Exit Ticket Sample Solutions

Consider the radical equation $3\sqrt{6-x}+4=-8$.

1. **Solve the equation. Next to each step, write a description of what is being done.**

$3\sqrt{6-x}=-12$	*Subtract 4 from both sides.*
$\sqrt{6-x}=-4$	*Divide both sides by 3 in order to isolate the radical.*
$6-x=16$	*Square both sides to eliminate the radical.*
$x=-10$	*Subtract 6 from both sides and divide by -1.*

2. **Check the solution.**

   $3\sqrt{6-(-10)}+4=3\sqrt{16}+4=3(4)+4=16$, and $\neq -8$, *so -10 is not a valid solution.*

3. **Explain why the calculation in Problem 1 does not produce a solution to the equation.**

   Because the square root of a positive number is positive, $3\sqrt{6-x}$ will be positive. A positive number added to 4 cannot be -8.

Homework Problem Set Sample Solutions

1.

   a. **If $\sqrt{x}=9$, then what is the value of x?**

   $x=81$

   b. **If $x^2=9$, then what is the value of x?**

   $x=3$ or $x=-3$

   c. **Is there a value of x such that $\sqrt{x+5}=0$? If yes, what is the value? If no, explain why not.**

   Yes, $x=-5$

   d. **Is there a value of x such that $\sqrt{x}+5=0$? If yes, what is the value? If no, explain why not.**

   No, $\sqrt{x}$ will be a positive value or zero for any value of x, so the sum cannot equal 0. If $x=25$, then $\sqrt{25}+5=10$.

2.

a. **Is the statement $\sqrt{x^2} = x$ true for all x-values? Explain.**

No, this statement is only true for $x \geq 0$. If $x < 0$, it is not true. For example, if $x = -5$, $\sqrt{(-5)^2} = \sqrt{25} = 5$, then $\sqrt{(-5)^2} \neq -5$.

b. **Is the statement $\sqrt[3]{x^3} = x$ true for all x-values? Explain.**

Yes, this statement is true for all x-values. For example, if $x = 2$, then $\sqrt[3]{2^3} = 2$. If $x = -2$, then $\sqrt[3]{(-2)^3} = -2$. Since the cube root of a positive number is positive, and the cube root of a negative number is negative, this statement is true for any value of x.

3. Rationalize the denominator in each expression.

A. $\frac{4-x}{2+\sqrt{x}}$

$\mathbf{2 - \sqrt{x}}$

B. $\frac{2}{\sqrt{x-12}}$

$\mathbf{\frac{2\sqrt{x-12}}{x-12}}$

C. $\frac{1}{\sqrt{x+3}-\sqrt{x}}$

$\mathbf{\frac{\sqrt{x+3}+\sqrt{x}}{3}}$

4. Solve each equation, and check the solutions.

A. $\sqrt{x+6} = 3$

$x = 3$

B. $2\sqrt{x+3} = 6$

$x = 6$

C. $\sqrt{x+3} + 6 = 3$

No solution

D. $\sqrt{x+3} - 6 = 3$

$x = 78$

E. $16 = 8 + \sqrt{x}$

$x = 64$

F. $\sqrt{3x-5} = 7$

$x = 18$

G. $\sqrt{2x-3} = \sqrt{10-x}$

$x = \frac{13}{3}$

H. $3\sqrt{x+2} + \sqrt{x-4} = 0$

No solution

I. $\frac{\sqrt{x+9}}{4} = 3$

$x = 135$

J. $\frac{12}{\sqrt{x+9}} = 3$

$x = 7$

K. $\sqrt{x^2 + 9} = 5$

$x = 4$ *or* $x = -4$

L. $\sqrt{x^2 - 6x} = 4$

$x = 8$ *or* $x = -2$

M. $\frac{5}{\sqrt{x-2}} = 5$

$x = 3$

N. $\frac{5}{\sqrt{x-2}} = 5$

$x = 9$

O. $\sqrt[3]{5x - 3} + 8 = 6$

$x = -1$

P. $\sqrt[3]{9 - x} = 6$

$x = -207$

5. Consider the inequality $\sqrt{x^2 + 4x} > 0$. Determine whether each x-value is a solution to the inequality.

c. $x = -10$ — *Yes*

d. $x = -4$ — *No*

e. $x = 10$ — *Yes*

f. $x = 4$ — *Yes*

6. Show that $\frac{a-b}{\sqrt{a}-\sqrt{b}} = \sqrt{a} + \sqrt{b}$ for all values of a and b such that $a > 0$ and $b > 0$ and $a \neq b$.

If we multiply the numerator and denominator of $\frac{a-b}{\sqrt{a}-\sqrt{b}}$ by $\sqrt{a} + \sqrt{b}$ to rationalize the denominator, then we have

$$\frac{a-b}{\sqrt{a}-\sqrt{b}} = \frac{a-b}{\sqrt{a}-\sqrt{b}} \cdot \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}+\sqrt{b}} = \frac{(a-b)(\sqrt{a}+\sqrt{b})}{a-b} = \sqrt{a} + \sqrt{b}.$$

7. Without actually solving the equation, explain why the equation $\sqrt{x+1} + 2 = 0$ has no solution.

The value of $\sqrt{x+1}$ must be positive, which is then added to 2. The sum of two positive numbers is positive; therefore, the sum cannot equal 0.