

5.4 Solving Radical Equations & Rational Exponent Equations Practice WS

Domain Restrictives

Solve each equation. Check for extraneous solutions. Show all work for full credit. Box final answers.

1. $(3)^2 = (\sqrt{b-1})^2$
 $b-1 \geq 0$
 $b \geq 1$
 $9 = b - 1$
 $+1 \quad +1$
 $10 = b$

$D: [1, \infty)$

$3 = \sqrt{10-1}$
 $3 = \sqrt{9}$
 $3 = 3 \checkmark$

2. $(2)^2 = \left(\sqrt{\frac{x}{2}}\right)^2$
 $4 = \frac{x}{2}$
 $8 = x$

$D: [0, \infty)$

$2 = \sqrt{\frac{8}{2}}$
 $2 = \sqrt{4}$
 $2 = 2 \checkmark$
 $\frac{x}{2} \geq 0$
 $x \geq 0$

3. $(\sqrt{x+4})^2 = (0)^2$
 $x+4 = 0$
 $-4 \quad -4$
 $x = -4$

$D: [-4, \infty)$

$\sqrt{-4+4} = 0$
 $\sqrt{0} = 0 \checkmark$
 $x+4 \geq 0$
 $x \geq -4$

4. $(\sqrt[3]{-8-2a})^3 = (0)^3$
 $-8-2a = 0$
 $+8 \quad +8$
 $-2a = 8$
 $-\frac{2}{2} \quad -\frac{2}{2}$
 $a = -4$

$a = -4$

$\sqrt[3]{-8-2(-4)} = 0$
 $\sqrt[3]{-8+8} = 0$
 $\sqrt[3]{0} = 0 \checkmark$
 $D: (-\infty, \infty)$

5. $(\sqrt[2]{2m-6})^2 = (\sqrt[2]{3m-14})^2$
 $2m-6 \geq 0$
 $2m \geq 6$
 $m \geq 3$
 $2m-6 = 3m-14$
 $-2m \quad -2m$
 $-6 = m-14$
 $+14 \quad +14$
 $8 = m$

$D: [\frac{14}{3}, \infty)$

$\sqrt{2(8)-6}$
 $\sqrt{16-6}$
 $\sqrt{10} \checkmark$
 $\sqrt{3(8)-14}$
 $\sqrt{24-14}$
 $\sqrt{10} \checkmark$

6. $(5)^3 = (\sqrt[3]{r-3})^3$
 $125 = r-3$
 $+3 \quad +3$
 $128 = r$

$D: (-\infty, \infty)$

$5 = \sqrt[3]{128-3}$
 $5 = \sqrt[3]{125}$
 $5 = 5 \checkmark$

7. $(\sqrt{2v-7})^2 = (v-3)^2$
 $2v-7 \geq 0$
 $2v \geq 7$
 $v \geq \frac{7}{2}$
 $2v-7 = (v-3)(v-3)$
 $2v-7 = v^2-6v+9$
 $-2v+7 \quad -2v+7$
 $0 = v^2-8v+16$
 $0 = (v-4)(v-4)$
 $0 = v-4$
 $+4 \quad +4$
 $4 = v$

$D: [\frac{7}{2}, \infty)$

$\sqrt{2(4)-7}$
 $\sqrt{8-7}$
 $\sqrt{1}$
 $1 \checkmark$
 $4-3 = 1 \checkmark$

8. $(\sqrt[3]{9-w})^3 = (\sqrt[3]{1-9w})^3$
 $9-w = 1-9w$
 $+9w \quad +9w$
 $9+8w = 1$
 $-9 \quad -9$
 $8w = -8$
 $\frac{8w}{8} = \frac{-8}{8}$
 $w = -1$

$w = -1$

$\sqrt[3]{9-(-1)} = \sqrt[3]{9+1}$
 $\sqrt[3]{10} = \sqrt[3]{10}$
 $\sqrt[3]{1-9(-1)} = \sqrt[3]{1+9}$
 $\sqrt[3]{10} = \sqrt[3]{10}$
 $D: (-\infty, \infty)$

