Solving Equations

- There are two basic steps to solve an equation:
  - **Collect like terms**
  - **Isolate the variable**

- **Collect Like Terms**
  - **Identify** each group of like terms.
  - **Remove** a term from one side of the equal sign.
    - Remove a term by performing its opposite operation.
    - If the term to be removed is added, then subtract; if multiplied, then divide; etc.
    - Sometimes, the like terms are on one side of the equal sign; if so, combine them as appropriate.
  - **Balance** the equation by performing the same operation on the other side of the equal sign. This will **move** the term you just removed – from one side of the equal sign to the other.

- **Isolate the Variable**
  - **Goal**: get the variable alone on one side of the equal sign.
  - When there are other terms on the same side of the equal sign as the variable term, use the **remove/move** approach to move them to the opposite side of the equal sign.
  - The variable will often be multiplied or divided by a constant. Remove the constant using the inverse operation – division or multiplication.

- **Tips**
  - Usually, do all operations outside any parentheses first.
  - If possible, combine variable terms first; remove/move so that you get a positive variable term.
  - Usually, perform additions and subtractions before multiplications and divisions.

Examples:

• $x + 4 = 6$	• There are two like terms: +4 and +6 • Remove +4 by subtracting 4 from each side of the equal sign. • No additional isolation of the variable is required. $x = 2$
• $2 + 2x + 4 = x$	• There are two groups of like terms: $+2x$ and $+x$; and +2 and +4 • Remove $+x$ by subtracting x from each side of the equal sign. • Combine +2 and +4 (they're on the same side of the equal sign) • Isolate the variable by subtracting 4 from each side of the equal sign. $x = -6$.
• $4x + 2 = x - 4$	• There are two sets of like terms: $+4x$ and $+x$, and +2 and –4 • Remove $+x$ by subtracting x from each side of the equal sign. • Remove the +2 by subtracting 2 from each side of the equal sign • Isolate the variable by dividing each side by 3. $x = -2$.
• $2l + 2w = 16$ Solve for l.	• Remove $+2w$ by subtracting $2w$ from each side of the equal sign. • Isolate the variable by dividing each side of the equation by 2. $l = 8 - w$.