Lesson Title 5.4 Solving Radical Functions & Inequalities NOTES **Alg 2** **Date** _____

OBJECTIVE 1: Solving Radical Equations & Inequalities

STEPS:

1. Get the radical alone on one side
2. Eliminate the radical by raising each side to the power of the index
   a. If square root, then square both sides
   b. If cube root, then cube both sides
   c. If fourth root, then do both sides to the fourth power
3. Solve each equation for your variable, usually x
4. Check your solution for extraneous solutions
   - Think about domain restrictions
5. Restrict your domain, if necessary
   a. Rule 1: radicand ≥ 0
   b. Rule 2: denominator cannot = 0
   c. Rule 3: radicand in the denominator > 0

TASK 1: Solve the following equations by following the steps above.

a) $\sqrt[3]{x} - 9 = -6$

$+9 \quad +9$

$\sqrt[3]{x}^3 = 3^3$

$x = 27$

b) $(\sqrt{x+25})^2 = (2)^2$

$x + 25 = 4$

$x = -21$

c) $\sqrt[3]{2x-5} - 2 = 3$

$+2 \quad +2$

$(\sqrt[3]{2x-5})^3 = (5)^3$

$2x - 5 = 125$

$+5 \quad +5$

$\frac{2x}{2} = \frac{130}{2}$

$x = 65$

TASK 2: Check for Extraneous Solutions

a) $(x+1)^2 = (\sqrt{7x+15})^2$

FOIL

$x^2 + 2x + 1 = 7x + 15$

$x^2 - 5x - 14 = 0$

$(x-7)(x+2) = 0$

$x = 7, -2$ $\boxed{x=7}$

$7+1 = \sqrt{7(7)+15}$ $\quad -2+1 = \sqrt{7(-2)+15}$

$8 = \sqrt{64}$ ✓ $\quad -1 = X$

b) $(\sqrt{2x+7})^2 = (x-4)^2$

FOIL

$2x + 7 = x^2 - 8x + 16$

$0 = x^2 - 10x + 9$

$0 = (x-9)(x-1)$

$x = 9, 1$ $\boxed{x=9}$

$\sqrt{2(9)+7} = 9 - 4$ ✓

$\sqrt{2(1)+7} = 1 - 4$ X

TASK 3: Solve Equations with Two Radicals

a) $(\sqrt{10x+9})^2 = (x+3)^2$

$10x+9 = x^2+6x+9$

$0 = x^2-4x$

$0 = x(x-4)$

$x = 0, 4$

b) $(\sqrt{6}-2)^2 = (\sqrt{x-2})^2$ FOIL

$10-4\sqrt{6} = x-2$

exact: $12-4\sqrt{6} = x$

$x \approx 2.202$

$(\sqrt{6}-2)(\sqrt{6}-2)$

$\sqrt{36}-2\sqrt{6}-2\sqrt{6}+4$

$6-4\sqrt{6}+4$

$10-4\sqrt{6}$

OBJECTIVE 2: Solving Equations with Rational Exponents

TASK 4: Solve equations with rational exponents by converting to radicals and following the steps provided above in objective 1.

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

$3x = -27$

$x = -9$

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

$x+6 = x^2$

$0 = x^2-x-6$

$0 = (x-3)(x+2)$

$x = 3, -2$ $x = 3$

c) $(x+2)^{\frac{3}{4}} = 8$ $\frac{4}{3}$ $\frac{4}{3}$

$x+2 = (\sqrt[3]{8})^4$

$x+2 = (2)^4$

$x+2 = 16$

$x = 14$

OBJECTIVE 3: Solving a Radical Inequality

STEPS:

1) Determine if the graph is solid (≤ or ≥) or dashed (< or >)
2) Determine if you shade above or below the function above (> or ≥) or below (< or ≤)
3) Follow the same steps from objective 1

TASK 5: solve the radical inequalities following the steps above

a) $2\sqrt{x}-3 \geq 3$

$+3 \quad +3$

$\frac{2\sqrt{x}}{2} \geq \frac{6}{2}$

$(\sqrt{x})^2 \geq (3)^2$

$x \geq 9$

b) $\frac{4\sqrt[3]{x+1}}{4} < \frac{8}{4}$

$(\sqrt[3]{x+1})^3 < (2)^3$

$x+1 < 8$

$-1 \quad -1$

$x < 7$

c) $3\sqrt{x}-4 \leq 8$

$+4 \quad +4$

$\frac{3\sqrt{x}}{3} \leq \frac{12}{3}$

$(\sqrt{x})^2 \leq (4)^2$

$x \leq 16$

Still need help with: