FOOD

REQUIRED FOR:

ENERGY &

GROWTH

METABOLISM

- All the chemical reactions that take place within a living organism.
- Can be subdivided into:
  - **Anabolism** – building up simple molecules into more complex molecules.e.g. Photosynthesis
  - **Catabolism** – breaking down complex molecules into simpler ones. E.g Respiration & Digestion

3.3 Food is essential for life's activities

Food is required for:

- Energy – food is broken down in cellular respiration to produce energy.
- Provide building blocks for growth and repair of cells.
- Metabolism – to produce the chemicals that take part in and control all the chemical reactions occurring in the body.

BIOELEMENTS

- 6 Main elements (Macronutrients) : Carbon (C), Hydrogen (H), Oxygen (O), Nitrogen (N), Phosphorous (P) and Sulphur (S)
- 5 Mineral elements (Micronutrients) found as dissolved salts : Sodium (Na), Magnesium (Mg), Chlorine (Cl), Potassium (K) and Calcium (Ca)
- 3 Trace elements: Iron (Fe), Copper (Cu) and Zinc (Zn).

BIOMOLECULES

DEF: Biomolecules are chemicals that are made inside a living thing.

- 4 major types found in food are:
  - Carbohydrates
  - Lipids
  - Proteins
  - Vitamins

CARBOHYDRATES

- Elements: C , H, O
- Smallest unit: Monosaccharide's (Fig 5.3 Pg 33)

Types:

-Starch-stored in plants (storage Role)

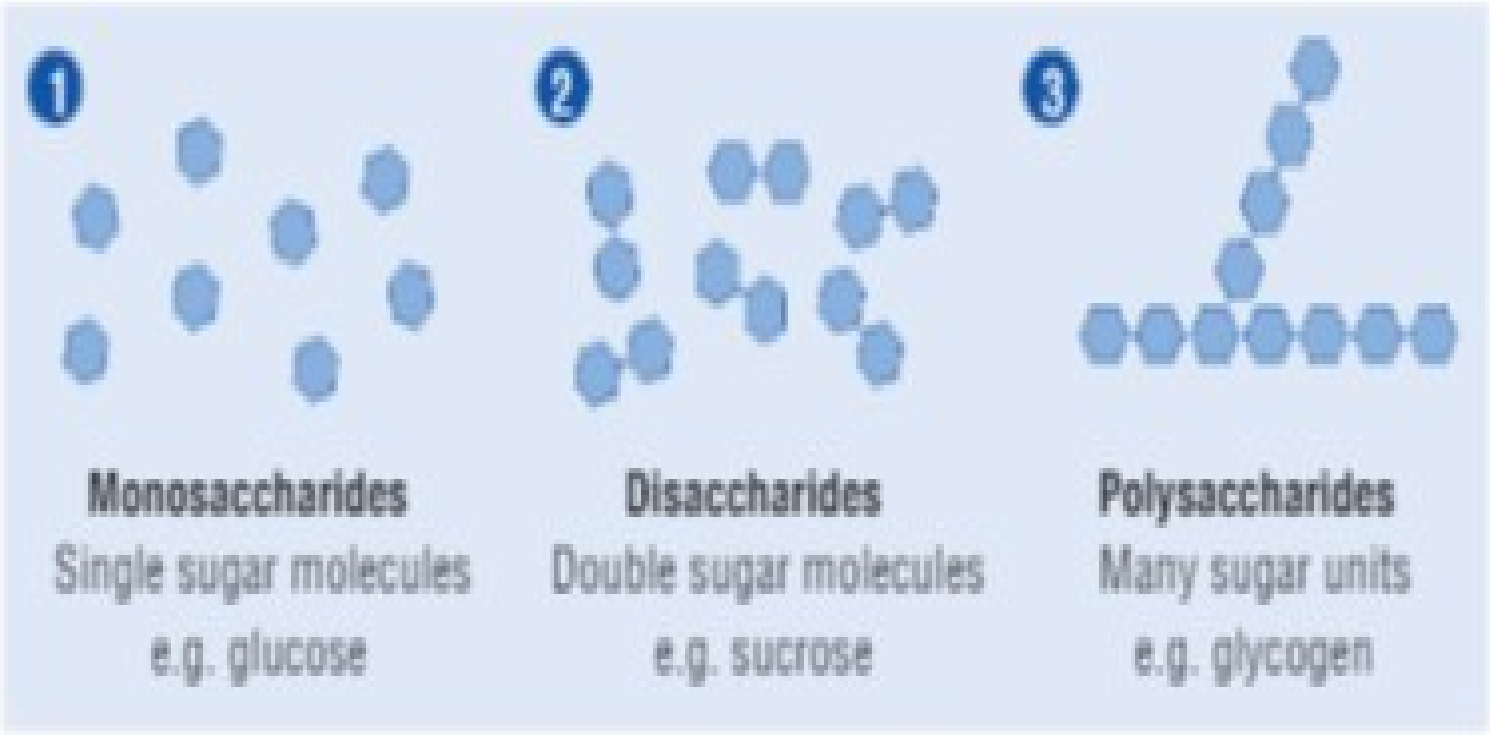
-Cellulose-Found in cell walls of plant (Structural Role)

