9.1

1) $\sqrt{2x+3}-3=0$

$+3 \quad +3$

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

$2x+3=9$

$-3 \quad -3$

$\frac{2x}{2}=\frac{6}{2}$

$x=3$

Check: $\sqrt{2(3)+3}-3=0$

$\sqrt{6+3}-3=0$

$\sqrt{9}-3=0$

$3-3=0$

$0=0\,\surd$

$x=3$

3) $\sqrt{6x-5}-x=0$

$+x \quad +x$

$\left(\sqrt{6x-5}\right)^2=x^2$

$6x-5=x^2$

$-6x+5 \quad -6x+5$

$0=x^2-6x+5$

$0=(x-1)(x-5)$

$x-1=0 \quad x-5=0$

$+1 \quad +1 \qquad +5 \quad +5$

$x=1 \qquad x=5$

Check: $\sqrt{6(5)-5}-5=0$

$\sqrt{30-5}-5=0$

$\sqrt{25}-5=0$

$5-5=0$

$0=0\,\surd$

Check: $\sqrt{6(1)-5}-1=0$

$\sqrt{6-5}-1=0$

$\sqrt{1}-1=0$

$1-1=0$

$0=0\surd$

$x=5,1$

5) $(3+x)^2=\left(\sqrt{6x+13}\right)^2$

$9+6x+x^2=6x+13$

$-13-6x \quad -6x-13$

$x^2-4=0$

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

$x+2=0 \quad x-2=0$

$-2 \quad -2 \qquad +2 \quad +2$

$x=-2 \qquad x=2$

Check: $3+(-2)=\sqrt{6(-2)+13}$

$1=\sqrt{-12+13}$

$1=\sqrt{1}$

$1=1\,\surd$

Check: $3+(2)=\sqrt{6(2)+13}$

$5=\sqrt{12+13}$

$5=\sqrt{25}$

$5=5\,\surd$

$x=-2,2$

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

$+1 \quad +1$

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

$3-3x=4x^2+4x+1$

$-3+3x \qquad +3x-3$

$0=4x^2+7x-2$

$0=(4x-1)(x+2)$

$4x-1=0 \quad x+2=0$

$+1 \quad +1 \qquad -2 \quad -2$

$\frac{4x}{4}=\frac{1}{4} \qquad x=-2$

$x=\frac{1}{4}$

Check: $\sqrt{3-3(\frac{1}{4})}-1=2\left(\frac{1}{4}\right)$

$\sqrt{3-\frac{3}{4}}-1=\frac{1}{2}$

$\sqrt{\frac{9}{4}}-1=\frac{1}{2}$

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

$\frac{1}{2}=\frac{1}{2}\surd$

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

$\sqrt{3+6}-1=-4$

$\sqrt{9}-1=-4$

$3-1=-4$

$2=-4 \quad No!$

$x=\frac{1}{4}$

9) $\sqrt{4x+5}-\sqrt{x+4}=2$

$+\sqrt{x+4} \quad +\sqrt{x+4}$

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

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

$4x+5=8+x+4\sqrt{x+4}$

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

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

$9x^2-18x+9=16(x+4)$

$9x^2-18x+9=16x+64$

$-16x-64 \quad -16x-64$

$9x^2-34x-55=0$

$(9x+11)(x-5)=0$

$9x+11=0 \quad x-5=0$

$-11 \quad -11 \quad +5 \quad +5$

$\frac{9x}{9}=\frac{(-11)}{9} \quad x=5$

$x=-\frac{11}{9}$

Check: $\sqrt{4\left(-\frac{11}{9}\right)+5}-\sqrt{-\frac{11}{9}+4}=2$

$\sqrt{-\frac{44}{9}+5}-\sqrt{\frac{25}{9}}=2$

$\sqrt{\frac{1}{9}}-\frac{5}{3}=2$

