

**Solving Equations Containing Rational Expressions -  
Section 7.3 – 7.4 in MATH 101**

**Class Strategy:**

**Discovery Learning Activity: Students do Activity 5.4( Blood – Alcohol Levels) – Mathematics in Action – Algebraic, Graphic, & Trigonometric Problems Solving – Second Edition - The Consortium For Foundation Mathematics**

In 1992, the U.S. Department of Transportation recommended that states adopt 0.08% blood – alcohol concentration as the legal measure of drunk driving. If you assume that a regular 12 – ounce beer is 5% alcohol by volume and that the normal bloodstream contains 5 liters ( Or 169 ounces) of fluid, your maximum blood – alcohol concentration,  $B$ , can be approximately modeled by the function having the equation

$$B = \frac{600n}{w(169 + 0.6n)}$$

where  $n$  is the number of beers consumed in one hour and  $w$  is your body weight in pounds.

- 1.a. Replace  $w$  with your body weight. Write an equation for  $B$  in terms of  $n$ .
  
  
  
  
  
  
  
  
  
  
- b. Complete the following table using your equation from part a.

<b>Number of Beers, <math>n</math></b>	1	2	3	4	5	6	7	8	9	10
<b>Blood – Alcohol Concentration, <math>B</math></b>										

2. According to this model, how many beers can you consume in one hour without exceeding the recommended legal measure of drunk driving?

3.a. A football player friend of yours weighs 232 pounds. Rewrite the equation for  $B$  in terms of  $n$ . What is his maximum blood-alcohol level if he drinks four beers in one hour?

b. Complete the following table using your equation in part a.

<b>Number of Beers, <math>n</math></b>	1	2	3	4	5	6	7	8	9	10
<b>Blood – Alcohol Concentration, <math>B</math></b>										

4.a. Your 232- pound football player friend is given a breathalyzer test. The result is a blood-alcohol concentration of 0.05%. Using the blood- alcohol concentration function, write an equation that can be solved to determine the number of beers your friend consumed in the previous hour.

**Instructor Led Discussion:**

**Example 1:**

**Method 1:** Solve  $\frac{16}{x+3} = 2$ , by multiplying both sides by the LCD

$$\frac{16}{x+3} = 2$$

$$(x+3) \cdot \frac{16}{x+3} = 2(x+3)$$

$$16 = 2x + 6$$

$$10 = 2x$$

$$5 = x$$

$$\text{check: } \frac{16}{5+3} = \frac{16}{8} = 2$$

**Method 2:** Solve  $\frac{16}{x+3} = 2$ , by cross multiplying

$$\frac{16}{x+3} = \frac{2}{1}$$

$$2(x+3) = 16 \cdot 1$$

$$2x + 6 = 16$$

$$2x = 10$$

$$x = 5$$

**Student Practice:**

5.a.  $\frac{45}{x} = 9$

b.  $\frac{23}{x+2} = 15$

c.  $\frac{13}{x} = \frac{2}{5}$

d.  $\frac{16}{x^2} = \frac{1}{4}$

6.a. Solve the equation in problem 4a using an algebraic approach.

**Continue with ILD:**

1. Solve  $\frac{-2}{3x} + \frac{8}{3} = \frac{2}{x}$

2. Solve  $\frac{2}{x+1} + \frac{1}{3x+3} = \frac{2}{3}$

3. Solve  $\frac{2}{x} + 1 = \frac{3}{x^2}$

4. Solve  $\frac{8}{x+2} = 1 + \frac{2}{x}$

**Solving Equations Containing Rational Expressions**

1. Multiple both sides of the equation by the \_\_\_\_\_
2. Distribute; that is, multiply every term of the equation by the \_\_\_\_\_
3. Multiply by canceling common \_\_\_\_\_
4. Solve the resulting equation (it should have no fraction) \_\_\_\_\_

**Example 1:**  $\frac{5}{3} - \frac{2}{3x} = \frac{6}{x}$

**Example 2:**  $\frac{3}{5} - \frac{1}{x-1} = \frac{7}{5x-5}$

**Example 3:**  $\frac{x^2}{x+100} = 50$