PROTEINS (POLYPEPTIDES)

- Proteins are **macromolecules** that consist of long, unbranched _____ of **amino acids**. These chains may contain about 20 up to hundreds of amino acids.

- Each cell contains hundreds of different proteins, and each kind of cell has some proteins that are _____ to it. Plant or animal species that are closely related by evolution have proteins that are very _____. Their proteins will differ considerably from those of a _____ related species.

- There are about 20 different amino _____, that can be arranged in billions of ways to make long-chain proteins. Not all proteins contain all of the possible amino acids.

- Proteins are broken down by digestive _____ to amino acids, and then these amino acids are _____ to form different proteins (e.g. muscle, _____)

- About 12 of the amino acids can be synthesised by the human body (in ribosomes), but 8 amino acids cannot be made by the body. These 8 must be included in the _____, and are called essential amino acids.

- **5 Functions of Proteins**
  1. Supporting structure (e.g. cell membranes)
  2. Metabolism (e.g. enzymes)
  3. Immune defence (e.g. antibodies)
  4. Body regulation (e.g. hormones)
  5. Last resort energy source after carbohydrates and lipids

- **3 Main Types of Proteins**
  1. Fibrous Proteins – structural proteins that resemble coiled springs (e.g. keratin in hair, collagen in skin, myosin in muscle)
  2. Globular Proteins – functional proteins that have irregular shapes (e.g. enzymes, hormones, antibodies)
  3. Conjugated Proteins – composed of both protein and non-protein parts (e.g. lipoproteins in cell membranes, nucleoproteins in the cell nucleus)

NUCLEIC ACIDS (DNA and RNA)

2 Types of Nucleic Acids

1. DNA or Deoxyribonucleic Acid forms the _____ and is found only in the _____ of cells
2. RNA or Ribonucleic Acid is found in the nucleus, _____, and some other parts of the cell such as mitochondria and chloroplasts

Nucleotides

- Nucleic acids consist of a large number of _____ joined to form long, unbranched chains.

- Each nucleotide is made of 3 parts:
  1. **a nitrogen-containing base** (adenine, guanine, cytosine, _____ or uracil)
  2. **a phosphate group**
  3. **a sugar** (ribose or)

Complementary Nitrogen Bases

- The nitrogen bases are of 2 types:
  1. **Purines** (adenine and _____)
  2. **Pyrimidines** (cytosine, and thymine or uracil)

Structure of DNA

- DNA is composed of _____ long strands of nucleotides that are twisted around each other into a double _____ shape.

- The nitrogen bases of DNA are adenine and guanine, and _____ and thymine.

- The sugar of DNA is deoxyribose (ribose with one less oxygen atom).

- The order of nitrogen bases is the **complement** of each other on the 2 strands.

Structure of RNA

- RNA is composed of _____ strand of nucleotides in different shapes.

- The nitrogen bases of RNA are adenine and guanine, and cytosine and uracil.

- The sugar of RNA is _____

- There are 3 types of RNA:
  1.**Messenger RNA** (mRNA)
  2. **Transfer RNA** (_____)
  3. **Ribosomal RNA** (_____)