

Name: \_\_\_\_\_

**KEY**

Date: \_\_\_\_\_

**HW Pre-Calculus 11 Section 6.2 Multiplying and Dividing Rational Expressions**

1. Multiply or Divide each of the following rational :

a) $\frac{8x}{9} \times \frac{27y}{24x^3}$ $= \frac{3}{3x^2} = \frac{1}{x^2}$	b) $\frac{14a^2}{2b} \times \frac{8b^3}{21a}$ $= \frac{(2a)(4b^2)}{3}$ $= \frac{8ab^2}{3}$	c) $\frac{14x^2y}{6xy} \times \frac{(4xy)^2}{8xy}$ $= \frac{14x^2y}{3} \times \frac{16x^2y^2}{8xy} = \frac{14x^2y}{3}$
d) $\frac{-6x}{14} \div \frac{12x^2}{35x}$ $= \frac{-5}{4}$	e) $\frac{-15xy}{9y^3} \div \frac{9x^2}{-16xy}$ $= \frac{80}{27y}$	f) $\frac{2x+1}{15y^2} \div \frac{12xy}{27y^3} \div \frac{8x+4}{9xy}$ $= \frac{27y}{80}$
g) $\frac{8x-4}{x-3} \times \frac{2x+6}{3x-6}$ $= \frac{8(2x-1)(x+3)}{3(x-3)(x-2)}$	h) $\frac{5x^2-10}{3x-y} \times \frac{27x-9y}{4x^2-8}$ $= \frac{5}{1} \times \frac{9}{4} = \frac{45}{4}$	i) $\frac{3x+6}{3x-4} \times \frac{6x^2-8x}{4x+8}$ $= \frac{3}{1} \times \frac{x}{2} = \frac{3x}{2}$

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

a) $\frac{(2x)^2}{5y} \times \frac{10x}{8y} \div \frac{15x}{(4y)^2}$ $= \frac{4x^2}{5y} \times \frac{10x}{8y} \times \frac{16y^2}{15x}$ $= \frac{4x^2}{5} \times 2 \times \frac{2}{3} = \frac{16x^2}{15}$ NPV's: $y \neq 0$ $x \neq 0$	b) $\frac{3(3x-4)}{8} \times \frac{6x}{12(3x-4)}$ $= \frac{3}{8} \times \frac{x}{2} = \frac{3x}{16}$ NPV's: $x \neq \frac{4}{3}$	c) $\frac{2x-3}{x+2} \div \frac{3x+4}{x^2-9}$ $= \frac{2x-3}{x+2} \times \frac{(x+3)(x-3)}{3x+4}$ $= \frac{2x-3(x+3)(x-3)}{(x+2)(3x+4)}$ NPV's: $x \neq -2, 3, -\frac{4}{3}$
d) $\frac{15x}{2x+6} \div \frac{10x}{3x+9}$ $= \frac{3}{2} \times \frac{3}{2} = \frac{9}{4}$ NPV's: $x \neq -3, 0$	e) $\frac{(x+1)(x-1)}{(2x+1)} \times \frac{8x+4}{x^2+2x+1}$ $= \frac{(x-1)}{1} \times \frac{4}{(x+1)}$ $= \frac{4(x-1)}{x+1}$ NPV's: $x \neq -1, -\frac{1}{2}$	f) $\frac{8x^3-2x}{5x(x^4-13x^2+36)}$ $= \frac{2x(4x^2-1)}{5x(x^2-9)(x^2-4)}$ $= \frac{2x(2x-1)(2x+1)}{5x(x-3)(x+3)(x-2)(x+2)}$ NPV's: $x \neq 0, 2, -2, 3, -3$

