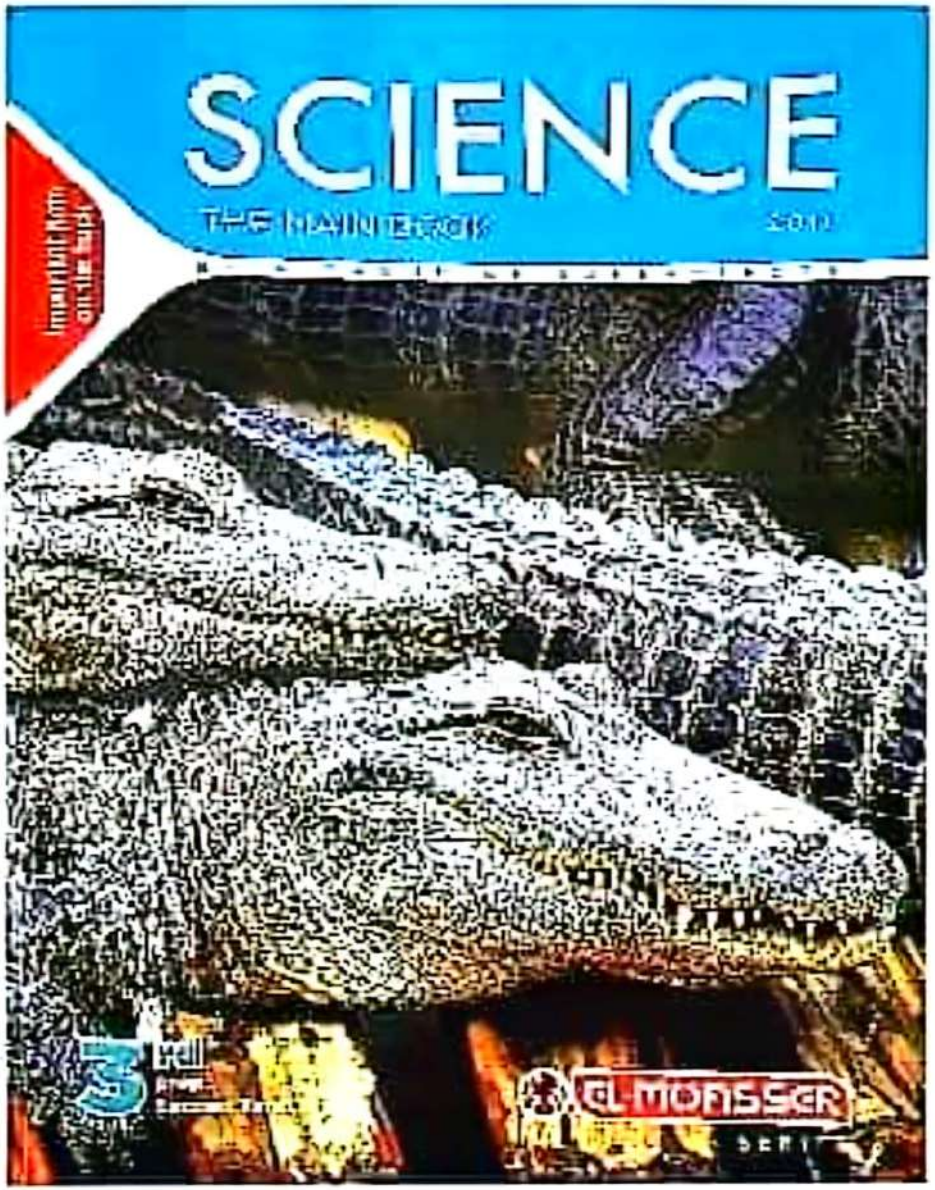


Final revision

علوم

مع غادة صلاح

Prep. 3

t2

Final revision Prep. 3 t2

Science علوم مع غادة صلاح

التاريخ: / /

1 Write the Scientific term

1) The change in the concentration of the reactants and products at a unit time	1. Speed of chemical reaction.
2) Reaction between an acid and an alkali forming salt and water	2 Neutralization reaction
3) The substance which gains an electron or more during a chemical reaction.	3 Oxidizing agent
4) The breaking up of bonds in reactants molecules and formation of new bonds in the products molecules.	4. chemical reaction
5) A reaction where double substitution occurs between the ions of two compounds to form two other new compounds.	5. Double substitution reactions
6) The charges transmitted by a current intensity with one ampere in one second.	6. The coulomb
7) The catalyst that is used to slow down a chemical reaction.	7. Negative catalyst
8) The quantity of electricity (electric charge) flowing through a cross-section of a conductor in one second	8. Electric current intensity
9) The individual that carries similar pair of hereditary factors either dominant or recessive	9- Pure individual
10) The arrangement of metals in a descending order according to their chemical activity.	10. Chemical activity series

MITKEES

التاريخ: / /

علوم مع غادة صلاح

1) Write the Scientific term

11) It is the state of an electric conductor that shows the transfer of the electricity from or to it when it is connected to another conductor.	11. Electric potential of a conductor
12) The traits that are transferred from a generation to another such as blood group	12. Hereditary (genetic) traits.
13) Its chemical structure is DNA with protein	13. The chromosom
14) The potential difference between two poles of the electric source when the electric circuit is opened.	14. The electromotive force
15) The material which increases the speed of reaction without being changed.	15. The catalyst
16) The quantity of charge transferred by a fixed current 1ampere per a second.	16. The coulomb
17) The genetic map of genes in human chromosomes.	17. Human genome
18) It's the substance which speeds up the chemical reaction without changing.	18. Catalyst
19) The resistance of a conductor that allows the passing of an electric current of 1ampere through it when the potential difference across its ends is 1 volt	19. The Ohm
20) The process of spontaneous decaying of atoms of some elements present in nature to reach a more stability.	20. Radioactivity phenomenon