$\frac{1}{3}-\frac{5}{3}=2$

$-2=2 \quad No!$

Check: $\sqrt{4(5)+5}-\sqrt{(5)+4}=2$

$\sqrt{20+5}-\sqrt{9}=2$

$\sqrt{25}-3=2$

$5-3=2$

$2=2 \surd$

$x=5$

11) $\sqrt{2x+4}-\sqrt{x+3}=1$

$+\sqrt{x+3} \quad +\sqrt{x+3}$

$\left(\sqrt{2x+4}\right)^2=\left(1+\sqrt{x+3}\right)^2$

$2x+4=1+2\sqrt{x+3}+x+3$

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

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

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

$x^2=4(x+3)$

$x^2=4x+12$

$-4x-12 \quad -4x-12$

$x^2-4x-12=0$

$(x-6)(x+2)=0$

$x-6=0 \quad x+2=0$

$+6 \quad +6 \quad -2 \quad -2$

$x=6 \quad x=-2$

Check: $\sqrt{2(6)+4}-\sqrt{(6)+3}=1$

$\sqrt{12+4}-\sqrt{9}=1$

$\sqrt{16}-3=1$

$4-3=1$

$1=1 \surd$

Check: $\sqrt{2(-2)+4}-\sqrt{(-2)+3}=1$

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

$\sqrt{0}-1=1$

$0-1=1$

$-1=1 \quad No!$

$x=6$

13) $\sqrt{2x+6}-\sqrt{x+4}=1$

$+\sqrt{x+4}\quad +\sqrt{x+4}$

$\left(\sqrt{2x+6}\right)^2=\left(1+\sqrt{x+4}\right)^2$

$2x+6=1+2\sqrt{x+4}+x+4$

$2x+6=5+x+2\sqrt{x+4}$

$-x-5\quad -5-x$

$(x+1)^2=\left(2\sqrt{x+4}\right)^2$

$x^2+2x+1=4(x+4)$

$x^2+2x+1=4x+16$

$-4x-16\quad -4x-16$

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

$(x-5)(x+3)=0$

$x-5=0\quad x+3=0$

$+5\quad +5\qquad -3\quad -3$

$x=5\qquad x=-3$

Check: $\sqrt{2(5)+6}-\sqrt{(5)+4}=1$

$\sqrt{10+6}-\sqrt{9}=1$

$\sqrt{16}-3=1$

$4-3=1$

$1=1$ √

Check: $\sqrt{2(-3)+6}-\sqrt{(-3)+4}=1$

$\sqrt{-6+6}-\sqrt{1}=1$

$\sqrt{0}-1=1$

$0-1=1$

$-1=1\quad No!$

$x=5$

$16x^2-24x-72=0$

$8(2x^2-3x-9)=0$

$8(2x+3)(x-3)=0$

$2x+3=0\quad x-3=0$

$-3\quad -3\qquad +3\quad +3$

$\frac{2x}{2}=\frac{-3}{2}\qquad x=3$

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

Check: $\sqrt{6-2(-\frac{3}{2})}-\sqrt{2\left(-\frac{3}{2}\right)+3}=3$

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

$\sqrt{9}-\sqrt{0}=3$

$3-0=3$

$3=3$ √

Check: $\sqrt{6-2(3)}-\sqrt{2(3)+3}=3$

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

$\sqrt{0}-\sqrt{9}=3$

$0-3=3$

$-3=3\quad No!$

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

15) $\sqrt{6-2x}-\sqrt{2x+3}=3$

$+\sqrt{2x+3}\quad +\sqrt{2x+3}$

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

$6-2x=9+6\sqrt{2x+3}+2x+3$

$6-2x=2x+12+6\sqrt{2x+3}$

$-12-2x\quad -2x-12$

$(-6-4x)^2=\left(6\sqrt{2x+3}\right)^2$

$36+48x+16x^2=36(2x+3)$

$16x^2+48x+36=72x+108$

$-72x-108\quad -72x-108$