<p>g) <math>\frac{x+14}{x^2-16} \div \frac{x^2-5x-14}{x^2-2x-8}</math></p> $\frac{x+14}{(x-4)(x+4)} \times \frac{(x-4)(x+2)}{(x-7)(x+2)}$ $= \frac{x+14}{(x+4)(x-7)}$ <p>NPV's: <math>x \neq 4, -4, 7, -2</math></p>	<p>h) <math>\frac{(x+1)^2}{x^2-1} \times \frac{x^2-4}{x^2+3x+2}</math></p> $\frac{(x+1)(x+1)}{(x-1)(x+1)} \times \frac{(x-2)(x+2)}{(x+2)(x+1)}$ $= \frac{x-2}{x-1}$ <p>NPV's: <math>x \neq -1, 1, -2</math></p>	<p>i) <math>\frac{x^2+5x+6}{x^2-5x+6} \div \frac{x^2-x-6}{x^2+x-6}</math></p> $\frac{(\sqrt{x+2})(x+3)}{(x-3)(x+2)} \times \frac{(x+3)(x-2)}{(x-3)(x-2)}$ $= \frac{(x+3)(x+3)}{(x-3)(x-3)}$ <p>NPV's: <math>x \neq 2, -2, -3, 3</math></p>
<p>j) <math>\frac{x^2-16y^2}{6x^2y} \div \frac{x^2+xy-20y^2}{4x^3y^2}</math></p> $\frac{(x-4y)(x+4y)}{3 \cancel{2x^2}y} \times \frac{2 \cancel{4x^2}y^2y}{(x+5y)(x+4y)}$ $= \frac{(x+4y)}{3} \times \frac{2xy}{(x+5y)}$ $= \frac{(x+4y)(2xy)}{3(x+5y)}$ <p>NPV's: <math>x \neq -5y, 4y, 0</math></p>	<p>k) <math>\frac{x^2+4x-5}{3x-6} \times \frac{x-2}{1-x}</math></p> $\frac{(x+5)(x-1)}{3(x-2)} \times \frac{x-2}{-(x-1)}$ $= \frac{(x+5)}{3} \times (-1)$ $= -\frac{(x+5)}{3}$ <p>NPV's: <math>x \neq 2, 1</math></p>	<p>l) <math>\frac{m^2-9mn+14n^2}{m^2+7mn+12n^2} \div \frac{3m^2-21mn}{4m^3+16m^2n}</math></p> $\frac{(m-2n)(m-7n)}{(m+3n)(m+4n)} \times \frac{4m^2(m+4n)}{3m(m-7n)}$ $= \frac{4m(m-2n)}{3(m+3n)}$ <p>NPV's: <math>m \neq -3n, -4n, 7n, 0</math></p>
<p>m) <math>\frac{3x^2+3x-6}{x^2y-7xy} \times \frac{x^2y-13xy+42y}{6x^2+12x}</math></p> $\frac{(x+6)(x-1)}{xy(x-7)} \times \frac{y(x-7)(x-6)}{6x(x+2)}$ $= \frac{(x-1)(x-6)}{6x^2}$ <p>NPV's: <math>x \neq 0, 7, -2</math></p>	<p>n) <math>\frac{x+2y}{x-3y} \times \frac{x^2-9y^2}{x^2-4y^2} \div \frac{x+3y}{x-2y}</math></p> $\frac{x+2y}{x-3y} \times \frac{(x-3y)(x+3y)}{(x-2y)(x+2y)} \times \frac{x-2y}{x+3y}$ $= 1$ <p>NPV's: <math>y \neq 2y, -2y, 3y</math></p>	<p>o) <math>\frac{(3a+7b)^2}{2a-5b} \times \frac{4a^2-25b^2}{9a^2-49b^2} \div \frac{2a+5b}{3a-7b}</math></p> $\frac{(3a+7b)(3a+7b)}{2a-5b} \times \frac{(2a-5b)(2a+5b)}{(3a+7b)(3a-7b)} \div \frac{3a-7b}{2a+5b}$ $= 3a+7b$ <p>NPV's: <math>a \neq \frac{7b}{3}, \frac{5b}{2}, \frac{-7b}{3}, \frac{-5b}{2}</math></p>

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

$s1: \frac{x-5}{5-x}$ $s2: \frac{x-5}{5-x}$ $s3: \frac{x}{-x}$ $s4: \frac{1}{-1}$ $s5: -1$ <p><i>Handwritten: CAN'T simplify like that!</i></p>	$s1: \frac{a^2+6a+8}{a^2+8}$ $s2: \frac{a^2+6a+8}{a^2+8}$ $s3: \frac{a^2+6a}{a^2}$ $s4: \frac{a(a+6)}{a^2}$ $s5: \frac{a+6}{a}$ <p><i>Handwritten: CAN'T simplify like that</i></p>	$s1: \frac{24a}{7b} \div \frac{13b}{21ab^3} \times \frac{3a}{b^2}$ $s2: \frac{24a}{7b} \times \frac{21ab^3}{13b} \times \frac{b^2}{3a}$ $s3: \frac{24a}{7b} \times \frac{21ab^3}{13b} \times \frac{b^2}{3a}$ $s4: \frac{24ab^2}{13}$ <p><i>Handwritten: one 'b' left</i></p>
$s1: \frac{a^2-16}{a+7} \div \frac{a^2+16}{a-7}$ $s2: \frac{a+7}{a^2-16} \times \frac{a^2+16}{a-7}$ $s3: \frac{a+7}{a^2-16} \times \frac{a^2+16}{a-7}$ $s4: \frac{1}{(a-4)(a+4)} \times \frac{(a+4)(a+4)}{-1}$ $s5: -\frac{a+4}{a-4} = -1$ <p><i>Handwritten: flip this fraction!</i></p>	$s1: \frac{x^2-6}{x+3} \div \frac{x^2-9}{x-3}$ $s2: \frac{(x+\sqrt{6})(x-\sqrt{6})}{x+3} \times \frac{x-3}{x^2-9}$ $s3: \frac{(x+\sqrt{6})(x-\sqrt{6})}{x+3} \times \frac{x-3}{(x-3)(x+3)}$ $s4: (x+\sqrt{6})(x-\sqrt{6})$ <p><i>Handwritten: CAN'T CANCEL THESE TWO!</i></p>	

4. What are the NPV's of the following rational expression?  $\frac{2x}{x^2+9} \times \frac{3x^2}{x^2+1}$

$$\frac{2x}{(x+3)(x-3)} \times \frac{3x^2}{x^2+1}$$

*Handwritten: CAN'T DO ANYTHING with THIS*

NPV:  $x \neq \pm 3$

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

<p>a) <math>\frac{\left(\frac{2}{3x} + 4\right)}{\left(5 - \frac{2}{x}\right)}</math></p> $\frac{2+12x}{15x-6}$ $= \frac{2(1+6x)}{3(5x-2)}$ <p>NPV: <math>x \neq \frac{2}{5}, 0</math></p>	<p>b) <math>\frac{\frac{1}{3} + 6x}{\frac{1}{9} - 3x}</math></p>	<p>c) <math>\frac{\frac{1}{6} + 7x}{\frac{4x}{6} - \frac{3}{2x}}</math></p>
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6. Simplify and find all the NPV's:

$$y + \frac{2y}{y+2} = \frac{y(y+2) + 2y}{(y+2)(y-2)}$$

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

$$= \frac{y^2}{(y+2)(y-2)}$$

$$= \frac{y^3-4y+2y^2-4y}{y^2-4+4} = \frac{y^3+2y^2-8y}{y^2} = \frac{y^2+2y-8}{y}$$

*Handwritten: (y+4)(y-2)*