

Algebra II

Unit 5 Review

"Procrastination is the natural assassination of opportunity." Anonymous

Name Answer Key

1. Simplify using the laws of exponents.

$$a) \frac{\cancel{35}x^2y^3}{\cancel{3}x^5y} = \frac{7y^2}{3x^3}$$

$$b) \frac{(2x^2y)^2}{(3xy^2)^3} = \frac{4x^4y^2}{27x^3y^6} = \frac{4x}{27y^4}$$

2. Write in simplest form without negative or zero exponents.

$$a) \frac{\cancel{3}x^2y^3}{\cancel{2}x^2y} = \frac{3x^2x^2}{2yy^3} = \frac{3x^4}{2y^4}$$

$$b) \frac{(3x^2y)^{-3}}{9x^{-2}y} = \frac{3^{-3}x^{-6}y^{-3}}{9x^{-2}y} = \frac{x^2}{\frac{3^3 \cdot 9 \cdot x^6 \cdot y^3 \cdot y}{(27)}} = \frac{x^2}{243x^4y^4}$$

$$c) \left(\frac{u^3}{v^{-1}}\right)^0 \left(\frac{-2u^1}{v^{-2}}\right)^2 (uv^2)^{-1}$$

$$= 1 \cdot \frac{4u^2}{v^{-4}} \cdot \frac{u^{-1}v^{-2}}{1} = \frac{4u^2v^4}{1} \cdot \frac{1}{uv^2} = \boxed{4uv^2}$$

3. Write **without** using fractions.

$$\frac{12x^0y^5}{y^3z^2} = 12y^5 \cdot y^{-3} \cdot z^{-2} = \boxed{12y^2z^{-2}}$$

4. Rewrite in scientific notation.

$$a) \underline{70200} = 7.02 \times 10^4$$

$$b) \underline{0.085} = 8.5 \times 10^{-2}$$

5. Rewrite in decimal (normal) form.

a)  $6.7 \times 10^{-3}$   
 $.0067$

b)  $4.2 \times 10^2$   
 $420$

6. Calculate each answer and write the answer in scientific notation with the correct number of significant digits.

a)  $(3.98 \times 10^{-14})(6.818 \times 10^{19}) = 2713564$   
 3s.f.      4s.f.  
 (answer 3 sig. fig.)  $2.71 \times 10^6$

b)  $\frac{5.22 \times 10^{-1}}{1.5 \times 10^8}$   
 3      2  
 $3.48 \times 10^{-9}$   
 $3.5 \times 10^{-9}$

7. Simplify the rational algebraic expression.

a)  $\frac{x^2 - 5x + 6}{x^2 - 7x + 12} \cdot \frac{(x-2)(x-3)}{(x-4)(x-3)}$   
 $\frac{x-2}{x-4}$

b)  $\frac{6+x-x^2}{x^2-9} \cdot \frac{(2+x)(3-x)}{(x-3)(x+3)}$   
 $\frac{-(2+x)}{(x+3)}$

8. Simplify each product or quotient.

a)  $\frac{x^2+3x}{x^2+2x-3} \cdot \frac{x+1}{x}$   
 $\frac{x(x+3)}{(x+3)(x-1)} \cdot \frac{x+1}{x} = \frac{x+1}{x-1}$

b)  $\frac{(x-4)(x+2)}{x^2-2x-8} \div (x^2-3x-4)$   
 $\frac{(x-4)(x+2)}{(x+2)(x+1)} \cdot \frac{1}{(x-4)(x+1)} = \frac{1}{(x+1)(x+1)}$   
 or  $\frac{1}{(x+1)^2}$

11. Solve the equation.

L.C.M: 12

$$\left( \frac{2x-1}{6} = \frac{x+2}{4} + \frac{1}{3} \right) \frac{12}{1}$$

$$\frac{(2x-1) \cdot \cancel{12}^2}{\cancel{6}} = \frac{(x+2) \cdot \cancel{12}^3}{\cancel{4}} + \frac{1 \cdot \cancel{12}^4}{\cancel{3}}$$

$$4x - 2 = 3x + 6 + 4$$

$$4x - 2 = 3x + 10$$

$$\underline{-3x \quad +2 \quad -3x \quad +2}$$

$$\boxed{x = 12}$$

12. Solve the equation.

LCM:  $(x+1)(x-2)$

$$\left( \frac{6}{x+1} - \frac{3}{x-2} = 0 \right) (x+1)(x-2)$$

$$\frac{6}{\cancel{(x+1)}} \cdot \frac{\cancel{(x+1)}(x-2)}{1} - \frac{3}{\cancel{(x-2)}} \cdot \frac{\cancel{(x-2)}(x+1)}{1}$$

