9.5 p585

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

$(\sqrt{x})^2 = 5^2$

$\boxed{x = 25}$

$\{25\}$

(3) $\sqrt{x} - 4 = 0$

$\sqrt{x} = 4$

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

$\boxed{x = 16}$ $\{16\}$

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

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

$x + 2 = 9$

$\boxed{x = 7}$

$\{7\}$

(7) $\sqrt{x-3} - 11 = 0$

$\sqrt{x-3} = 11$

$(\sqrt{x-3})^2 = 11^2$

$x - 3 = 121$

$\boxed{x = 118}$

$\{118\}$

(9) $\sqrt{3x-5} = 4$

$(\sqrt{3x-5})^2 = 4^2$

$3x - 5 = 16$

$3x = 21$

$\boxed{x = 7}$

$\{7\}$

(11) $\sqrt{x+5} + 2 = 5$

$\sqrt{x+5} = 3$

$(\sqrt{x+5})^2 = 3^2$

$x + 5 = 9$

$\boxed{x = 4}$

$\{4\}$

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

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

$x + 3 = 4x - 3$

$-x \quad\quad -x$

$3 = 3x - 3$

$9 = 3x$

$x = 3$

$\boxed{\{3\}}$

(15) $\sqrt{6x-2} = \sqrt{4x+4}$

$(\sqrt{6x-2})^2 = (\sqrt{4x+4})^2$

$6x - 2 = 4x + 4$

$-4x + 2 \quad\quad -4x + 2$

$2x = 6$

$x = 3$

$\boxed{\{3\}}$

(17) $11 = 6 + \sqrt{x+1}$

$5 = \sqrt{x+1}$

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

$25 = x + 1$

$x = 24$

$\boxed{\{24\}}$

9.5 p585

(19) $\sqrt{x}+10=0$

$\sqrt{x}=-10$

$\boxed{\emptyset}$

Principle Square root can not equal negative #

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

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

$x-1=9$

$x=10$

check

$\sqrt{10-1} \stackrel{?}{=} -3$

$\sqrt{9} \stackrel{?}{=} -3$

$3 \stackrel{?}{=} -3$

False

$\boxed{\emptyset}$

(23) $3\sqrt{x}=\sqrt{8x+16}$

$(3\sqrt{x})^2=(\sqrt{8x+16})^2$

$9x=8x+16$

$x=16$

check

$3\sqrt{16} \stackrel{?}{=} \sqrt{8(16)+16}$

$3\cdot 4=\sqrt{9\cdot 16}$

$3\cdot 4=3\cdot 4$

$\boxed{\{16\}}$

(25) $\sqrt{2x-3}+5=0$

$\sqrt{2x-3}=-5$ ←

$(\sqrt{2x-3})=(-5)^2$ principle square root can not be negative

$2x-3=25$

$2x=28$

$x=14$

check

$\sqrt{2(14)-3}+5 \stackrel{?}{=} 0$

$\sqrt{28-3}+5 \stackrel{?}{=} 0$

$\sqrt{25}+5 \stackrel{?}{=} 0$

$5+5 \stackrel{?}{=} 0$

False

$\boxed{\emptyset}$

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

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

$(\sqrt{3x+4})^2=5^2$

$3x+4=25$

$3x=21$

$x=7$

check

$\sqrt{3(7)+4} \stackrel{?}{=} 5$

$\sqrt{25}=5$

True

$\boxed{\{7\}}$

(29) $3\sqrt{x-1}=\sqrt{3x+3}$

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

$9(x-1)=3x+3$

$9x-9=3x+3$

$6x=12$

$x=2$

ck

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

$3\sqrt{1} = \sqrt{3(3)}$

True

$\{2\}$

9.5 p585

(31) $\sqrt{x+7} = x+5$

$(\sqrt{x+7})^2 = (x+5)^2$

$x+7 = x^2+10x+25$

$-x \quad -7$

$-x-7$

$0 = x^2+9x+18$

$0 = (x+3)(x+6)$

$x+3=0$ or $x+6=0$

$x=-3$ or $x=-6$

ck

$\sqrt{-3+7} \stackrel{?}{=} -3+5$

$\sqrt{4} \stackrel{?}{=} 2$ true

$\sqrt{-6+7} \stackrel{?}{=} -6+5$

$\sqrt{1} = -1$ false

$\{-3\}$

(33) $\sqrt{2x+13} = x+7$

$(\sqrt{2x+13})^2 = (x+7)^2$

$2x+13 = x^2+14x+49$

$-2x \quad -13 \qquad -2x \quad -13$

$0 = x^2+12x+36$

$0 = (x+6)^2$

$x+6=0$

$x=-6$

check

$\sqrt{2(-6)+13} = -6+7$

$\sqrt{1} = 1$ true

$\{-6\}$