$$3x - 11 \geq 0$$

$$3x \geq 11$$

$$x \geq \frac{11}{3}$$

$$D: \left[\frac{11}{3}, \infty \right)$$

$$-2 - 2x \geq 0$$

$$-2x \geq 2$$

$$x \leq -1$$

$$9. (-3)^{\frac{1}{2}} - (-2 - 2x)^{\frac{1}{2}} = 1$$

$$D: (-\infty, -1]$$

$$\frac{\sqrt{3}}{\sqrt{3}} - \sqrt{-2-2x} = 1 - \sqrt{3}$$

$$x = -3 + \sqrt{3}$$

$$\sqrt{-2-2x} = \frac{1 - \sqrt{3}}{-1}$$

$$\sqrt{3} - (-2 - 2(-3 + \sqrt{3}))^{\frac{1}{2}} = 1 - \sqrt{3}$$

$$1 = 1$$

$$(\sqrt{-2-2x})^2 = (-1 + \sqrt{3})^2$$

$$-2 - 2x = (-1 + \sqrt{3})(-1 + \sqrt{3})$$

$$-2 - 2x = 1 - 2\sqrt{3} + 3$$

$$+2 \quad +2$$

$$11. m^{\frac{2}{3}} = (27)^{\frac{1}{3}}$$

$$\frac{2}{3} \quad \frac{1}{3} \quad -2x = \frac{6 - 2\sqrt{3}}{-2}$$

$$m = (\sqrt[3]{27})^4$$

$$81 = 27$$

$$m = (3)^4$$

$$27 = 27 \checkmark$$

$$m = 81$$

$$D: [0, \infty)$$

$$10. x = 5 + (3x - 11)^{\frac{1}{2}}$$

$$\frac{-5 - 5}{(x-5)^2} = \frac{(3x-11)^{\frac{1}{2}}}{(3x-11)^{\frac{1}{2}}}$$

$$(x-5)(x-5) = 3x-11$$

$$x^2 - 10x + 25 = 3x - 11$$

$$-3x + 11 \quad -3x + 11$$

$$x^2 - 13x + 36 = 0$$

$$(x-9)(x-4) = 0$$

$$x = 9, 4$$

$$x = 9$$

$$12. x^{-\frac{3}{2}} = \frac{1}{729}$$

$$\frac{1}{x^{\frac{3}{2}}} = \frac{1}{729}$$

$$\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}} = \left(729\right)^{\frac{2}{3}}$$

$$x = \sqrt[3]{729}$$

$$x = 81$$

$$9 = 5 + (3(9) - 11)^{\frac{1}{2}}$$

$$9 = 5 + (16)^{\frac{1}{2}}$$

$$9 = 5 + 4$$

$$9 = 9 \checkmark$$

$$4 = 5 + (3(4) - 11)^{\frac{1}{2}}$$

$$4 = 5 + (12 - 11)^{\frac{1}{2}}$$

$$4 = 5 + \sqrt{1}$$

$$4 = 5 + 1$$

$$4 \neq 6 \quad X$$

$$81^{-\frac{3}{2}} = \frac{1}{729}$$

$$1,001 \approx 1,001$$

$$D: (0, \infty)$$

$$D: [0, \infty)$$

$$13. 26 = -1(27x)^{\frac{3}{4}}$$

$$\frac{-26}{-1} = \frac{-1(27x)^{\frac{3}{4}}}{-1}$$

$$\sqrt[3]{456976} = \frac{27x}{27}$$

$$2.853 \approx \frac{\sqrt[3]{456976}}{27} = x$$

$$26 = -1(27(2.853))^{\frac{3}{4}}$$

$$26 \neq -26$$

$$\emptyset$$

$$14. 5 = 3 + 4a^{-\frac{1}{6}}$$

$$\frac{2}{4} = \frac{4a^{-\frac{1}{6}}}{4}$$

$$\frac{1}{2} = a^{-\frac{1}{6}}$$

$$\frac{1}{2} = \frac{1}{a^{\frac{1}{6}}}$$

$$(a^{\frac{1}{6}})^6 = (2)^6$$

$$a = 64$$

$$5 = 3 + 4(64)^{-\frac{1}{6}}$$

$$5 = 3 + 4(.5)$$

$$5 = 3 + 2$$

$$5 = 5 \checkmark$$

$$D: (0, \infty)$$

$$15. 9 + 5\sqrt[3]{2m} = 29$$

$$\frac{5\sqrt[3]{2m}}{5} = \frac{20}{5}$$

$$\left(\sqrt[3]{2m}\right)^3 = (4)^3$$

$$2m = 64$$

$$m = 32$$

$$9 + 5\sqrt[3]{2(32)} = 29$$

$$29 = 29$$

$$D: (-\infty, \infty)$$

$$16. -3 + (8 - 2x)^{\frac{5}{4}} = 29$$

$$\frac{(8-2x)^{\frac{5}{4}}}{4} = \frac{32}{4}$$

$$8 - 2x = (2)^4$$

$$8 - 2x = 16$$

$$-16 \quad -16$$

$$\frac{-2x}{-2} = \frac{8}{-2}$$

$$x = -4$$

$$-3 + (8 - 2(-4))^{\frac{5}{4}} = 29$$

$$29 = 29$$

$$8 - 2x \geq 0$$

$$-2x \geq -8$$

$$x \leq 4$$

$$D: (-\infty, 4]$$