Term (2): Unit (1): Chemical Reactions

* **Chemical Reaction:** Breaking up of coherences in molecules of reactants and formation of new coherences in molecules of new resultants (products) from reaction.

*** Types: A- Thermal Decomposition reactions:** Reactions which Involve breaking up compounds by effect of heat.

Metal oxide	Mercuric oxide	red	metal Mercury	silver precipitate	+ oxygen (increases flame of match)	$2\,HgO \xrightarrow{\Delta} 2\,Hg + O_2\uparrow$
Metal hydroxide	Copper hydroxide	blue	metal oxide Copper oxide	black	+Water vapour (extinguish burning match)	$Cu(OH)_2 \xrightarrow{\Delta} CuO + H_2O\uparrow$
Metal sulphate	Copper sulphate	blue			+ Sulphur trioxide (with vapour form H_2SO_4)	$CuSO_4 \xrightarrow{\Delta} CuO + SO_3\uparrow$
Metal carbonate	Copper carbonate	green			+ Carbon dioxide (extinguish burning match)	$CuCo_3 \xrightarrow{\Delta} CuO + CO_2\uparrow$
Metal nitrate	Sodium nitrate	white	Sodium nitrite	yellowish white	+ oxygen	$2\,NaNo_3 \xrightarrow{\Delta} 2\,NaNO_2 + O_2\uparrow$

* **Chemical activity series:** Arrangement of the metals in a descending order according to the degree of their chemical activity.

B- Substitution reactions: Reactions which depend on activity of metals, where element which is more active substitutes (replaces) less active one in its compound.

*** Types:1- Simple substitution reactions:** Reactions in which one of elements substitutes another element in a solution of one of its compounds.

(A) - A metal substitutes the hydrogen of water or acid.		**(B) - A metal substitutes another one in its salt solution.**
metal substitutes the hydrogen of water	metal substitutes the hydrogen of acid.	Magnesium is more active than Copper (comes before) so, (Mg)substitutes (Cu)
produce metal hydroxide and Hydrogen	Produce acid salt + Hydrogen	Mg + Copper sulphate (blue) → Magnesium sulphate + Cu (reddish brown ppt.)
Sodium subs H → Sodium hydroxide	$Zn + 2\,HCl \longrightarrow ZnCl_2 + H_2\uparrow$	$Mg + CuSO_4 \longrightarrow MgSO_4 + Cu\downarrow$ (reddish brown ppt.)
$2\,Na + 2\,H_2O \longrightarrow 2\,NaOH + H_2\uparrow$	$2\,Al + 6\,HCl \longrightarrow 2\,AlCl_3 + 3\,H_2$	
$Cu + H_2O \longrightarrow$ No reaction	$Cu + HCl \longrightarrow$ No reaction	

Although Aluminum comes before Zinc in C.A.S, but it takes time more than Zinc to react with acid: Due to presence of a layer of aluminum oxide on aluminium sheet which takes time to be removed.

* Copper doesn't react with HCl * Copper doesn't replace Zinc in its salt solution: As Copper comes after Hydrogen, Zinc in C.A.S, so it is less active than H or Zn.

2- Double substitution reactions: Reactions in which Substitution occurs between ions (radicals) of two compounds to give two other new compounds.

a - Acid and Alkali: Neutralization: Reaction between acid and alkali forming salt and water.

Hydrochloric acid + sodium hydroxide → sodium chloride + water	$HCl + NaOH \longrightarrow NaCl + H_2O$

b - Acid and Salt:

Hydrochloric acid + Sodium carbonate → Sodium chloride + Water + Carbon dioxide	$Na_2CO_3 + 2\,HCl \longrightarrow 2\,NaCl + H_2O + CO_2\uparrow$ (turbids clear limewater)

c - Two salt solutions:

Sodium chloride + Silver nitrate → Sodium nitrate + Silver chloride (white ppt)	$NaCl + AgNO3 \longrightarrow NaNO_3 + AgCl\downarrow$ (white ppt)

C- Oxidation and Reduction Reactions:

* **Oxidation** A chemical process which causes the increases of the oxygen percentage or decreases of hydrogen percentage.
* **Reduction** A chemical process which causes the increases of the hydrogen percentage or decreases of oxygen percentage.
* **Oxidizing agent** The substance which gives oxygen or takes hydrogen away during a chemical reaction.
* **Reducing agent** The substance which takes oxygen away or gives hydrogen during a chemical reaction.

