40. $\sqrt[4]{2x} + \sqrt[4]{x+3} = 0$

$-\sqrt[4]{x+3} \quad -\sqrt[4]{x+3}$

$(\sqrt[4]{2x})^4 = (-1\sqrt[4]{x+3})^4$

$2x = x+3$

$-x \quad -x$

$x = 3$

No Sol.

check:

$\sqrt[4]{2(3)} + \sqrt[4]{3+3} = ?$

$\sqrt[4]{6} + \sqrt[4]{6} = ?$

$2\sqrt[4]{6} = 0$

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

$x = (x-6)(x-6)$

$x = x^2 - 6x - 6x + 36$

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

$-x \quad -x$

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

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

$-4x \quad -9x \quad -13x$

$x - 4 = 0$ or $x - 9 = 0$

$+4 \quad +4 \quad +9 \quad +9$

$x = 4$ $x = 9$

38. $(2\sqrt[3]{10-3x})^3 = (\sqrt[3]{2-x})^3$

$8(10-3x) = 2-x$

$80 - 24x = 2 - x$

$+24x \quad +24x$

$80 = 2 + 23x$

$-2 \quad -2$

$\frac{78}{23} = \frac{23x}{23}$

$x = \frac{78}{23}$

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

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

$-3x \quad -3x$

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

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

$-12x \quad -3x \quad -15x$

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

$+12 \quad +12 \quad +3 \quad +3$

$x = 12$ $x = 3$

42. $(\sqrt{3x+7})^2 = (x+3)^2$

$3x+7 = (x+3)(x+3)$

$3x+7 = x^2 + 6x + 9$

$-3x \quad -7 \quad -3x \quad -7$

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

$(x+2)(x+1)$

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

$-2 \quad -2 \quad -1 \quad -1$

5.6 Imaginary Numbers

Allow us to solve negative roots

$i = \sqrt{-1}$ $\quad i^2 = -1$ $\quad i^3 = -\sqrt{-1}$ $\quad i^4 = 1$

Ex: Write the following using im. #'s

$\sqrt{-5} = \sqrt{5} \cdot \sqrt{-1} = \sqrt{5}\,i$

$\sqrt{-49} = \sqrt{49} \cdot \sqrt{-1} = 7i$

$\sqrt{-\frac{4}{9}} = \sqrt{\frac{4}{9}} \cdot \sqrt{-1} = \frac{2}{3}i$

Adding + subtracting im. #'s

$\sqrt{-9} + \sqrt{-36}$

$3i + 6i$

$9i$

$6\sqrt{-28} - \sqrt{-63}$

$6 \cdot \sqrt{4}\sqrt{7}\,i - \sqrt{9}\sqrt{7}\,i$

$12\sqrt{7}\,i - 3\sqrt{7}\,i$

$9\sqrt{7}\,i$

Multiplying Im. #5

$\sqrt{-15} \cdot \sqrt{-15} = \sqrt{225} = 15$

$\sqrt{15}\,i \cdot \sqrt{15}\,i$

$\sqrt{225}\,i^2$

$15 \cdot -1$

-15

Complex Numbers

Numbers with real + imaginary terms.

$$a + bi$$

real imaginary

Ex: Add

$$(-7+8i)+(5-3i)$$

$$-2+5i$$

Ex: Subtract

$$(8-i)+(+6+-3i)$$

$$14-4i$$

Ex: multiply

$$\sqrt{-4}(3-4i)$$

$$2i(3-4i)$$

$$6i-8i^2$$

$$6i-8(-1)$$

$$6i+8$$

$$8+6i$$

HW: p. 354
2-60 even, skip 22-28