Solve the following

1. $2x - 7 = 34$

2. $x^2 + 18 = 45$

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

4. $x^2 + 2x + 24 = 0$

① $\frac{2x}{2} = \frac{41}{2}$ $x = 20.5$

② $\sqrt{x^2} = \sqrt{27}$

$x = \pm 3\sqrt{3}$

③ $(x+3)(x+1) = 0$

$x+3=0$ $x+1=0$

$x=-3$ $x=-1$

$a=1$ $b=2$ $c=24$ $x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(24)}}{2(1)}$

$= \frac{-2 \pm \sqrt{-92}}{2}$

$= \frac{-2 \pm 2i\sqrt{23}}{2}$

$= \boxed{-1 \pm i\sqrt{23}}$

Solving Higher Level Polynomials by Factoring

Steps:

1. Make sure the equation is equal to zero.
2. Factor the polynomial by the appropriate method.
3. Set each factor equal to zero.
4. Solve each equation using the appropriate method.

Example 1: $5x^4 + 33x^2 + 40 = 0$

$5 \cdot 40 = 200$

$10 \quad 20 = 30$

$8 \quad 25$

$5x^4 + 8x^2 + 25x^2 + 40 = 0$

$x^2(5x^2+8) + 5(5x^2+8) = 0$

$(5x^2+8)(x^2+5) = 0$

$5x^2 + 8 = 0$

$-8 \quad -8$

$\frac{5x^2}{5} = \frac{-8}{5}$

$\sqrt{x^2} = \sqrt{\frac{-8}{5}}$

$x = \pm 2i\sqrt{\frac{2}{5}}$

$x^2 + 5 = 0$

$-5 \quad -5$

$\sqrt{x^2} = \sqrt{-5}$

$x = \pm i\sqrt{5}$

Example 2: $5x^3 - x^2 - 15x + 3 = 0$

$\frac{5x^3}{x^2} = x$

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

$x^2(5x-1) - 3(5x-1) = 0$

$(5x-1)(x^2-3) = 0$

$5x - 1 = 0$

$+1 \quad +1$

$\frac{5x}{5} = \frac{1}{5}$

$x = \frac{1}{5}$

$x^2 - 3 = 0$

$+3 \quad +3$

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

$x = \pm\sqrt{3}$

Example 3: $x^3 - 1 = 0$

$\sqrt[3]{x^3} = x$

$\sqrt[3]{1} = 1$

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

$x-1=0$

$x=1$

$x^2+1x+1=0$

$a=1 \quad b=1 \quad c=1$

$x = \frac{-1 \pm \sqrt{(1)^2-4(1)(1)}}{2(1)}$

$x = \frac{-1 \pm \sqrt{-3}}{2}$

$x = \frac{-1 \pm i\sqrt{3}}{2}$

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

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

$a \cdot c = -4$ $\quad 2x^2+3x-2$

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

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

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

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

$x=0$

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

$x=-2$

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

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

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

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

$$=\frac{-3\pm\sqrt{25}}{4}$$

$\frac{-3+5}{4}=\frac{1}{2}$

$\frac{-3\pm5}{4}$

$\frac{-3-5}{4}=-2$