$H_2 + CuO \longrightarrow Cu + H_2O$	
Hydrogen is oxidized: As it combines with oxygen	Copper oxide is reduced; As it loses oxygen
Hydrogen is reducing agent: As it reduces copper oxide (took oxygen).	Cooper oxide is oxidizing agent: As it oxidizes hydrogen (gave it oxygen).

Oxidation and Reduction by losing and gaining electrons;

Oxidation: chemical process where atom loses electron or more.		**Reduction:** chemical process where the atom gains an electron or more.
Oxidizing agent: substance which gains an electron or more during a reaction		**Reducing agent:** substance which loses an electron or more during a reaction.
Sodium is oxidized: As it combines with oxygen.($2Na \longrightarrow 2\,Na^+$)	**$2\,Na + Cl_2 \longrightarrow 2\,NaCl$**	Chlorine is reduced; As it loses oxygen. ($Cl_2 \longrightarrow 2\,Cl^-$)
Sodium is reducing agent: As it reduces Chlorine (gives an electron).	Chlorine is oxidizing agent: As it oxidizes Sodium (gains an electron).	

Lesson (2): Speed of Chemical Reaction

- **Types of chemical reactions:**
  - Reactions are very fast: (Firework).
  - Reactions are slower: (Oil with caustic soda (NaOH) to form soap).
  - Reactions need months: (Iron rust).
  - Reactions take hundreds of years: (Reactions inside Earth to form oil (Petroleum).
- **The speed of Chemical Reaction:** The change in the concentration of the reactants and the resultants at a unit of time.
  * The speed of decomposition of nitrogen pentoxide * $2N_2O_2 \longrightarrow 4\ NO_2 + O_2\uparrow$ * $N_2O_5 \longrightarrow 2\ NO_2 + ½\ O_2$
- $2\ NaOH + CuSO_4 \longrightarrow Na_2SO_4 + Cu(OH)_2\downarrow$ Speed of reaction is measured by: disappearance rate of the blue colour of copper sulphate (reactant) or appearance of blue precipitate of copper hydroxide (resultant).
- **Factors affecting the speed of chemical reaction: 1- nature of reactants * 2- concentration of reactants* 3- temperature of reaction.* 4- Catalysts.**

1- The nature of the reactants: A- Kind f coherence in reactants B- Surface area of reactants exposed to reaction

A- Kind f coherence in reactants:

Covalent (coordinate) compounds:	Ionic compounds
slow reacting-: As they don't break up into ions (reaction between molecules)	fast reacting: As they break up into ions (reaction between ions)
Ex: Organic compounds.	Ex: $Na^+Cl^- + Ag^+NO^-_3 \longrightarrow Na^+NO^-_3 + AgCl\downarrow$ (white ppt.)

B- Surface area of reactants exposed to reaction are outer layer of molecule, when reactant decomposes surface area increases, So the speed of reaction increases.

$Fe + 2\ HCl \longrightarrow FeCl_2 + H_2\uparrow$: Iron filings have more surface area than iron cube, So reaction in iron filings is faster than that in iron cube.
Hydrogen pushes the piston of syringe backward more in iron filing than iron cube.

- Using Nickel filings in hydrateng oil instead of piece of it: As surface area of Nickel filings are more than that of piece of nickel to increase speed of reaction.

2- concentration of reactants (no. of molecules): increases no. of collisions between molecules, Thus speed of reaction increases (becomes faster).

- Combustion of steel cleans (scours) Aluminum: rate of combustion of steel in pure oxygen (high concentration) is faster than that in atmospheric oxygen (low con.).
- $Mg + 2\ HCl \longrightarrow MgCl_2 + H_2\uparrow$: Magnesium reacts with Hydrochloric acid and hydrogen gas evolves.
- More bubbles of hydrogen appears in tube contains Concentrated HCl than tube contains Dilute HCl: As increase of concentration increases collisions number.
- Speed of reaction in (conc. HCl) is faster than in (dil. HCl): due to increase of no. of molecules in (conc. HCl), So collisions between them, thus reaction increases.

3- The temperature of the reaction: increases speed of reaction: Due to the increase of the number of collisions between molecules.

- Effervescent tablet makes more and faster effervescence when putted in hot water.
- Food goes rotten in summer days: Due to the increase of the speed of the chemical reactions by bacteria.

4- Catalyst: It's a substance which speeds up the chemical reaction without changing or being used up.