-Glycogen—carbohydrate stored by animals (Storage)

Carbohydrates cont….

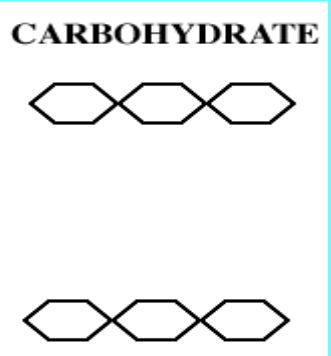
- Metabolic role- Broken down in respiration to provide energy

- Food source-Breads, potatoes, rice , sugars, cakes etc



3.4 Three types of carbohydrate

Carbohydrates



The general formula for a carbohydrate is

$C_x(H_2O)_y$

There are twice as many hydrogen molecules as oxygen molecules

Most carbohydrates contain 6 carbons

A common carbohydrate

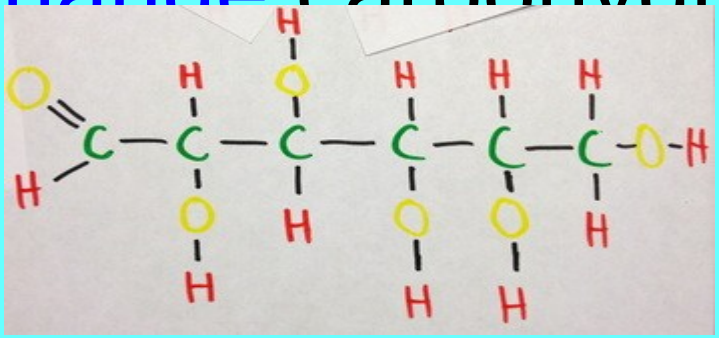
General formula = $C_x(H_2O)_y$

When x = y = 6 (6 is most common value for x and y)

We get the formula $C_6H_{12}O_6$

What is the name of this monosaccharide carbohydrate?

Glucose



Another common carbohydrate

General formula = $C_x(H_2O)_y$

When x = 12 and y = 11

We get the formula $C_{12}H_{22}O_{11}$

What is the name of this disaccharide carbohydrate?

