Algebra II - Notes

Alg. II Chp 6-7 T6-6 Notes 2-13-14

2-13-14 T6-6 Chp 6-7 **Solving/Verify w/Radicals**

Sample: Test Q's

even

$$\sqrt{\frac{1}{108}x^6y^9} = \frac{\sqrt{1}}{\sqrt{108}}\sqrt{x^6}\sqrt{y^9} =$$

$6 \div 2 = 3$

odd $\quad 8 \div 2 = 4$

$$\frac{1|x^3|\sqrt{y^8}\sqrt{y}}{2\cdot 3\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}} = \frac{|x^3|y^4\sqrt{y}\sqrt{3}}{2\cdot 3\cdot 3} = \boxed{\frac{|x^3|y^4\sqrt{3y}}{18}}$$

108
2 54
2 27
3 9
3 3

$$\frac{\sqrt[8]{81}}{\sqrt[6]{3^1}} = \frac{\sqrt[8]{3^4}}{\sqrt[6]{3^1}} = \frac{3^{\frac{4}{8}}}{3^{\frac{1}{6}}} = \frac{3^{\frac{1}{2}}}{3^{\frac{1}{6}}} = 3^{\frac{1}{2}-\frac{1}{6}} =$$

$$3^{\frac{3}{6}-\frac{1}{6}} = 3^{\frac{2}{6}} = 3^{\frac{1}{3}} = \boxed{\sqrt[3]{3}}$$

81
9 9
3 3 3 3

Note: $x^2 \cdot x^7 = x^{2+7} = x^9$
$\frac{x^7}{x^2} = x^{7-2} = x^5$
} Exponent Rule

SADMERP
↑
Use to Solve

1. $\sqrt{y-2} - 1 = 5$

$\quad +1 \quad +1$

$(\sqrt{y-2})^2 = 6^2$ ← Square both sides

$y - 2 = 36$

$\quad +2 \quad +2$

$y = 38$

verify:

$\sqrt{38-2} - 1 = 5$

$\sqrt{36} - 1 = 5$

$6 - 1 = 5$

$5 = 5$ ✓

2. $\sqrt{x-12} = 2 - \sqrt{x}$

square both sides $\rightarrow$ $\sqrt{x-12}^{\,2} = (2-\sqrt{x})^2$

$$x - 12 = (2-\sqrt{x})(2-\sqrt{x})$$

$$x - 12 = 4 - 2\sqrt{x} - 2\sqrt{x} + x$$

$$\cancel{x} - 12 = 4 - 4\sqrt{x} \cancel{+x}$$
$$-\cancel{x} \qquad\qquad -\cancel{x}$$

$$-12 = \cancel{4} - 4\sqrt{x}$$
$$-4 \qquad \cancel{-4}$$

$$\frac{-16}{-4} = \frac{\cancel{-4}\sqrt{x}}{\cancel{-4}}$$

$$4^2 = \sqrt{x}^{\,2}$$ $\leftarrow$ square both sides again!

$$16 = x \qquad \boxed{\text{No Solution}}$$

Verify: $\sqrt{16-12} = 2 - \sqrt{16}$

$$\sqrt{4} = 2 - 4$$

$$2 \neq -2$$

3. $(3y+1)^{\frac{1}{3}} \cancel{+5} = 0$

$$\cancel{-5} \qquad -5$$

raise to 3 power (both sides) $\longrightarrow$ $\left((3y+1)^{\frac{1}{3}}\right)^3 = (-5)^3$

$$3y \cancel{+1} = -125$$
$$\cancel{-1} \qquad -1$$

$$\frac{\cancel{3}y}{\cancel{3}} = \frac{-126}{3}$$

$$\boxed{y = -42}$$

Note:

Exponent Rule

$(2^3)^4 = 2^{3 \cdot 4} = 2^{12}$

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

Verify:

$(3(-42)+1)^{\frac{1}{3}} + 5 = 0$ ✓

(on calculator)

☆ on test

4. $2\sqrt{2x-7} = \sqrt{2x+4}$ ← square both sides

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

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

Distribute → $4(2x-7) = 2x+4$

$8x - 28 = \cancel{2x}+4$

$-2x \qquad -\cancel{2x}$

$6x - \cancel{28} = 4$

$+\cancel{28} \qquad +28$

$\frac{\cancel{6}x}{\cancel{6}} = \frac{32}{6}$

$x = \frac{16}{3}$

Note:

$\underbrace{(a\cdot b)^2 = a^2b^2}$ only with multiplication & DIV.

$(a+b)^2 = (a+b)(a+b)$

Verify:

✓ $2\sqrt{2(\frac{16}{3})-7} = \sqrt{2(\frac{16}{3})+4}$

$\boxed{\text{Done on Calculator}}$

5. $\sqrt{4x+13} - x = -8$

$+x \qquad +x$

square both sides → $(\sqrt{4x+13})^2 = (x-8)^2$ ← foil

$4x+13 = (x-8)(x-8)$

$4x+13 = x^2-8x-8x+64$

$4x+13 = \underbrace{x^2-16x+64}_{\text{Quadratic}}$

get to 0 then Factor

$\cancel{4x}+13 = x^2-16x+64$

$-4x-\cancel{13} = \qquad -4x-13$

$0 = x^2-20x+51$

$0 = (x-3)(x-17)$

51	-20
-3 · 17	-3 - 17

$x-3=0$, $+3 \quad +3$, $\boxed{\cancel{x=3}}$

$x-\cancel{17}=0$, $+\cancel{17} \quad 17$, $\boxed{x=17}$

verify (both solutions):

① $\sqrt{4(3)+13} - 3 = -8$

$\sqrt{12+13} - 3 = -8$

$\sqrt{25} - 3 = -8$

$5 - 3 = -8$

$2 \neq -8$

② $\sqrt{4(17)+13} - 17 = -8$

$\sqrt{68+13} - 17 = -8$

$\sqrt{81} - 17 = -8$

$9 - 17 = -8$

$-8 = -8$ ✓

$\boxed{x=17}$

6. $7\left(\sqrt[6]{5m+4}\right) \cancel{-4} = 10$

$\cancel{+4} \quad +4$

$\dfrac{\cancel{7}\left(\sqrt[6]{5m+4}\right)}{\cancel{7}} = \dfrac{14}{7}$

raise to 6th power

$\left(\sqrt[6]{5m+4}\right)^6 = 2^6$

$5m\cancel{+4} = 64$

$\cancel{-4} \quad -4$

$\dfrac{\cancel{5}m}{\cancel{5}} = \dfrac{60}{5}$

$\boxed{m = 12}$

verify: $7\left(\sqrt[6]{5(12)+4}\right) - 4 = 10$

$7\left(\sqrt[6]{60+4}\right) - 4 = 10$

$7\sqrt[6]{64} - 4 = 10$

$7\sqrt[6]{2^6} - 4 = 10$

$7 \cdot 2 - 4 = 10$

$14 - 4 = 10$

$10 = 10$ ✓