*** Types of catalyst:**

Positive catalyst	Negative catalyst
It's the catalyst which speeds up the chemical reaction.	It's the catalyst which slows down the chemical reaction.

* $2\ H_2O_2 \xrightarrow{MnO_2} 2\ H_2O + O_2\uparrow$: amount of oxygen bubbles increases in the tube contains hydrogen peroxide and manganese dioxide (Positive catalyst).
* Properties of catalysts: Decreases energy needed for the reaction.
* enzymes: Important to breathe, move, digest food and increases the speed of reactions inside human body.
* Bubbles increases when we put sweet potato in tube contains H_2O_2: As sweet potato contains Oxidase enzyme which acts as a catalyst and increases the rate of decomposition of H_2O_2.

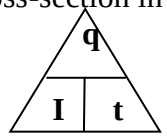
Physical properties of electric current

Electric current: It's the flow of electric negative charges (electrons) through a conductor.
* **G.r: Atom is electrically neutral:** As the positive protons number equals the negative electrons number.
* **G.r: The nucleus is positively charged:** As it contains protons (positively charged) and neutral neutrons.

Electric current intensity (I): quantity of electricity (q) in coulomb or the electric charges flowing through a cross-section of the conductor in one second (t).

- Measuring unit of current intensity: **Ampere** * Measuring unit of quantity of electricity: **Coulomb**. * Measuring unit of time: **Second**.

Ampere: It's the electric current intensity passing through a circuit when a charge of one coulomb passes through a given cross-section in one second.
Coulomb: It's the charge transferred by a constant current intensity one ampere in one second.

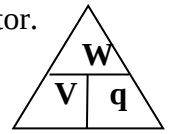


- What is meant by: electric current intensity passing through conductor is 1.5 amperes:
  This means that the quantity of electric charge that passes through a conductor in one second equals 1.5 coulomb.

Ammeter: Apparatus used to measure current intensity and connected in the circuit in series.

- **Technological application: Uncut electric charger device:** store the electric energy, where it provides electric devices with current when there isn't current.

Electric potential of conductor: state of an electric conductor that shows the transfer of electricity to and from it when it is connected to another conductor.
Potential difference across a conductor: value of the work done to transfer a quantity of charge (1 coulomb) between the two poles of this conductor.



- No electric current pass: when the two conductors have the same potential difference: As potential difference between them = Zero.
- Measuring unit of potential difference: **Volt.** * Measuring unit of work: **Joule**.

Volt: It's the potential difference across two terminals of a conductor on doing a work of one joule to transfer a quantity of charge of 1 coulomb.
Joule: It's the amount of work done by a force of one Newton to move an object through a distance of 1 meter.

Electromotive force: potential difference between the two poles of the battery when the electric circuit is open.

- The electromotive force: Acts as a pump to maintain a continuous flow of electric current.
- Measuring unit of electromotive force (E.M.F): Volt.

Voltmeter: Used to measure of potential difference and electromotive force and connected in parallel between the two terminals of the conductor.
Electromotive force (e.m.f): It's the potential difference between the two poles of the battery when the electric circuit is open.

- **Technological application:** The electric potential at home: converts high electric potential into smaller voltage (step up) and vice versa (step down).

Electric resistance: It's the opposition that the electric current faces during its passing through a conductor.

- Measuring unit of resistance: **Ohm**. * **Ohmmeter:** Apparatus used to measure resistance.

Ohm: resistance between two points of conductor when constant potential difference of 1 volt, applied to these points, produce current of 1 ampere in conductor

- **Types of electric resistance:** Constant – Variable resistance **(Rheostat)**
- **Rheostat: when wire length increases, the resistance increases and current intensity decreases.**

Ohm's law: The electric current intensity passing through a conductor is directly proportional to the potential difference across it at constant temperature.

- **V = R × I**

Resistance of conductor: ratio between the potential difference across the two ends of a conductor and the current intensity passing through it.
Ohm: It's resistance of a conductor which allows passing an electric current intensity of 1 ampere when the potential difference between it's terminals is 1 volt.
Ampere: It's the current intensity passing through a conductor whose resistance is 1 ohm and the potential difference between it's terminals is 1 volt.
Volt: It's the potential difference across the two ends of a conductor whose resistance is 1 ohm and current intensity passing through it is 1 ampere.