Sucrose

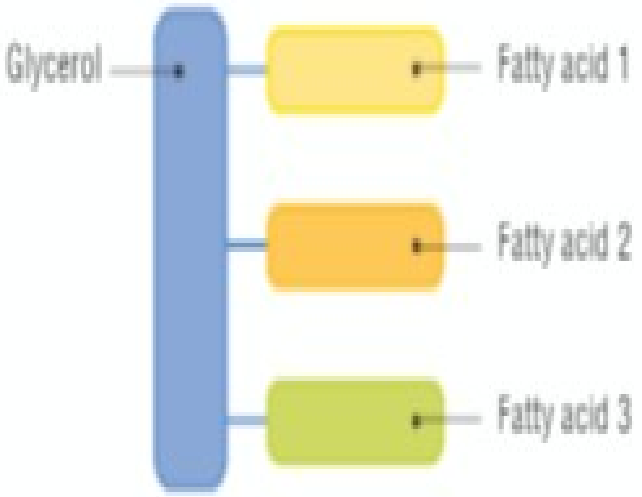
Structural Role-cellulose

Lipids(Fats&Oils)

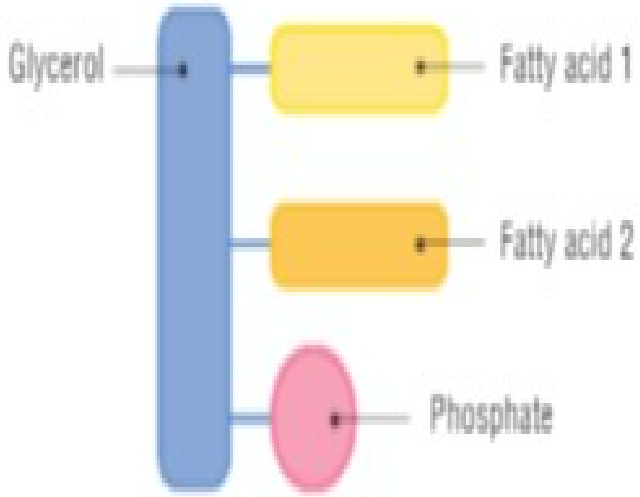
- Elements: C, H,O
- Smallest unit: **Triglyceride** (One molecule of glycerol linked to three fatty acids)
- Fig 5.4 Pg 35
- Phospholipids: are fat like substances where one of the fatty acids is replaced by a phosphate group added to it (Fig 5.5)
- Types:
  - Animal fats
  - Plant oils

Lipids continued

- Metabolic role: Broken down in respiration to provide energy
- Structural role: Store energy/Insulate
- Dietary source: Butter, oils, margarine, cream etc



