1) How do you determine where a rational expression is undefined?

watch cartoons with it

2) Consider $y = \dfrac{3x+1}{4x^2-81}$:

a) Evaluate the expression at $x = 2$:

$$\frac{3(2)+1}{4(2)^2-81} = \boxed{\frac{7}{-65}}$$

b) Determine the values where the rational expression is undefined:

$$4x^2-81=0$$

$$(2x+9)(2x-9)=0$$

$$\boxed{x=-\frac{9}{2} \quad x=\frac{9}{2}}$$

3) Perform the indicated operation. You may leave the answer in factored form:

a) $\dfrac{x^2+7x+6}{x^2-7x} \cdot \dfrac{x^2+4x+3}{x^2+2x+1}$

$$\frac{(x+6)\cancel{(x+1)}}{x(x-7)} \cdot \frac{\cancel{(x+1)}(x+3)}{\cancel{(x+1)}\cancel{(x+1)}}$$

$$\boxed{\frac{(x+6)(x+3)}{x(x-7)}}$$

b) $\dfrac{x^2+5x+6}{x^2+9x+14} \div \dfrac{x^2+6x+9}{x^2-9}$

flip

$$\frac{\cancel{(x+2)}\cancel{(x+3)}}{(x+7)\cancel{(x+2)}} \cdot \frac{\cancel{(x+3)}(x-3)}{\cancel{(x+3)}\cancel{(x+3)}}$$

$$\boxed{\frac{x-3}{x+7}}$$

4) Perform the indicated operation. Be sure to simplify the numerator and reduce as needed. You may leave the denominator factored:

a) $\dfrac{y^2}{y+3} - \dfrac{9}{y+3}$

$$= \frac{y^2-9}{y+3} = \frac{\cancel{(y+3)}(y-3)}{\cancel{(y+3)}}$$

$$= \boxed{y-3}$$

b) $\dfrac{x+3}{x^2+7x+6} + \dfrac{3}{x^2+8x+12}$

$(x+2)$ $(x+1)$

$(x+2)\ (x+6)(x+1) \qquad (x+6)(x+2)\ (x+1)$

$$= \frac{(x+3)(x+2)+3(x+1)}{(x+2)(x+6)(x+1)}$$

$$= \frac{x^2+5x+6+3x+3}{(x+2)(x+6)(x+1)} = \boxed{\frac{x^2+8x+9}{(x+2)(x+6)(x+1)}}$$

$\dfrac{2}{35}$

5) Simplify the complex fractions completely:

a) $(x+5)(x+4)\dfrac{\dfrac{2}{x+5}+\dfrac{1}{x+4}}{\dfrac{3}{x+5}-\dfrac{5}{x+4}}(x+5)(x+4)$

$2x+8+x+5$

$\dfrac{2(x+4)+1(x+5)}{3(x+4)-5(x+5)}$

$3x+12-5x-25$

$\boxed{\dfrac{3x+13}{-2x-13}}$

b) $(x+1)\dfrac{6+\dfrac{4}{x+1}}{1-\dfrac{2}{x+1}}(x+1)$

$\dfrac{6(x+1)+4}{(x+1)-2}$

$\boxed{\dfrac{6x+10}{x-1}}$

c) $\dfrac{a^{-1}+b^{-2}}{a^{-2}-b^{-1}} = \dfrac{a^2b^2\frac{1}{a}+\frac{1}{b^2}a^2b^2}{a^2b^2\frac{1}{a^2}-\frac{1}{b}a^2b^2}$

$\boxed{\dfrac{ab^2+a^2}{b^2-a^2b}}$

6) Solve for the variable:

a) $\dfrac{x+3}{x-2}=\dfrac{x-1}{x+2}$ cross multiply

$(x+3)(x+2)=(x-2)(x-1)$

$x^2+5x+6=x^2-3x+2$

$8x=-4$

$\boxed{x=-1/2}$

b) $\dfrac{3x}{x^2+7x+12}-\dfrac{3x}{x+3}(x+3)(x+4)=\dfrac{4}{x+4}(x+3)(x+4)$

$3x - 3x(x+4)=4(x+3)$

$3x-3x^2-12x=4x+12$

$0=3x^2+13x+12$

$0=(3x+1)(x+4)$

$x=-1/3$

~~$x=-4$~~

7) Short Answer: In this chapter, several of the sections dealt with using the LCD to complete the problem. Explain in each type of problem how the LCD was used. Do not give examples. Instead, give instructions as if you were explaining the process to someone who did not know:

a) Adding/Subtracting Fractions:

bark

b) Simplifying Complex Fractions:

woof

c) Solving Equations with Rational Expressions:

yip

8) Solve for t in the equation $Y=\dfrac{5}{a+t}$ $\cdot (a+t)$

$Y(a+t)=5$

$Ya+Yt=5$

$\dfrac{Yt}{Y}=\dfrac{5-Ya}{Y}$

$\boxed{t=\dfrac{5-Ya}{Y}}$

~~4~~ 5

9) SpongeBob, Patrick, and Sandy are jelly-fishing in Jellyfish Fields. SpongeBob can catch all the jellyfish in 9 hours, Sandy can do it in 18 hours, and if all three of them work together, they can get the job done in 4 hours. Patrick is bad at math. Help him figure out how long it would take him by himself.

	# hrs to complete	part done in 1 h
SB	9	1/9
PAT	x	1/x
SANDY	18	1/18
TOG	4	1/4

$36x \cdot \frac{1}{9} + 36x \cdot \frac{1}{x} + 36x \cdot \frac{1}{18} = \frac{1}{4} \cdot 36x$

$4x + 36 + 2x = 9x$

$36 = 3x$ $\quad x = 12$ hrs

10) After spending the night over Psyche's house, Cupid gets up and goes for a morning jog. He can jog at a rate of 3 miles per hour (the wings are heavy.) Psyche wakes up 1 hour later and begins running on the same path Cupid took. She can run at a rate of 5 miles per hour. How long after Psyche awoke did she catch up to Cupid? Hint: let x represent Psyche's time for running.

	D	R	T
Cupid	$3(x+1)$	3	$x+1$
Psyche	$5x$	5	x

$5x = 3(x+1)$

$5x = 3x + 3$

$2x = 3 \rightarrow \boxed{x = \frac{3}{2} = 1.5 \text{ hr}}$

11) Suppose y varies inversely as x. When y is 2, x is 7. Find y when x is 3:

$y = \frac{k}{x}$

$2 = \frac{k}{7} \Rightarrow k = 14$

$y = \frac{14}{x}$ $\quad \boxed{y = \frac{14}{3}}$

12) The area of a projected picture on a movie screen varies directly as the square of the distance from the projector to the screen. If a distance of 20 feet produces a picture with an area of 64 square feet, what distance produces an area of 100 square feet?

a = area

d = distance from the projector to screen

$a = k \cdot d^2$

$64 = k \cdot 20^2$

$k = \frac{64}{400} = \frac{4}{25}$

$a = \frac{4}{25} d^2$

$100 = \frac{4}{25} d^2$

$625 = d^2$

$\boxed{d = 25 \text{ feet}}$

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