Lesson(2): Electric current and Cells

- **Sources of electric current**:

Source	Energy change	Type of electric current
Electrochemical cells (Dry cell- Battery)	the chemical energy changes into electric energy	Direct current
Electric generators (Dynamo)	The mechanical energy changes into electric energy	Alternating current

Direct current	Alternating current
It's unidirectional and has constant intensity	It's variable in both direction and intensity
It's produced from electrochemical cells	It's produced from electric generators
It can't be changed into an alternating current	It can be changed into a direct current
It can't be transmitted focr long distances	It can be transmitted for long distances through wires
It's used in electroplating and electrolysis process	It's used in lightning and operating electric appliances

- **Methods of connecting the cells in an electric circuit**

Series connection	Parallel connection
Positive pole of first cell connects with negative pole of second cell	Positive poles of all cells are connected together and so negative poles
Used to obtain high (e.m.f)	Used to obtain low (e.m.f)

Lesson (3): Radioactivity and Nuclear Energy

- The mass of the atom is concentrated in the nucleus: As the mass of electrons is negligible compared with the mass of protons and neutrons in the nucleus.
- Nuclear reactions occur: due to changing in the number of protons and neutrons in the nucleus.
- Nuclear Energy stored in the atom's nucleus. The origin of nuclear energy (nuclear energy is originated): due to Nuclear binding force.
- Nuclear binding force: is the force that binds the nucleus components together and covers the repulsion force between the positively charged protons.
- Henri Becquerel discovered: Radioactivity. He discovered: Emission of unseen rays from the Uranium element which have ability to penetrate solid objects.
- He named these elements: Radioactive elements.
- Some atoms are stable: As they have suitable number of neutrons make them stable.
- **Radioactive elements:** elements whose atoms' nuclei contain a number of neutrons more than number required for its stability (as they've excess energy).
- Ex: Radium – Rubidium – Cesium – Selenium – Polonium – Uranium – Zirconium.
- Radioactive elements emits: Radiation particles: (Alpha – Beta – Gamma) and nuclear energy: to become more stable.
- **Radioactivity Phenomenon:** decaying of nuclei of Radioactive elements in an attempt to achieve a more stable composition.
- **Types of Radioactivity:** **1- Natural**: spontaneous decaying of nuclei of radioactive elements. **2- Artificial:** inducing radiation.

  Artificial radioactivity: used in: **1-** Nuclear reactions (safe uses): can be controlled. **2-** Nuclear bombs (military uses): can't be controlled.

	Field	Use
Peaceful uses of nuclear energy	Medical field	Treat and diagnose diseases like cancer
	Agricultural field	Eliminate pests and improve some races
	Drilling field	For drilling of petroleum and underground water.
	Space exploration field	Radioactive materials are used as a nuclear fuel for rockets.
	Industrial field	Convert sand to silicon sheets to be used in manufacturing of computer processors of electric appliances.
	Electricity generation field	Nuclear energy is used to heat water to produce steam which is used to operate turbines to generate electricity.

- **Radiation Pollution:** increase of the amount of radiation in the environment.
- **Sources of radiation pollution:** **1-** Natural radiation sources: **A-** Natural radioactive materials on earth. **B-** Cosmic radiation comes from outer space.
  2- Artificial radiation sources: due to explosion of nuclear bombs.
- The elements were found in food after Chernobyl accident are: Iodine and Cesium isotopes which resulted from decaying Uranium-235.
- **Isotopes:** atoms of the same element with the same number of protons and with different number of neutrons.
- **The radiation effect on the human body:**
  1- Effects due to exposure to **large dose for short time:** damage: Bone marrow – Spleen - Digestive system - Central nervous system.
    - **Bone marrow:** responsible for formation of red blood cells whose number decreases cause: feeling of being sick- sore throat- vertigo and diarrhea.
  2- Effects due to exposure to **small dose for long time:**
    A- Physical effects: changes appear on living.
    B- Genetic effects: changes in sex chromosomes composition which result in abnormal birth.
    C- Cellular effects: lead to destroying cells.
- If chemical composition of Hemoglobin changes: it becomes incapable of carrying oxygen.
- **Sievert :** measuring unit for radiation.
- **Means of protection from radiation pollution:**
  1- Not to be exposed to the maximum safe doses of nuclear radiation (1mm **Sievert** a day).
  2- Nuclear wastes of weak and medium radiation are surrounded by a cement layer and placed deep, while strong are cooled with water.
  3- Cool hot water before throwing it in seas and lakes.

Genetics:
science research hereditary traits transmission from generation to another by studding similarities & differences between parents & offspring.