3.8 A triglyceride (lipid molecule)



3.9 A phospholipid molecule

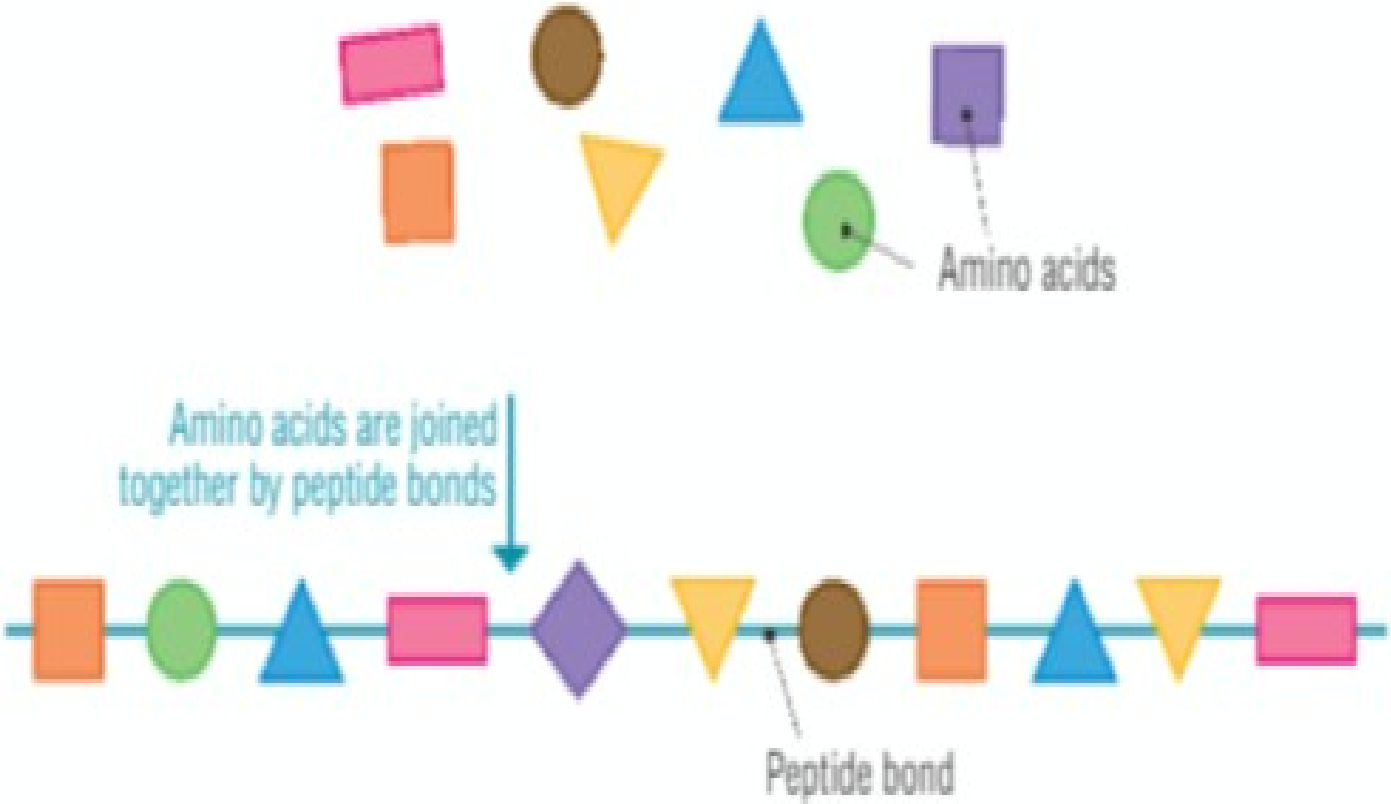
PROTEINS

- Elements: C, H, O, N
- Proteins are composed of 20 common amino acids
- Bond between amino acids is called a peptide bond
- Smallest Unit: peptide
- Peptide (<20 amino acids) - polypeptide(>20 amino acids) – protein (at least 200 amino acids)

Proteins continued

- Metabolic role (folded proteins)-Used as enzymes to control reactions

- Structural role (fibrous proteins)-Found in e.g. keratin in hair, nails and feathers
- Dietary source: meat, fish, egg, nuts, beans



3.10(a) Part of a protein molecule, consisting of a polypeptide chain

VITAMINS

- Organic compounds
- Cannot be made in the body
- Must be taken in the diet
- Required in very small amounts
- Essential for correct functioning of the body
- Often act as co-enzymes
- Lack of a vitamin causes a deficiency disease
- Named by letters.

Water soluble/Fat soluble Vitamins

- **Water soluble**

Vitamin C

Source-Citrus Fruits

Function

Forms connective tissue such as skin and gums

-Helps Immune System

Deficiency: Scurvy-Poor healing of skin, gums causing loss of teeth

- **Fat soluble**

Vitamin D

Source-Dairy Products

Function Helps to absorb calcium needed for healthy bones and teeth

Deficiency: Rickets-weak deformed bones

MINERALS

- Inorganic nutrients in the form of dissolved salts.
- Humans:
  - Iron for haemoglobin
  - Calcium for healthy bones
- Plants:
  - Magnesium for producing chlorophyll
  - Calcium for cementing cell walls together

Figure 2. Photograph of a patient with rickets showing bowing of the legs (A) with classical radiological findings (B). of rickets.

(A)

(B)

WATER

- H_20 – most abundant liquid on earth, vital for all living things.
- Properties:
  - Liquid at normal environmental temperatures
  - Transport medium
  - Solvent – lots of things dissolve in water
  - High heat capacity –slow to warm up or cool down
  - Surface tension

Importance of Water

- 5 reasons why water is so important: