Name:_____ Date:_____ Per._____

U7 CWK #5: *Solve Equations using Square and Cube Roots*

In the problems below, we review how to solve some basic equations.

1. Write the inverse operation used to solve each of following equations, then show the steps used to solve the equation.

a. $x + 3 = 7$ → $-3 \quad -3$ → $x = 4$

b. $-3x = 18$ → $\frac{-3x}{-3} = \frac{18}{-3}$ → $x = -6$

c. $x - 6 = -14$ → $+6 \quad +6$ → $x = -8$

d. $\frac{x}{7} = 3$ → $\times 7 \quad \times 7$ → $x = 21$

2. What does an inverse operation do?

opposite operation (cancels each other)

3. Write and solve an equation to find the side length of a square with an area of 25 cm^2.

$\sqrt{25} = \sqrt{s^2}$

$5 = s$

$A = 25\ cm^2$

Now consider the equation $x^2 = 25$ out of context. Is 5 the only solution? In other words, is 5 the only number that makes this equation true when substituted in for x?

so we say $x = \pm 5$ (pos. or neg.)

-5 can also be. would it make sense for a square to have − (NO) but in other circumstances it can.

5. Write and solve an equation to find the side length of a cube with a volume of 27 in^3.

$\sqrt[3]{s^3} = \sqrt[3]{27}$

$s = 27$

6. Now consider the equation $x^3 = 27$ out of context. Is 3 the only solution? In other words, is 3 the only number that makes this equation true when substituted in for x?

it's the only possibility

$(-3)^3$ would be -27.

7. State the inverse operation you would use to solve these equations. Solve each equation.

a. $\sqrt{x^2} = \sqrt{100}$ square root → $x = \pm 10$

b. $\sqrt{x^2} = \sqrt{36}$ square root → $x = \pm 6$

c. $\sqrt[3]{x^3} = \sqrt[3]{27}$ cubed root → $x = 3$

8. Solve the equations below. Express your answer in simplest radical form.

a. $\sqrt{x^2} = \sqrt{64}$

$x = \pm 8$

b. $\sqrt{x^2} = \sqrt{-64}$

NOT possible — can't have $\sqrt{}$ of neg. #

c. $\sqrt[3]{x^3} = \sqrt[3]{8}$

$x = 2$

d. $\sqrt[3]{x^3} = \sqrt[3]{-8}$ ← OK w/ cube roots. neg. answer

$x = -2$

e. $\sqrt[3]{x^3} = \sqrt[3]{1}$

$x = 1$

f. $\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

g. $\sqrt{x^2} = \sqrt{5}$

$x = \pm\sqrt{5}$

h. $\sqrt{x^2} = \sqrt{10}$

$x = \pm\sqrt{10}$

i. $\sqrt[3]{x^3} = \sqrt[3]{15}$

$x = \sqrt[3]{15}$

j. $\sqrt{x^2} = \sqrt{-100}$

NOT possible

k. $\sqrt[3]{x^3} = \sqrt[3]{-512}$

$x = -8$

l. $\sqrt{x^2} = \sqrt{8}$

$x = \sqrt{4 \cdot 2}$

$x = \pm 2\sqrt{2}$

m. $\sqrt{x^2} = \sqrt{45}$

$x = \sqrt{9 \cdot 5}$

$x = \pm 3\sqrt{5}$

n. $\sqrt[3]{x^3} = \sqrt[3]{250}$

$x = \sqrt[3]{125 \cdot 2}$

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

o. $\sqrt[3]{x^3} = \sqrt[3]{128}$

$x = \sqrt[3]{64 \cdot 2}$

$x = 4\sqrt[3]{2}$

p. $\sqrt{a^2} = \sqrt{\frac{1}{36}}$

$a = \pm \frac{1}{6}$

q. $\sqrt[3]{z^3} = \sqrt[3]{\frac{1}{27}}$

$z = \frac{1}{3}$

r. $\sqrt{y^2} = \sqrt{0.16}$ $\frac{16}{100} \cdot \frac{4}{10}$

$y = \pm .4$

s. $x^2 + 16 = 25$

$-16 \quad -16$

$\sqrt{x^2} = \sqrt{9}$

$x = \pm 3$

t. $x^2 - 5 = 59$

$+5 \quad +5$

$\sqrt{x^2} = \sqrt{64}$

$x = \pm 8$

u. $\frac{10x^2}{10} = \frac{1440}{10}$

$\sqrt{x^2} = \sqrt{144}$

$x = \pm 12$

v. $\frac{2x^2}{2} = \frac{16}{2}$

$\sqrt{x^2} = \sqrt{8}$

$x = \sqrt{4 \cdot 2}$

$x = \pm 2\sqrt{2}$

w. $\frac{y^3}{2} = 32 \cdot 2$

$\sqrt[3]{y^3} = \sqrt[3]{64}$

$y = 4$

x. $x^2 = p$ where p is a positive rational number * solve * for x

$\sqrt{x^2} = \sqrt{p}$

$x = \pm\sqrt{p}$

9. Estimate the solution. Use a calculator to check your estimate.

a. $\sqrt{x^2} = \sqrt{53}$ between $\sqrt{49}$ & $\sqrt{64}$ ↑ closer to

$x = \pm 7.2$

± 7.28

b. $\sqrt{a^2} = \sqrt{15}$ between $\sqrt{9}$ & $\sqrt{16}$ ↑ super close

$a = \pm 3.9$

± 3.87

c. $\sqrt[3]{z^3} = \sqrt[3]{29}$ between $\sqrt[3]{27}$ & $\sqrt[3]{64}$ ↑ super close

$z = 3.1$

3.07