

Solve each equation. Be sure to check for extraneous solutions.

$$1. \quad 1 + x\sqrt{2} = 0$$

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

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

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

$$10. \quad (\sqrt{4x})^4 = 81$$

$$4x = 81$$

$$x = 20.25$$

$$2. \quad 6 + 2x\sqrt{3} = 0$$

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

$$x = \frac{-3}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

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

$$11. \quad \sqrt{2x+3} - 7 = 0$$

$$\sqrt{2x+3} = 7$$

$$2x+3 = 49$$

$$2x = 46$$

$$x = 23$$

$$3. \quad x\sqrt{2} + 3x = 4$$

$$x(\sqrt{2} + 3) = 4$$

$$x = \frac{4}{(\sqrt{2} + 3)(\sqrt{2} - 3)}$$

$$x = \frac{4\sqrt{2} - 12}{2 - 9}$$

$$x = \frac{4\sqrt{2} - 12}{-7}$$

$$12. \quad \sqrt{3x-5} - 3 = 1$$

$$\sqrt{3x-5} = 4$$

$$3x-5 = 16$$

$$3x = 21$$

$$x = 7$$

$$4. \quad x - x\sqrt{5} = 2$$

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

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

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

$$x = \frac{2(1 + \sqrt{5})}{-4}$$

$$x = \frac{1 + \sqrt{5}}{-2}$$

$$13. \quad \sqrt{4x+8} + 9 = 11$$

$$\sqrt{4x+8} = 2$$

$$4x+8 = 4$$

$$4x = -4$$

$$x = -1$$

$$5. \quad \sqrt{x-4} - 3 = 0$$

$$\sqrt{x-4} = 3$$

$$x-4 = 9$$

$$x = 13$$

$$14. \quad \sqrt{1+2x} - 6 = -3$$

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

$$1+2x = 9$$

$$2x = 8$$

$$x = 4$$

$$6. \quad \sqrt{x-5} - 7 = 0$$

$$\sqrt{x-5} = 7$$

$$x-5 = 49$$

$$x = 54$$

$$15. \quad \sqrt{5x+1} + 6 = 10$$

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

$$5x+1 = 16$$

$$5x = 15$$

$$x = 3$$

$$7. \quad (\sqrt[3]{x+1})^3 = 2^3$$

$$x+1 = 8$$

$$x = 7$$

$$16. \quad \sqrt[4]{2x+3} + 5 = 4$$

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$$8. \quad \sqrt[3]{x-1} = 3$$

$$x-1 = 27$$

$$x = 28$$

$$17. \quad \sqrt{3x+1} - 2 = 6$$

$$\sqrt{3x+1} = 8$$

$$3x+1 = 64$$

$$3x = 63$$

$$x = \frac{63}{3} = 21$$

$$9. \quad \sqrt[4]{3x} - 2 = 0$$

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

$$3x = 16$$

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

$$18. \quad \sqrt[3]{x+5} + 6 = 4$$

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

$$x+5 = -8$$

$$x = -13$$

Solve each equation. Be sure to check for extraneous solutions.

$$1. \begin{aligned} x+3 &= x\sqrt{2} \\ x-x\sqrt{2} &= -3 \\ x(1-\sqrt{2}) &= -3 \\ x &= \frac{-3}{1-\sqrt{2}} \cdot \frac{(1+\sqrt{2})}{(1+\sqrt{2})} = \boxed{x = 3+3\sqrt{2}} \end{aligned}$$

$$2. \begin{aligned} 4x-\sqrt{2} &= x\sqrt{3}+2\sqrt{2} \\ 4x-x\sqrt{3} &= 3\sqrt{2} \\ x(4-\sqrt{3}) &= 3\sqrt{2} \\ x &= \frac{3\sqrt{2}}{4-\sqrt{3}} \cdot \frac{(4+\sqrt{3})}{(4+\sqrt{3})} = \boxed{x = \frac{12\sqrt{2}+3\sqrt{6}}{13}} \end{aligned}$$

$$3. \begin{aligned} 5-\sqrt{3x+4} &= 0 \\ \sqrt{3x+4} &= 5 \\ 3x+4 &= 25 \\ 3x &= 21 \\ x &= 7 \end{aligned} \quad \boxed{x=7}$$

$$4. \begin{aligned} \sqrt[3]{5x+4}-4 &= 0 \\ \sqrt[3]{5x+4} &= 4 \\ 5x+4 &= 64 \\ 5x &= 60 \\ x &= 12 \end{aligned} \quad \boxed{x=12}$$

$$5. \begin{aligned} \sqrt{3x-2} &= 5 \\ 3x-2 &= 25 \\ 3x &= 27 \\ x &= 9 \end{aligned} \quad \boxed{x=9}$$

$$6. \begin{aligned} \sqrt[3]{4x+9} &= 5 \\ 4x+9 &= 125 \\ 4x &= 116 \\ \frac{4x}{4} &= \frac{116}{4} \\ x &= 29 \end{aligned} \quad \boxed{x=29}$$

$$7. \begin{aligned} 18-3x &= x\sqrt{2} \\ x\sqrt{2}+3x &= 18 \\ x(\sqrt{2}+3) &= 18 \\ x &= \frac{18}{\sqrt{2}+3} \cdot \frac{(\sqrt{2}-3)}{(\sqrt{2}-3)} = \boxed{x = \frac{18\sqrt{2}-54}{-7}} \end{aligned}$$

$$8. \begin{aligned} \sqrt{x+8}-5 &= 0 \\ x+8 &= 25 \\ x &= 17 \end{aligned} \quad \boxed{x=17}$$

$$9. \begin{aligned} (\sqrt[3]{x-7})^3 &= (4)^3 \\ x-7 &= 64 \\ x &= 71 \end{aligned} \quad \boxed{x=71}$$

$$10. \begin{aligned} \sqrt[3]{3x}-2 &= 0 \\ \sqrt[3]{3x} &= 2 \\ 3x &= 8 \\ x &= \frac{8}{3} \end{aligned} \quad \boxed{x = \frac{8}{3}}$$

$$11. \begin{aligned} \sqrt{8x-5}-1 &= 2 \\ \sqrt{8x-5} &= 3 \\ 8x-5 &= 9 \\ 8x &= 14 \\ x &= \frac{14}{8} \end{aligned} \quad \boxed{x = \frac{43}{4}}$$

$$12. \begin{aligned} \sqrt{1-4x}-8 &= -6 \\ \sqrt{1-4x} &= 2 \\ 1-4x &= 4 \\ -4x &= 3 \\ x &= -\frac{3}{4} \end{aligned} \quad \boxed{x = -\frac{3}{4}}$$

$$13. \sqrt[4]{7x-2}+12=7$$

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$$14. \begin{aligned} \sqrt[3]{6x-5}+2 &= -3 \\ \sqrt[3]{6x-5} &= -5 \\ 6x-5 &= -125 \\ 6x &= -120 \\ x &= -20 \end{aligned} \quad \boxed{x = -20}$$

$$15. \begin{aligned} \sqrt{6x-4} &= \sqrt{2x+10} \\ 6x-4 &= 2x+10 \\ 4x &= 14 \\ x &= \frac{7}{2} \end{aligned} \quad \boxed{x = \frac{7}{2}}$$

$$16. \begin{aligned} \sqrt{9x-4} &= \sqrt{7x-20} \\ 9x-4 &= 7x-20 \\ 2x &= -16 \\ x &= -8 \end{aligned} \quad \boxed{x = -8}$$

$\frac{2}{16}$   
 $\frac{4}{64}$

$\frac{2}{18}$   
 $\frac{3}{54}$