

Rational Variable Expressions Review

- 1.** Simplify the following (*state all restrictions on the variables!*):

a) $\frac{-9rst}{6rs}$	b) $-\frac{21x^2y^4z}{15x^4y^2z^3}$	c) $\frac{(x+2)(x+5)}{(x+5)(x-2)}$	d) $\frac{(m-3)^2}{(m+3)(m-3)}$
e) $\frac{(a-2b)^3(2a+b)}{(2a+b)^2(a-2b)}$	f) $\frac{2t-4}{t^2-3t+2}$	g) $\frac{x^2+7x}{x^2+14x+49}$	h) $\frac{x^2-3x-28}{x^2-4x-21}$
i) $\frac{6x+6y}{3x-3y}$	j) $\frac{x^2-5x}{x^2-x-20}$	k) $\frac{2m+4}{m^2-4}$	l) $\frac{x^2-9}{3-x}$
m) $\frac{6x^2+11x+3}{6x^2-7x-3}$	n) $\frac{x^2-y^2}{y-x}$	o) $\frac{6x^2+9x-6}{9x^2+33x+30}$	p) $\frac{-xm-ym}{x^2+2xy+y^2}$

- 2.** Simplify the following (*state all restrictions on the variables!*):

a) $\frac{14x^2}{21y^2} \times \frac{15y^4}{7x^3}$	b) $\frac{28x^3y}{5xy} \div \frac{7x^2y^6}{10xy^4}$	c) $\frac{56x^4y^6z}{7x^3yz} \div 2xyz$
d) $\frac{x+3}{5x} \times \frac{10x}{x+3}$	e) $\frac{m-2}{x} \times \frac{9x^2}{3m-6}$	f) $\frac{x^2-9}{3x+9} \times \frac{2}{3-x}$
g) $\frac{x^2+3x+2}{4-x^2} \times \frac{10x}{5x+5}$	h) $\frac{x^2+7x+12}{x^2+3x+2} \times \frac{x^2+5x+6}{x^2+6x+9}$	i) $\frac{2x^2+7x-4}{6x^2+x-2} \div \frac{5x^2+19x-4}{15x^2+7x-2}$
j) $\frac{x^2+2x-15}{x^2-5x+6} \times \frac{x^2+2x-8}{x^2-6x+9} \times \frac{x^2-7x+12}{x^2-x-30}$	k) $\frac{x+7}{x^2-5x-36} \times \frac{x^2-15x+54}{x^2-36} \div \frac{x^2-2x-63}{x+4}$	
l) $\frac{x^2-4}{\frac{4x^2}{x+2}}$	m) $\frac{\frac{m^2+2m+1}{m+1}}{m}$	

- 3.** Simplify the following (*state all restrictions on the variables!*):

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

- 4.** Simplify the following (*state all restrictions on the variables!*):

a) $\frac{4}{x-1} - (x-2)$	b) $\frac{4}{x-1} - x - 2$	c) $x + \frac{5}{x-1} + 3$
d) $\frac{2}{x+5} + \frac{3}{x+2}$	e) $\frac{4}{x-3} - \frac{2}{x+1}$	f) $\frac{x-2}{x+2} + \frac{x+1}{x-4}$
g) $7 + \frac{3x}{x-4} - \frac{x}{x+2}$	h) $\frac{5}{3(y-7)} - \frac{2}{3(y+1)}$	i) $\frac{3}{5x-10} + \frac{7}{2x-4}$
j) $\frac{x-1}{x(x+5)} + \frac{2x-3}{x(x-1)}$	k) $\frac{x+3}{x^2+11x+24} - \frac{2x+10}{x^2+11x+30}$	l) $\frac{4x^2-20x}{x^2+2x-35} + \frac{3x-6}{x^2-12x+20}$
m) $\frac{x}{x+1} + \frac{x+1}{2} - \frac{x}{x^2-1} + \frac{2}{1-x}$	n) $\frac{1-\frac{2}{x}+\frac{3}{x^2}}{2-\frac{1}{x}-\frac{1}{x^2}}$	o) $\frac{\frac{x-1}{x+1} + \frac{x+1}{x-1}}{\frac{x-1}{x+1} - \frac{x+1}{x-1}}$

