

## Chapter 2a – Rational Expressions – REVIEW

MCR3U

Jensen

### Section 1: Negative and Rational Exponents

1) Evaluate. Express as a fraction in lowest terms.

a)  $10^{-1}$

b)  $4^{-2}$

c)  $3^{-2} + 9^{-1}$

d)  $5^{-3} + 5^0$

e)  $\left(\frac{1}{5}\right)^{-1}$

f)  $\left(\frac{3}{4}\right)^{-3}$

2) Simplify. Express your answers using only positive exponents.

a)  $(x^{-2})(x^{-1})(x^0)$

b)  $(3km^2)(2k^{-2}m^{-2})$

c)  $w^{-3} \div w^{-2}$

d)  $\frac{u^{-2}v^3}{u^{-3}v^{-2}}$

e)  $(z^{-3})^{-2}$

f)  $(2ab^{-1})^{-2}$

**3)** Simplify. Express your answers using only positive exponents.

**a)**  $(4a^{-2})(-2a^{-3})$

**b)**  $\frac{(2x^2y)^{-2}(3xy)^{-1}}{(6x^2y^2)^{-2}}$

**c)**  $\left(\frac{1}{4x^2}\right)^{-2}$

**d)**  $\left(\frac{6a^3}{4b^4}\right)^{-2}$

**4)** Evaluate.

**a)**  $\sqrt[3]{64}$

**b)**  $\sqrt[4]{625}$

**c)**  $\sqrt[5]{-3125}$

**d)**  $\left(\frac{1}{64}\right)^{\frac{1}{6}}$

**e)**  $27^{\frac{2}{3}}$

**f)**  $(-1000)^{\frac{4}{3}}$

**g)**  $-4^{-3}$

**h)**  $\left(\frac{3}{4}\right)^{-2}$

**i)**  $\left(-\frac{27}{125}\right)^{-\frac{2}{3}}$

5) Simplify. Express answers using only positive exponents.

a)  $n^{\frac{1}{2}} \times n^{\frac{1}{3}} \times n^{\frac{1}{4}}$

b)  $(27y^3)^{\frac{1}{3}} \times \left(\frac{1}{16y^4}\right)^{-\frac{3}{4}}$

c)  $(27x^6)^{\frac{2}{3}} \div (9x^4)^{\frac{1}{2}}$

d)  $\frac{x^{-\frac{2}{3}}}{x^{-\frac{4}{5}}}$

## Section 2: Rational Expressions

6) Simplify each expression and state all restrictions on  $x$ .

a)  $\frac{x+7}{x^2+10x+21}$

b)  $\frac{x^2-64}{x-8}$

c)  $\frac{x^2-9}{x^2-8x+15}$

7) Simplify each expression and state the restrictions.

a)  $\frac{3x^2}{5xy} \times \frac{20xy^3}{12xy}$

b)  $\frac{150a^3b^4}{20a^2b} \div \frac{6b}{8ab^2}$

$$\text{c) } \frac{1}{3x} + \frac{5}{2x^2}$$

$$\text{d) } \frac{4}{x-6} - \frac{3}{x-4}$$

**8)** Simplify each expression and state restrictions.

$$\text{a) } \frac{x^2+7x}{3x+21} \times \frac{x^2+3x+2}{x+2}$$

$$\text{b) } \frac{x^2+4x-60}{3x+30} \div \frac{x^2-8x+12}{6x-12}$$

$$\text{c) } \frac{3}{x^2+7x+10} - \frac{5x}{x^2-4}$$

$$\text{d) } \frac{-10x}{x^2+18x+32} + \frac{12x}{x^2+6x-160}$$

9) Simplify each expression and state any restrictions

a)  $\frac{x-8}{x+7} \times \frac{x+15}{x^2+12x-45}$

b)  $\frac{x^2+12x+20}{x+5} \div \frac{x^2+7x-30}{x+10}$

c)  $\frac{x+3}{x-7} - \frac{x+9}{x-2}$

d)  $\frac{x+8}{x+3} + \frac{x-6}{x^2+9x+18}$

e)  $\frac{5x+1}{2x-1} - \frac{3x-3}{1-2x}$

## Answers

1) a)  $\frac{1}{10}$  b)  $\frac{1}{16}$  c)  $\frac{2}{9}$  d)  $\frac{126}{125}$  e) 5 f)  $\frac{64}{27}$

2) a)  $\frac{1}{x^3}$  b)  $\frac{6}{k}$  c)  $\frac{1}{w}$  d)  $uv^5$  e)  $z^6$  f)  $\frac{b^2}{4a^2}$

3) a)  $-\frac{8}{a^5}$  b)  $\frac{3y}{x}$  c)  $16x^4$  d)  $\frac{4b^8}{9a^6}$

4) a) 4 b) 5 c) -5 d)  $\frac{1}{2}$  e) 9 f) 10 000 g)  $-\frac{1}{64}$  h)  $\frac{16}{9}$  i)  $\frac{25}{9}$

5) a)  $n^{\frac{13}{12}}$  b)  $24y^4$  c)  $3x^2$  d)  $x^{\frac{2}{15}}$

6) a)  $\frac{1}{x+3}$ ,  $x \neq -7, x \neq -3$  b)  $x+8$ ,  $x \neq 8$  c)  $\frac{x+3}{x-5}$ ,  $x \neq 3, 5$

7) a)  $xy$ ,  $x \neq 0, y \neq 0$  b)  $10a^2b^4$ ,  $a \neq 0, b \neq 0$  c)  $\frac{2x+15}{6x^2}$ ,  $x \neq 0$  d)  $\frac{x+2}{(x-4)(x-6)}$ ,  $x \neq 4, x \neq 6$

8) a)  $\frac{x(x+1)}{3}$ ,  $x \neq -7, -2$  b)  $2$ ,  $x \neq -10, 2, 6$  c)  $\frac{-5x^2-22x-6}{(x+5)(x+2)(x-2)}$ ,  $x \neq -5, -2, 2$

d)  $\frac{2x(x+62)}{(x+16)(x+2)(x-10)}$ ,  $x \neq -16, -2, 10$

9) a)  $\frac{x-8}{(x+7)(x-3)}$ ,  $x \neq -15, -7, 3$  b)  $\frac{(x+10)(x+2)}{(x+5)(x-3)}$ ,  $x \neq -10, -5, 3$  c)  $\frac{-x+57}{(x-7)(x-2)}$ ,  $x \neq 2, 7$

d)  $\frac{x^2+15x+42}{(x+6)(x+3)}$ ,  $x \neq -6, -3$  e)  $\frac{8x-2}{2x-1}$ ,  $x \neq \frac{1}{2}$