(35) $\sqrt{9x^2+2x-4} = 3x$

$(\sqrt{9x^2+2x-4})^2 = (3x)^2$

$9x^2+2x-4 = 9x^2$

$-9x^2 \qquad -9x^2$

$2x-4=0$

$2x=4$

$x=2$

check $\sqrt{9(2)^2+2(2)-4} = 3(2)$

$\sqrt{36} = 6$ true

$\{2\}$

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

$-1 \quad -1$

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

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

$x^2 - 2x + 1 = 2x - 2$

$-2x+2 \quad -2x+2$

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

$x - 3 = 0$ or $x - 1 = 0$

$x = 3$ or $x = 1$

check

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

$3 = \sqrt{4} + 1$

true

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

$1 = 1$

true

$\{1, 3\}$

(39) $x = \sqrt{8-7x} + 2$

$-2 \quad -2$

$x - 2 = \sqrt{8-7x}$

$(x-2)^2 = (\sqrt{8-7x})^2$

$x^2 - 4x + 4 = 8 - 7x$

$+7x - 8 \quad -8 + 7x$

$x^2 + 3x - 4 = 0$

$(x-1)(x+4) = 0$

$x - 1 = 0$ or $x + 4 = 0$

$x = 1$ or $x = -4$

check

$-1 \stackrel{?}{=} \sqrt{8-7(1)} + 2$

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

false

$-4 = \sqrt{8-7(-4)} + 2$

$= \sqrt{8+28}$

$= \sqrt{36} + 2$

false

$\emptyset$

9.5 p 585

(41) $\sqrt{3x+10} = x+4$

$-10 \quad -10$

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

$(\sqrt{3x})^2 = (x-6)^2$

$3x = x^2 - 12x + 36$

$-3x \quad = -3x$

$0 = x^2 - 15x + 36$

$0 = (x-12)(x-3)$

$x-12=0$ or $x-3=0$

$x=12$ or $x=3$

check

$\sqrt{3(12)} + 10 \stackrel{?}{=} 12+4$

$\sqrt{36} + 10 = 16$

$6+10 = 16$

true

$\sqrt{3(3)} + 10 = 3+4$

$\sqrt{9} + 10 = 7$

$3+10 = 7$

false

$\{12\}$

(43) $3\sqrt{x} + 5 = 2$

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

$\sqrt{x} = -1$

principal sq. root cannot be neg.

$\boxed{\emptyset}$

(45) $\sqrt{4x} + 2 = 10$

$\sqrt{4x} = 8$

$2\sqrt{x} = 8$

$\sqrt{x} = 4$

$\boxed{x = 16}$

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

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

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

$x^2 - 8x + 16 = 2x$

$-2x \quad -2x$

$x^2 - 10x + 16 = 0$

$(x-8)(x-2) = 0$

$x-8=0$ or $x-2=0$

$x=8$ or $x=2$

$8 \stackrel{?}{=} \sqrt{2(8)} + 4$

$8 \stackrel{?}{=} \sqrt{16} + 4$

true

$\{8\}$

$2 \stackrel{?}{=} \sqrt{2(2)} + 4$

$2 \stackrel{?}{=} 2+4$

false

(55)

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(49) for $h$

$v = \sqrt{2gh}$

$v^2 = (\sqrt{2gh})^2$

$v^2 = 2gh$

$\frac{v^2}{2g} = \frac{2gh}{2g}$

$h = \boxed{\frac{v^2}{2g}}$

(51) $\sqrt{x+2} = \sqrt{x+8}$

$(\sqrt{x+2})^2 = (\sqrt{x+8})^2$

$(\sqrt{x+2})(\sqrt{x+2}) = x+8$

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

$-x \quad\quad -4 \quad\quad -x \quad -4$

$4\sqrt{x} = 4$

$\sqrt{x} = 1$

$x = 1$

$\boxed{\{1\}}$

(53) $\sqrt{x-8} = \sqrt{x} - 2$

$(\sqrt{x-8})^2 = (\sqrt{x}-2)^2$

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

$-x \quad\quad -x \quad\quad +8$

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

$-4 \quad\quad -4$

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

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

$3 = \sqrt{x}$

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

$x = 9$

check works!

$\boxed{\{9\}}$