ANSWERS

- 1a)** $-\frac{3t}{2}$ $r, s \neq 0$ **b)** $-\frac{7y^2}{5x^2z^2}$ $x, y, z \neq 0$ **c)** $\frac{x+2}{x-2}$ $x \neq -5, 2$
d) $\frac{m-3}{m+3}$ $m \neq \pm 3$ **e)** $\frac{(a-2b)^2}{2a+b}$ $a \neq -\frac{b}{2}, 2b$ **f)** $\frac{2}{t-1}$ $t \neq 1, 2$
g) $\frac{x}{x+7}$ $x \neq -7$ **h)** $\frac{x+4}{x+3}$ $x \neq -3, 7$ **i)** $\frac{2(x+y)}{x-y}$ $x \neq y$
j) $\frac{x}{x+4}$ $x \neq -4, 5$ **k)** $\frac{2}{m-2}$ $m \neq \pm 2$ **l)** $-(x+3)$ $x \neq 3$
m) $\frac{2x+3}{2x-3}$ $x \neq -\frac{1}{3}, \frac{3}{2}$ **n)** $-(x+y)$ $x \neq y$ **o)** $\frac{2x-1}{3x+5}$ $x \neq -2, -\frac{5}{3}$
p) $-\frac{m}{x+y}$ $x \neq -y$

- 2a)** $\frac{10y^2}{7x}$ $x, y \neq 0$ **b)** $\frac{8x}{y^2}$ $x, y \neq 0$ **c)** $\frac{4y^4}{z}$ $x, y, z \neq 0$
d) 2 $x \neq -3, 0$ **e)** $3x$ $x \neq 0, m \neq 2$ **f)** $-\frac{2}{3}$ $x \neq \pm 3$
g) $\frac{2x}{2-x}$ $x \neq \pm 2, -1$ **h)** $\frac{x+4}{x+1}$ $x \neq -3, -2, -1$ **i)** 1 $x \neq -4, -\frac{2}{3}, \frac{1}{5}, \frac{1}{2}$
j) $\frac{(x+4)(x-4)}{(x-3)(x-6)}$ $x \neq -5, 2, 3, 6$ **k)** $\frac{1}{(x+6)(x-9)}$ $x \neq -7, \pm 6, -4, 9$ **l)** $\frac{2(x-2)}{x}$ $x \neq -2, 0$
m) $m(m+1)$ $m \neq -1, 0$

- 3a)** $\frac{8}{x}$ **b)** $\frac{-2x+1}{x+1}$ **c)** $2x$
d) $\frac{13}{12a}$ **e)** $\frac{13}{24m}$ **f)** $\frac{k-43}{20}$
g) $\frac{-14a+25}{24}$ **h)** $\frac{8x-11}{6x}$ **i)** $\frac{9a-29}{18a}$
j) $\frac{2x^2-3x+8}{x^3}$ **k)** $\frac{2n^2+3mn-2m^2}{m^2n^2}$ **l)** $\frac{4x-1+x^2}{x}$

- 4a)** $\frac{-x^2+3x+2}{x-1}$ **b)** $\frac{-x^2-x+6}{x-1}$ **c)** $\frac{x^2+2x+2}{x-1}$
d) $\frac{5x+19}{(x+5)(x+2)}$ **e)** $\frac{2x+10}{(x-3)(x+1)}$ **f)** $\frac{2x^2-3x+10}{(x+2)(x-4)}$
g) $\frac{9x^2-4x-56}{(x-4)(x+2)}$ **h)** $\frac{3y+19}{3(y-7)(y+1)}$ **i)** $\frac{41}{10(x-2)}$
j) $\frac{3x^2+5x-14}{x(x+5)(x-1)}$ **k)** $\frac{-x-10}{(x+8)(x+6)}$ **l)** $\frac{4x^2-37x+21}{(x+7)(x-10)}$
m) $\frac{x^3+3x^2-9x-5}{2(x+1)(x-1)}$ **n)** $\frac{x^2-2x+3}{(2x+1)(x-1)}$ **o)** $-\frac{x^2+1}{2x}$