Kinds of traits	Hereditary traits	Acquired traits
	Traits are transmitted from one generation to another	Traits aren't transmitted from one generation to another.
	Ex: Hair color, Eye color, Skin color & Blood groups.	Ex: Playing football, Writing and Swimming.

- **Gregor Mendel:** first scientist showed how traits passed from parents to offspring. He performed his experiments using (pea plant).
  - **(G.R): Mendel used pea plant for reasons:**
    1- Easy plant and grows fast.
    2- Short life cycle.
    3- Hermaphrodite flower, so it can be self-pollination.
    4- Artificially pollinated by human.
    5- Producing large number of plants in a generation.
    6- It is has several pairs of easily identified contrasting traits.

In plants				In human		
Traits	**Dominant**	**Recessive**		**Traits**	**Dominant**	**Recessive**
Seed shape	Smooth (Round)	Wrinkled		Hair	Curly & black	Straight & light
Seed color	Yellow	Green		Eye	Wide & Black	Narrow & Colored
Pod (fruit) colour	Green	Yellow		Rolling Tongue	Ability to roll	Inability
Pod (fruit) shape	Smooth	Pinched		Ear lobe	Separate	Connected
Flower colour	Purple	White		Facial dimples	Dimples	No Dimples
Flower position	Axial (side)	Apical (terminal or end)		Facial freckles	No Freckles	freckles
Stem height	Tall	Short		Nose	Broad	Thin
				Height	Tall	Short
				Lips	Broad	Thin

* **Principle of complete dominance:** appearance of hereditary trait in individuals of first generation when two individuals copulate and one of them carrying pure hereditary trait contrasting trait carried by other individual.
- Both parents share in transmitting their hereditary factors to offspring through gametes.
***Gametes:** reproductive cells carry hereditary factors of both parents.

* **Gene:** part of (DNA), responsible for appearance of inherited characters.

* **Hybrid individual:** carries different (contrasting) pair of genes one is dominant and other is recessive.

* **Pure individual:** carries similar pair of genes either dominant or recessive.

Types of traits

Dominant traits	Recessive traits
- Pure or hybrid. - Appears if two similar factors for dominant trait aggregate or one factor for dominant and other of recessive. - Appears with ratio 100% in first generation and 75% in second - Represented by Capital letter	- Always pure. - Appears only if two similar factors for recessive trait aggregate. - Disappears in first generation and appears with ratio 25% in second. - Represented by small letter

* **Law of segregation of factors (Mendel's 1st law):** If two individuals are different in pair of alternative (contrasting) traits copulate, only dominant appears in first generation and two characteristics appear in second generation at ratio (3:1)

Parents	Pure (dominant) yellow pea		**X**	Pure (recessive) green pea	
	YY			y y	
Gametes	Y			y	
First Generation (F_1): Yy: 100 % Hybrid Dominant yellow pea					
P:	Yy		**X**	Yy	
G:	Y	y		Y	y
F_2:	YY	Yy	Yy		yy
3 : 1					
75% Dominant : 25% Recessive					

*__Inheritance of two pairs of allelomorphic traits (Mendel's 2nd law):__ If two individuals are different in two pairs or more of alternative (contrasting) traits copulate the trail of each pair is inherited independently and appears in second generation at ratio of (3:1)

YyTt	YT	Yt	yT	yt
YT	YYTT	YYTt	YyTT	YYTt
Yt	YYTt	YYtt	YyTt	Yytt
yT	YyTT	YyTt	yyTT	yyTt
yt	YyTt	Yytt	yyTt	yytt

Y: yellow T: tall

(1): Green & short. (9): yellow & tall. (3): Green & tall. (3): yellow & short.

12:4

3:1

Genes

* **Genes:** They are parts of DNA present on the chromosomes & control the individual hereditary traits.
* Nucleus contain genetic (hereditary) material, consists number of chromosomes each chromosome consists of nucleic acid (DNA) & protein.

* **The scientists Watson and Creek were able to make a model for the DNA molecule.**

* **DNA:** composed of two strands coiled around each other like the spiral ladder (double helix).
*

* How do the genes perform their functions?

- **Scientist Badel and Tatum** (Nobel prize), discovered means of how genes control in appearance of traits, found every special code of gene gives special enzyme (responsible for occurrence of reaction resulting in protein appearing special hereditary trait).
  Every gene Special code Special enzyme Special protein Special hereditary trait.

* Ex: **1-** Color of eyes: appears brown colored eyes: bec. It is dominant.
  2- Color of hair: appears black colored hair: bec. It is dominant trait.