$$6x - 12 - 3x - 3 = 0$$

$$3x - 15 = 0$$

$$\quad +15 \quad +15$$

$$\frac{3x}{3} = \frac{15}{3}$$

$$\boxed{x = 5}$$

13. How much of an 8% saline solution should be added to 600 ml of a 3% solution to produce a 5% saline solution?

$$8\% = .08$$

$$3\% = .03$$

$$5\% = .05$$

%	mL	Solution
.08	X	.08x
.03	600	.03(600)
.05	x+600	.05(x+600)

$$8\% + 3\% \quad 5\%$$

$$.08x + 18 = .05(x + 600)$$

$$.08x + 18 = .05x + 30$$

$$\underline{-.05x \quad -18 \quad -.05x \quad -18}$$

$$\frac{.03x}{.03} = \frac{12}{.03}$$

$$.03 \quad .03$$

$$\boxed{x = 400 \text{ mL}}$$

9. Consider the following rational function:  $f(x) = \frac{x^2 + 4x - 12}{x^2 + 7x + 6} = \frac{(x+6)(x-2)}{(x+6)(x+1)}$

a) What are the excluded values for x?

$$\begin{array}{cc} x+6=0 & x+1=0 \\ -6 & -1 \end{array}$$

$$\boxed{x \neq -6, -1}$$

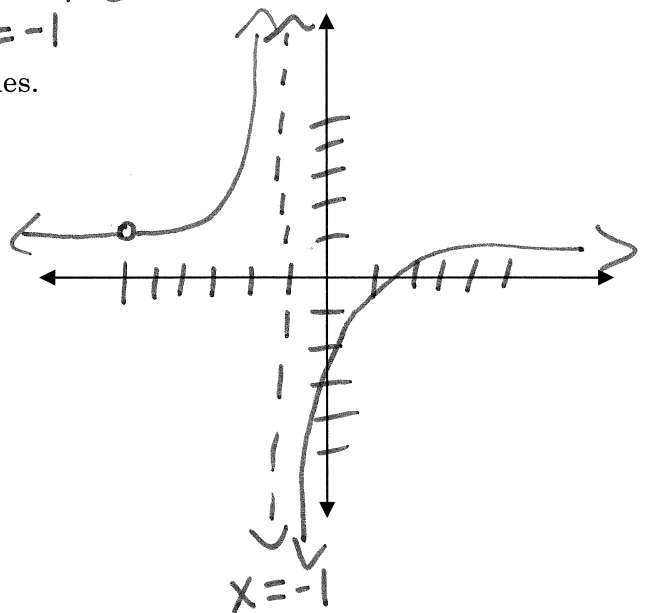
$$f(x) = \frac{(x-2)}{(x+1)}$$

b) Identify the locations of all vertical asymptotes and/or holes.

$$f(-6) = \frac{-6-2}{-6+1} = \frac{-8}{-5} = \frac{8}{5} \quad \text{hole @ } (-6, \frac{8}{5})$$

$$f(-1) = \frac{-1-2}{-1+1} = \frac{-3}{0} \quad \text{vert asy @ } x = -1$$

c) Graph the function. Show all asymptotes and/or holes.



10. Simplify each sum or difference.

$$\text{LCM: } (x-1)(x+1)$$

a)  $\frac{x}{x-1} + \frac{4}{x+1}$

$$\frac{x}{x-1} \cdot \frac{(x+1)}{(x+1)} + \frac{4}{x+1} \cdot \frac{(x-1)}{(x-1)}$$

$$\frac{x^2 + x + 4x - 4}{(x-1)(x+1)} = \boxed{\frac{x^2 + 5x - 4}{(x-1)(x+1)}}$$

b)  $\frac{5}{x-2} - \frac{2}{x+3}$  LCM:  $(x-2)(x+3)$

$$\frac{5}{x-2} \cdot \frac{(x+3)}{(x+3)} - \frac{2}{x+3} \cdot \frac{(x-2)}{(x-2)}$$

$$\frac{5x + 15 - 2x + 4}{(x-2)(x+3)} = \boxed{\frac{3x + 19}{(x-2)(x+3)}}$$