ALGEBRA PROBLEM SESSION #9 SOLUTIONS

Rational Equations

1. (a) The equations $\frac{1}{5x} = \frac{1}{9x}$ and $5x = 9x$ are not equivalent equations, since the equation $5x = 9x$ has a solution of 0, while the equation $\frac{1}{5x} = \frac{1}{9x}$ does not.

   (b) No we cannot multiply both sides of $\frac{1}{5x} = \frac{1}{9x}$ by the LCD, because $x \neq 0$.

2. It is necessary to check the solutions of a rational equation because there could be extraneous solutions, solutions for which the original expression is undefined, usually because of division by zero.

   a) no solution b) $y = 1, \ y = 8$ c) $x = -\frac{13}{6}$

3. $t = -252$ 4. $n = -2, n = 3$

Formulas and Applications of Rational Equations

1. $q = \frac{pf}{p-f}$

2. $R = \frac{E - Ir}{I}$

3. The average rate of the first engine is 35 and the average rate of the second engine is 40.

4. It would take the experienced bricklayer 20 hours to build the wall working alone.

5. Working together, it will take 20 minutes to clear the driveway. 20 minutes is less than 30 minutes, thus it will give you enough time before you have to leave.

6. Your walking speed on the nonmoving sidewalk is 5.1 feet per second, to the nearest tenth.

7. It will take 2.25 hours to fill the pool if both pipes are open.

8. The rate of the water's current is 2 miles per hour.

Variation

1. This is not direct variation, since $C = \frac{5}{9}(F - 32)$, if it were direct variation then $C = kF$, where k is a nonzero constant.

2. Yes, this is an inverse variation, but the cost of the purchase is on a limited domain.

3. $y = 9$.

4. $a = \frac{7}{4}$.

5. $C = 300$

6. 31 pounds on the Moon.

7. The stopping distance for a car traveling at 60 miles per hour is 120 feet.

8. 0.88° Celsius

9. The illumination when the distance is 50 feet is 2.4 footcandles.

10. The chronological age of a person with a mental age of 40 and an IQ of 80 is 50 years old.

11. A year would seem like $\frac{1}{3}$ year or 4 months long, when you are three times as old as you are now.

Radical Expressions and Functions

1. When $x < 0$.

2. If $x < 0$, then $\sqrt[3]{x^3} = x < 0$.

3. a. **0.7**   b. **13**

4. $f(28) = 5,\ f(4) = 1$

5. $f(30) = 3,\ f(11) = 2$

6. The domain of $f(x) = \sqrt{x + 2}$ is $x \geq -2$

7. $|x - 2|$ 8. $|x + 7|$

9. $\frac{1}{10}$

10. **3 is real**   11. **−1 is real**

12. $|y|$ 13. **−6**

14. The motorist speed was approximately 36.7 mph before braking. Therefore the officer should not believe her.