ex3 Solve $7+\sqrt{3x} = \sqrt{5x+4} + 5$ $\quad x \geq 0$ ↑ covers both restrictions.

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

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

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

$16(3x) = 4x^2$

$48x = 4x^2$

$0 = 4x^2 - 48x$

$0 = 4x(x-12)$

$x=0 \quad x=12$

check $x=0$

$7+0 = \sqrt{4}+5$

$7 = 2+5$ ✓

check $x=12$

$7+\sqrt{36} = \sqrt{60+4}+5$

$7+6 = \sqrt{64}+5$

$13 = 8+5$ ✓

$x=0$ and $x=12$

Day 1 Do 4, 5, 6, 8, 10

5.3

Day 2 Do 9, 11-19

4a) $\sqrt{z}=5$ $\quad z=25$

b) $-\sqrt{y}=-6$ $\quad y=36$

c) $\sqrt{3x}=2$ $\quad 3x=4$ $\quad x=4/3$

d) $-7=-\sqrt{-6m}$ $\quad 49=-6m$ $\quad m=-\frac{49}{6}$

5. $k+4=\sqrt{-2k}$

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

$k^2+10k+16=0$

$(k+8)(k+2)=0$

$k=-8 \quad k=-2$

check $k=-8$

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

$-4=\sqrt{16}$

NO.

extraneous

$k=-2$

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

$2=\sqrt{4}$

$2=2$ ✓

$k=-2$

6a) $-3\sqrt{n-1}+7=-14$

$-3\sqrt{n-1}=-21$

$\sqrt{n-1}=7$

$n-1=49$

$n=50$

check $-3\sqrt{49}+7=-14$

$-3(7)+7=$

$-21+7=$

$-14=-14$ ✓

$n=50$

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6b) $-7-4\sqrt{2x-1}=17$

$-4\sqrt{2x-1}=24$

$\sqrt{2x-1}=-6$

$2x-1=36$

$2x=37$

$x=37/2$

check $-7-4\sqrt{2(37/2)-1}=17$

$-7-4\sqrt{36}=$

$-7-4(6)=$

$-7-24=$

$-31=17$

∴ no solution

c) $12=-3+5\sqrt{8-x}$

$15=5\sqrt{8-x}$

$3=\sqrt{8-x}$

$9=8-x$

$x=-1$

check $12=-3+5\sqrt{8--1}$

$12=-3+5(3)$

$12=-3+15$ ✓

$x=-1$

8 a) $\sqrt{3x-5}=x-5$

$3x-5=x^2-10x+25$

$0=x^2-13x+30$

$0=(x-10)(x-3)$

$x=10 \quad x=3$

check $x=10$

$5+\sqrt{30-5}=10$

$5+\sqrt{25}=10$

$5+5=10$ ✓

$x=3$

$5+\sqrt{9-5}=3$

$5+\sqrt{4}=3$

$5+2=3$ no.

$x=10$

b) $\sqrt{x^2+30x}=8$

$x^2+30x=64$

$x^2+30x-64=0$

$(x+32)(x-2)=0$

$x=-32 \quad x=2$

check

$x=-32$

$\sqrt{64}=8$ ✓

$x=2$

$\sqrt{4+60}=8$

$\sqrt{64}=8$

$8=8$ ✓

$x=2, x=-32$

c) $\sqrt{d^2+5}=d-1$

$d^2+5=d^2-2d+1$

$0=d^2-3d-4$

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

$d=4 \quad d=-1$

check

$d=4$

$\sqrt{9}=4-1$

$3=3$ ✓

$d=-1$

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

$2=-2$

no

∴ $d=4$

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8d) $\sqrt{\frac{j+1}{3}} + 5j = 3j - 1$

$\sqrt{\frac{j+1}{3}} = -2j - 1$

$\frac{j+1}{3} = 4j^2 + 4j + 1$

$j + 1 = 12j^2 + 12j + 3$

$0 = 12j^2 + 11j + 2$

$0 = (4j + 1)(3j + 2)$

$j = -\frac{1}{4} \quad j = -\frac{2}{3}$

check $-\frac{1}{4}$

$\sqrt{\frac{3/4}{3}} + -5/4 = -\frac{3}{4} - 1$

$\sqrt{1/4} + -5/4 = -\frac{7}{4}$

$\frac{1}{2} - \frac{5}{4} = -\frac{7}{4}$

$-\frac{3}{4} = -\frac{7}{4}$ no

check $-\frac{2}{3}$

$\sqrt{\frac{1/3}{3}} - \frac{10}{3} = -2 - 1$

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

$\frac{1}{3} - \frac{10}{3} = -3$

$-\frac{9}{3} = -3$ ✓

$\boxed{j = -\frac{2}{3}}$

10a) $\sqrt{z+5} = \sqrt{2z-1}$

$z + 5 = 2z - 1$

$6 = z$

check $\sqrt{11} = \sqrt{12-1}$

$\sqrt{11} = \sqrt{11}$

$\boxed{z = 6}$

b) $\sqrt{6y-1} = \sqrt{y^2-17}$

$6y - 1 = y^2 - 17$

$0 = y^2 - 6y - 16$

$0 = (y - 8)(y + 2)$

$y = 8 \quad y = -2$

check $y = 8$

$\sqrt{48-1} = \sqrt{64-17}$

$\sqrt{47} = \sqrt{47}$ ✓

$y = -2$

$\sqrt{-12-1} = \sqrt{4-17}$

$\sqrt{-13} = \sqrt{-13}$

but $y \geq \frac{1}{6}$

∴ discard

$\boxed{y = 8}$

c) $\sqrt{5r-9} - 3 = \sqrt{r+4} - 2$

$\sqrt{5r-9} = \sqrt{r+4} + 1$

$5r - 9 = r + 4 + 1 + 2\sqrt{r+4}$

$4r - 14 = 2\sqrt{r+4}$

$2r - 7 = \sqrt{r+4}$

$4r^2 - 28r + 49 = r + 4$

$4r^2 - 29r + 45 = 0$

Hilroy

$(4r-9)(r-5)=0$

$r=\frac{9}{4}$ $r=5$

check $r=9/4$

$\sqrt{\frac{45}{4}-9}-3=\sqrt{\frac{9}{4}+4}-2$

↓ not possible

check $r=5$

$\sqrt{25-9}-3=\sqrt{5+4}-2$

$\sqrt{16}-3=\sqrt{9}-2$

$4-3=3-2$ ✓

$r=5$

d) $\sqrt{x+19}=7-\sqrt{x-2}$

$x+19=49+x-2-14\sqrt{x-2}$

$-28=-14\sqrt{x-2}$

$2=\sqrt{x-2}$

$4=x-2$

$6=x$

check

$\sqrt{25}=7-\sqrt{4}$

$5=7-2$

$5=5$ ✓

$x=6$