Hormones:

* We know the nervous system organizes and coordinate all activities and functions of organs of living organisms.

* Hormone: chemical substance (message) that controls and organizes most of vital activities and functions in living organisms bodies.

* Endocrine Glands: ductless glands organs that secrete hormones in blood stream without passing through ducts in the human body.

* Endocrine Glands secrete hormones in blood stream only not in cavity: as the site of action (target cells) are away from Endocrine Glands, But the blood is the only way for these hormones to reach target cells

Gland	Locat	Descrip	Hormones secreted	Growth hormone function	Disorder of Growth hormone secretion	
					Decreasing Causes	**Increasing causes**
1.	Below brain	2 lobes, small, in size of pea seed,	**1) Growth hormone**	***** Controls growth rate speed of body muscles, bones and other organs. ***** Determines height that person will reach when becomes adult.	**Dwarfism** Body stops growing. Person becomes dwarf **Reason:** Decrease of secretion in growth hormone at childhood	**Gigantism** Continuous growth in limbs' bones. Person becomes giant **Reason:** Increase of secretion in growth hormone at childhood

Pituitary	**(Master gland) GR:** **- Secrete hormones regulate other endocrine glands activities** **- Regulate whole body growth**	**Stimulating hormones**	**Function**
		2. Thyroid stimulating (TSH)	Giving order to the thyroid gland for secreting thyroxin hormone.
		3. Adrenal stimulating	Giving order to adrenal gland for secreting cortex hormones.
		4. Gonads stimulating	Reregulates sex organs growth and development (testes - ovaries).
		5. Mammary glands stimulating	Giving order to mammary glands to secrete milk.
		6. Water regulating	Controls excreted water from body to maintain water level inside body
		7. Facilitating during delivery	Affects uterine contraction and increases it during delivery.

Type	Lactation	Description	Hormones	Hormone function	Disorder of hormone secretion	
					Decreasing Causes	**Increasing causes**
2. **Thyroid**	In front surface of neck, on both sides of trachea	2 lobes, slightly red.	**1) Thyroxin**	Plays main role in food assimilation processes in body. GR Because it liberates energy needed for body from food.	**Simple Goiter** Enlargement of thyroid gland and neck. due to: decrease of secretion in thyroxin. due to: lack of iodine in food as it enters in hormone's structure.	**Exophthalmic goiter** Enlargement of thyroid gland accompanied by loss of weight, tension and exophthalmoses. due to increase of secretion in thyroxin

			2) Calcitonin	Controls calcium and phosphorous levels in the blood.		
Type	**Lactation**	**Description**	**Hormones**	**Hormone function**	**Disorder of hormone secretion**	
3. **Pancreas**	Between stomach and small intestine	Leaf-like	**1) Insulin**	**Reduces blood sugar level, by:** - Transporting glucose sugar from blood to cells: to release energy. - Storing glucose in liver	**Causes**	**Diabetes.**
					Reason	Cells unable to use glucose as a result of decreasing in insulin secretion
					Symptoms	- Feeling thirsty - Multiple urination times. - Production of glucose in urine.
	(Mixed gland) GR: **As it acts as:** **1- Exocrine gland (secretes enzymes for digestion)** **2- Endocrine gland (secretes hormones)**		**2) Glucagon** Its function contradicts insulin function	**Raises blood sugar level , by:** - Stimulating liver and muscles to convert stored glycogen into glucose and release it in bloodstream to be available to cells		

Type	**Locat**	**Description**	**Hormones**	**Hormone function**
4. Two Ovaries	Alongside lateral wall of uterus.	2 glands whitish in color.	**1) Estrogen**	Responsible for appearance of female secondary sex characteristics.
			2) Progesterone	Promotes growth of endometrium (uterus lining)

Type	**Locat**	**Description**	**Hormone**	**Hormone function**
5. Two Testes	Inside scrotal sac outside the man body.		**Testosterone**	Responsible for appearance of male secondary sexual characteristics.

Type	**Locat**	**Description**	**Hormone**	**Hormone function**
6. Two Adrenal	Above kidney	Cortex (outer part), Medulla (inner part)	**Adrenalin**	Stimulates body's organs to response to emergencies.

- **What happens if:**
  1. **Pancreas increases its secretion of insulin: glucose level in blood decreases.**
  2. **Pancreas decreases its secretion of insulin: glucose level in blood increases (Person is suffering from diabetes).**