21) The trait that appears in all individuals of the first generation in Mendel's experiments.	21. Dominant trait

MITKEES

التاريخ: / /

موضوع الدرس:

1) Write the Scientific term

22) A type of Connection of similar electric cells used to obtain high (twice) e.m.f. (electromotive force).	22. series Connection
23) A chemical process which cause the increase in the oxygen percentage or decrease in the hydrogen percentage in a substance	23. Oxidation Process
24) The opposition that the electric current faces during its passage in a conductor	24. Electric resistance
25) It chemically consists of a nucleic acid called DNA binds with Protein	25. The chromosome
26) The plant that is used by Mendel in his experiments.	26. Pea plant
27) The changes that appear on a living organism as a result of exposure to radiation	27. Physical changes (effects)
28) An enzeme that is found in sweet potato and helps in decomposition of hydrogen peroxide	28. Oxidase enzyme
29) The flow of electric negative charges in a conducting substance.	29. the electric current
30) The measuring unit of absorbed radiation.	30. Rem
31) They are parts of DNA present on the chromosomes and control the hereditary traits of the individual	31. Genes

MITKEES

1- Write the Scientific term

التاريخ: / /

موضوع الدرس:

32) A science that researches the transmission of the hereditary traits from one generation to another.	32. Genetics
33) Organs secrete hormones directly into blood stream	33. Endocrine glands.
34) A chemical message that controls and regulates the activities and functions of most of the body.	34. Hormone
35) They are considered one of the most important safety means in cars at emergencies	35. Air bags
36) The substance that is used in polishing silver or any decorative metal pieces made of copper or chrome.	36. Sodium bicarbonate
37) Cells by which the chemical energy is converted into electric energy	37. electrochemical cells
38) The force that is needed to bind the nucleus components together and to overcome the repulsion force between the positively charged protons	38. Nuclear binding force
39) The Scientists who made a model for the DNA molecule	39. Watson and Crick.
40) The hormone which controls the level of Calcium in the blood.	40. Calcitonin hormone
41) The hormone that stimulates body organs to respond to emergencies	41. Adrenalin hormone
42) The element that enters in the composition of thyroxin hormone	42. Iodine

