Biology Revision Notes – Digestion And Genetics

1. A balanced diet needs carbohydrates, proteins, fats, vitamins, minerals, fibre, and water.
2. **Carbohydrates** are chains of **glucose**, made of carbon, hydrogen, and oxygen – **sugars** are short chains of glucose, and **starches** are long chains of glucose.
3. **Proteins** are made of **amino acids**, which are made of carbon, hydrogen, oxygen, nitrogen, sulphur and phosphates.
4. **Fats** are made of **glycerol** and **fatty acids**, which are made of carbon, hydrogen and oxygen.
5. **Vitamins** are used for chemical reactions in cells.
6. **Minerals** are used for synthesising important molecules.
7. **Fibre** is made of cellulose, and keeps the digestive system's muscles working.
8. **Digestion** works **mechanically**, by chewing and mixing, and **chemically**, with enzymes.
9. The parts of the digestive system.
10. **Enzymes** are biological catalysts:
    - **Carbohydrases** – turn carbohydrates into glucose.
    - **Proteases** – turn proteins into amino acids.
    - **Lipases** – turn fats into glycerol and fatty acids.
11. The properties of all enzymes:
    - They are **denatured** at high temperatures.
    - They are affected by the **pH** – i.e. they work best at an optimum pH.
    - They are destroyed by **heavy metals**.
    - They are **specific**.
    - They usually work in **small amounts**.
12. The **substrate** fits into the **active site** of the enzyme, and is broken down (in digestive enzymes).
13. When an enzyme is **denatured**, the active site changes shape, and so doesn't fit the substrate.
14. **Variation** can be inherited, or affected by the environment:
    - **Continuous variation** – gradual changes, e.g. height and weight.
    - **Discontinuous variation** – distinct changes, e.g. shoe size and blood group.
15. **Asexual reproduction** has only one parent, and the offspring are identical (unicellular organisms).
16. **Sexual reproduction** has two parents, and some features are inherited from each.
17. Humans have 23 pairs of **chromosomes**, made of **DNA** (deoxyribose nucleic acid).
18. **Genes** are sections of DNA that code for certain characteristics, e.g. eye colour.
19. The following words are used in genetics:
    - **Alleles** – different forms of the same gene.
    - **Dominant** – the allele 'overpowers' the recessive allele when they are both different.
    - **Recessive** – the allele is 'overpowered' by the dominant allele when they are both different.
    - **Homozygous** – having two identical alleles for a particular characteristic.
    - **Heterozygous** – having two different alleles for a particular characteristic.
    - **Phenotype** – an organism's outward appearance.
    - **Genotype** – the genes that an organism contains.
    - **Diploid** – a cell with the full complement of chromosomes (46 in humans).
    - **Haploid** – a cell with half the full complement of chromosomes (23 in humans).
    - **Parental generation** – the 'parents'.
    - **F1 generation** – the 'children'.
    - **F2 generation** – the 'grandchildren'.
20. Drawing genetic diagrams, and calculating probabilities of characteristics.
21. Males have **XY** chromosomes, and females have **XX** chromosomes – the Y chromosome is smaller than the X chromosome.
22. The following are **genetic diseases**:
    - **Cystic fibrosis** – caused by a recessive allele.
    - **Huntington's chorea** – caused by a dominant allele (HH is a lethal gene).
    - **Haemophilia** – caused by a recessive allele on the X chromosome (hh is a lethal gene).
    - **Down's syndrome** – caused by three chromosome 21s.
23. **Mutations** are spontaneous changes in the genes/chromosomes. They sometimes give rise to better adapted organisms (e.g. bacterial resistance to antibiotics). They are caused by radiation, mutagenic chemicals, and/or spontaneous changes.
24. **Evolution** is the way organisms change to become better adapted, and to form new species.
25. **Natural selection** states that the 'fittest' organisms will survive and breed, making each generation better adapted to the environment (i.e. 'survival of the fittest').