Name: _____ Date: _____

SOLVING SQUARE ROOT EQUATIONS
COMMON CORE ALGEBRA II

Equations involving square roots arise in a variety of contexts, both applied and purely mathematical. As always, the key to solving these equations lies in the applications of inverse operations. The key inverse relationship in these equations is that between taking a square root and squaring.

***Exercise* #1:** Solve each of the following square root equations, which are arranged from less to more complex. Check each equation.

(a) $\sqrt{x} = 7$

(b) $\sqrt{x-3} = 5$

(c) $\sqrt{2x-1} = 4$

(d) $3\sqrt{x} - 4 = 20$

(e) $2\sqrt{x+5} + 7 = 13$

(f) $5\sqrt{3x-2} - 4 = 36$

***Exercise* #2:** Which of the following is the solution to $3\sqrt{\frac{x}{2}} = 15$?

(1) $x = 12.5$

(3) $x = 50$

(2) $x = 25$

(4) $x = 4050$

_____

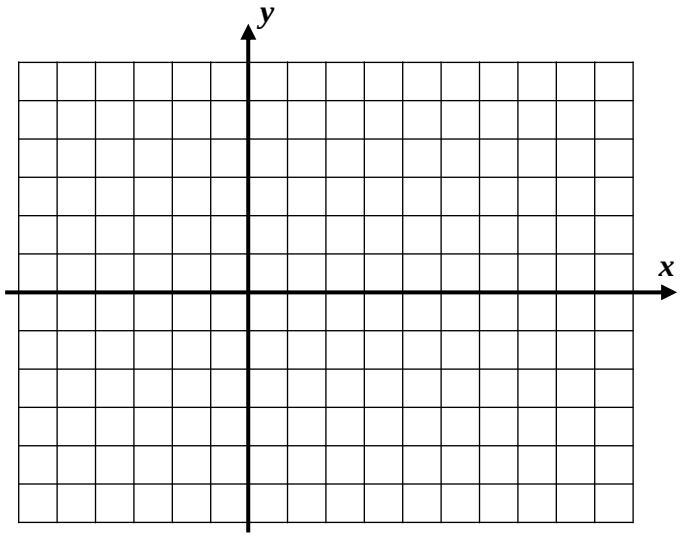
A more complicated scenario arises when a square root expression is equal to a linear expression. The next exercise will illustrate both the graphical and algebraic issues involved.

Exercise #3: Consider the system of equations shown below.

$y = \sqrt{x+3}$ and $y = x+1$

(a) Solve this system graphically using the grid to the right.

(b) Solve this system *algebraically* for only the *x*-values using substitution below.



(c) Why does your answer from part (a) contradict what you found in part (b)?

Oftentimes, roots are introduced by various algebraic techniques that for one reason or another are not valid solutions of the equations. These roots are known as **extraneous** and can always be found by checking within the **original equation**.

Exercise #4: Find the solution set of each of the following equations. Be sure to check your work and reject any extraneous roots.

(a) $\sqrt{2x-3} = x-3$

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

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SOLVING SQUARE ROOT EQUATIONS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Solve each of the following square root equations. As in the lesson, they are arranged from lesser to more complex. Check your answers.

(a) $\sqrt{x} = 5$

(b) $\sqrt{x+2} = 10$

(c) $\sqrt{\frac{2x}{3}} = 6$

(d) $4\sqrt{x} = 24$

(e) $2\sqrt{x} = 1$

(f) $\sqrt{3x+4} = 8$

(g) $\frac{1}{2}\sqrt{x} - 5 = 2$

(h) $\sqrt{4x-1} + 3 = 4$

(i) $5\sqrt{1-5x} - 3 = 27$

(j) $\sqrt{x^2 - 10x + 25} = 5$

(k) $\sqrt{2x^2 + 17x} = 3$

(l) $\sqrt{3x^2 + 7x + 10} = 4$

2. Which of the following values solves the equation $\frac{\sqrt{4x+19}}{2}=2$?

(1) $-\frac{9}{2}$ (3) $\frac{4}{3}$

(2) $-\frac{3}{4}$ (4) $\frac{1}{2}$ _____

3. Solve each of the following equations for all values of x. Check your possible solutions in the original equation. Reject any extraneous roots.

(a) $x-1=\sqrt{x+11}$ (b) $\sqrt{4x+36}=2x-6$

4. Solve each of the following equations for all values of x. As in problem #1, be sure to isolate the square root expression first before squaring both sides of the equation. Check your possible solutions in the original equation. Reject any extraneous roots.

(a) $6x=2\sqrt{24x+17}-8$ (d) $\frac{\sqrt{6x+4}-1}{4}=x$