Organic chemistry:

CARBON:
- Atomic # = 6, therefore has 4 valence electrons
- Forms covalent bonds with:

Hydrocarbons (p. 34; Fig. 3.1):
Ex.

6 FUNCTIONAL GROUPS: (p. 35; Fig. 3.2)

1. HYDROXYL GROUP

2. CARBONYL GROUP
   ALDEHYDES (C dbl bond O at the end)
   KETONES (C dbl bond O in middle)

3. CARBOXYL GROUP
carboxylic acids.

4. AMINE GROUP
amines.

5. SULFHYDRYL GROUP

6. PHOSPHATE GROUP
   Ex. ATP ---> ADP + Pi

Macromolecules:

4 classes of macromolecules in living organisms:
1. Carbohydrates
2. Proteins
3. Nucleic acids
4. Lipids

Classifying organic compounds:
   Monomers:

   Polymers:
Formation of polymers: (p. 36; Figure 3.3A)

**Dehydration synthesis:**

Ex. glucose + glucose = maltose (found in beer)

Breaking of polymers: (p. 36; Figure 3.3B)

**Hydrolysis** (water; loosening or splitting)

Ex. digestive enzymes

**Types of Macromolecules:**

**CARBOHYDRATES:**

Classified by:

1. **Monosaccharides** = (mono = single; sacchar = sugar) (p. 37; fig. 34B)
   
   Simple sugar composed of:
   Major nutrient for cells, with glucose being the most common.

   Can be produced by photosynthesis from CO₂, H₂O & sunlight.
   
   Photosynthesis: \( 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{sunlight} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \)

   Used in cellular respiration.
   
   Respiration: \( \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} \)

   Can be used into forming disaccharides & polysaccharides.

2. **Disaccharides** = (Di = two; saccharide = sugar)

   Results from the removal of:
   
   (p. 38; fig. 3.5)

<table>
<thead>
<tr>
<th>Disaccharide</th>
<th>Monomers</th>
<th>Usage</th>
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</thead>
<tbody>
<tr>
<td>Maltose</td>
<td></td>
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<tr>
<td>Lactose</td>
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<tr>
<td>Sucrose</td>
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</tbody>
</table>

3. **Polysaccharide:** (p. 39; fig. 3.7)

   -2 important biological functions:
   
   1. **Energy storage** (starch & glycogen)
      
      a) **Starch:**
      
      b) **Glycogen:**

   2. **Structural support** (cellulose & chitin)
      
      a) **Cellulose:**
      
      b) **Chitin:**
PROTEINS: (pp. 42-45; Figures 3.12 – 3.18)

Peptide bond (p. 43; Fig. 3.13):
-N-C-C-N-C-C- = backbone
Polypeptide chain =

There are **20 amino acids** which make up proteins.
Amino acids contain both **carboxyl** and **amino** functional groups.

Levels of protein structure (p. 45; Figs. 3.15 – 3.18):
a) **Primary structure (1°):**

b) **Secondary structure (2°):**

2 types of secondary structure:
- **α helix**
- β pleated sheet

c) **Tertiary structure (3°):**

1. Weak interactions (but cumulatively make it stable)
   a)
   b)
   c)

2. Covalent linkage
disulfide bridges
d) **Quaternary structure (4°):**

   Ex. Hemoglobin = 4 subunits

Denaturation:
Causes of denaturation:
1.
2.
3.
4.

8 Functions of proteins:
1. structural support
2. storage
3. transport
4. hormonal
5. receptor
6. contractile
7. defense
8. enzymatic
**NUCLEIC ACIDS:** (p. 46 - 47; Figs. 3.19 - 3.20A & B)

**Nucleotide** = building block of a nucleic acid; composed of:

a) **Pentose** (5-C sugar)

b) **Nitrogenous bases**:  
   - **Pyrimidine**:
     - Purine:

c) **Phosphate** Group:

3 **Examples of Nucleotide based molecules**:

1. **DNA** = deoxyribonucleic acid
   - DNA: the double helix = 3-D shape = Watson & Crick => 1953
   - Contains:

2. **RNA** = ribonucleic acid
   - Contains:

3. **ATP** = adenosine triphosphate

Functions of Nucleotide based molecules
   - a)
   - b)
   - c)
   - d)

**LIPIDS**: (p. 40 – 41)

1. **Fats**: macromolecules constructed from:
   - a) glycerol = 3C -OH
   - b) Fatty acid (carboxylic acid)
     - carboxyl:
     - hydrocarbon tail:
   - Formation of fats (p. 40; Fig. 3.8 B & C)

   **Triglycerides**:

<table>
<thead>
<tr>
<th>SATURATED</th>
<th>UNSATURATED</th>
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2. **Phospholipids**  
   Composed of:  
   Hydrophilic heads & Hydrophobic tails  
   
   **Amphipatic:**

   **Micelles:**

   **Surfactant:**

3. **Steroids** (p. 41; Fig. 3.9)

   **Functions of lipids:**
   1.
   2.
   3.
   4.
   5.
   6.