac{5x}{3x+9} - \frac{4x}{2x+6}$	h) $\frac{9}{x+2} + \frac{7}{x^2-4}$	i) $\frac{5}{x-1} + \frac{4x}{1-x} + \frac{x+3}{x-1}$

10. Factor and simplify. Then state all the NPV's:

a) $\frac{4x^2-20x}{x^2+2x-35} + \frac{3x-6}{x^2-12x+20}$	b) $\frac{2x-6}{x^2-5x+6} - \frac{3x-12}{x^2-x-12}$	c) $\frac{2x}{3x^2-11x+6} - \frac{3x-12}{3x^2-14x+8}$
NPV's:	NPV's:	NPV's:

d) $\frac{2x}{3-x} - \frac{3x}{x+3} + \frac{2}{x^2-9}$

$$\text{e) } \frac{w-6}{w^2-12w+36} + \frac{7w+56}{w^2+11w+24}$$

$$\text{f) } \frac{-4c-4}{c^2+2c-15} + \frac{6c+42}{c^2+12c+35}$$

NPV's:

NPV's:

NPV's:

g) $\frac{a}{a+b} - \frac{b}{b-a} + \frac{2ab}{a^2 - b^2}$

$$\text{h) } \frac{2x}{3-x} - \frac{3x}{x+3} + \frac{2}{x^2-9}$$

NPV's:

NPV's:

11. Given each of the following statements, indicate whether if they are true or false: Explain:

i) $\frac{x}{y} - \frac{y}{x} = \frac{x-y}{xy}$ TRUE / FALSE

ii) $\frac{x-y}{y-x} = -1$ TRUE / FALSE

iii) $\frac{wx + wy}{w + v} = \frac{x + y}{v}$ TRUE / FALSE

iv) $\frac{1}{x-y} + \frac{1}{y-x} = 0$ TRUE / FALSE

12. Simplify and find all the NPV's

$$\text{a) } \frac{x+1}{x+6} + \frac{x^2+4x+3}{x^2+x-6} \times \frac{x^2-2x}{x^2-1}$$

$$\text{b) } \frac{x+8}{x-3} - \frac{6x^2+x-2}{24x^2+7x-6} \div \frac{2x^2-7x+3}{8x^2-3x}$$

NPV's:

NPV's:

13. Let " a ", " b ", and " c " be given nonzero real numbers. Find " x ", " y " and " z " if the following equation is true:

$$\frac{ay + bx}{xy} = \frac{bz + cy}{yz} = \frac{cx + az}{zx} = \frac{4a^2 + 4b^2 + 4c^2}{x^2 + y^2 + z^2}$$

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14. If $\frac{x^2 - bx}{ax - c} = \frac{m - 1}{m + 1}$ has solutions for "x" such that each solution is the negative of the other, then find "m" in terms of "a" and "b". [AHSME]

15. Prove that if $\frac{a+b}{a} = \frac{b}{a+b}$ then "a" and "b" can't both be real numbers