MITKEES

1) Write the scientific term

التاريخ : / /

	موضوع الدرس :
(43) A physical quantity which is measured by (Volt × Coulomb)	43- Work
(44) the traits that are not transmitted from one generation to another	44- Acquired traits
(45) It is the potential difference between the terminals of a conductor on doing a work of one joule to transfer a quantity of charge of one coulomb	45- Volt
(46) the appearance of a dominant hereditary trait in the individuals of the first generation when two individuals are crossed, one of them carries a pure hereditary trait contrasting the trait carried by the other individual.	46- The principle of complete dominance
(47) they are chemical substances produced by the body of the living organism, act as catalysts that increase the speed of biological reactions.	47- Enzymes.
(48) A metallic can exist in most modern cars to treat the harmful gases emitted from the engine.	48- Catalytic converter
(49) The disease caused by the increase in the secretion of thyrexin hormone.	49- Exophthalmic goiter.
(50) When two different individuals bearing two pairs or more of alternative (contrasting) traits are crossed, the trait of each pair is inherited independently of the others and appears in the second generation at a ratio (MITKEES) of 3:1	50- Law of independent assortment of hereditary factors (Mendel's second Law)

1) Write the Scientific(term)

التاريخ : / /

	موضوع الدرس :
(51) It is the current intensity passing through a conductor whose resistance is one ohm and the potential (difference) across its terminals is one volt	51- the ampere
(52) They are elements whose atoms nuclei contain a number of neutrons more than the number required for its stability.	52- Radioactive elements
(53) The radiation or nuclear energy emitted during nuclear reactions that can be controlled and carried out by nuclear reactors	53- Artificial radioactivity
(54) A substance which loses one electron or more during a chemical reaction	54- Reducing agent
(55) The chemical reaction in which the compound decomposes by heat into simpler components	55- thermal decomposition reaction

2) Complete the following questions

(1) The instrument which is used to measure the electric potential difference is	1- Voltmeter
(2) The chromosome is chemically consisted of a nucleic acid called DNA binds with the	2- protein
(3) Sodium metal reacts with water producing sodium hydroxide and .... gas evolves.	3- hydrogen
(4) The scientist Mendel named the trait that appears in all individuals (MITKEES) of the first generation as the .... trait,	4- dominant

2) Complete

التاريخ : / / موضوع الدرس :

4) While the other (contrasting) trait that disappears in the individuals of the first generation as the ... trait — 4- recessive

5) $Na_2CO_3 + \ldots \rightarrow 2NaCl + H_2O + CO_2$ — 5- 2 HCl

6) One of the properties of the direct current is that .... — 6- it has constant intensity and direction

7) Every hereditary trait is controlled by two hereditary factors which separate during formation of the .... — 7- gametes

8) The gene controls the appearance of a hereditary trait of the living organism by giving .... which is responsible for the occurrence of a chemical reaction resulting in a protein — 8- specific enzyme

9) The measuring unit of the absorbed radiation is .... — 9- rem

10) The ability to roll the tongue is one of the .... traits in the human being. — 10- dominant

11) The rate of decomposition of hydrogen peroxide increases by adding .... or a piece of .... — 11- manganese dioxide - sweet potato

12) The most modern car are equipped with .... which helps in treatment of harmful gases emitted from the car engine. — 12- catalytic converter

13) Below the brain, there is a small gland called ...., and inspite of its small size it is called .... or .... — 13- pituitary gland - master gland - main gland

14) $2N_2O_5 \rightarrow \ldots + O_2$ — 14- $4NO_2$

15) The .... is considered a part of DNA which consists of smaller structural units called .... — 15- gene - nucleotides

② Complete

التاريخ : / / موضوع الدرس :

16) Iron rust is a .... chemical reaction, while a firework is a .... chemical reaction — 16- Very slow - Very fast

17) In the catalytic converter, the ceramic cells covered with a thin layer of .... metal as .... or palladium. — 17- Platinum

18) When blue copper sulphate is heated, ... gas evolves — 18- Sulphur trioxide (SO_3)

19) .... is a device used to provide electric devices with the electric current when no current at home — 19- uncut electric charger device.

20) .... gas turbids the clear Limewater — 20- Carbon dioxide

21) The curly hair trait dominates over the straight hair trait is follows the principle of .... in human being — 21- complete dominance.

22) Some reactions are very slow and need several months to take place, such as the formation of .... — 22- iron rust

23) The .... project is interested in the effect of the various mutations on the function of the genes. — 23- human genome

24) The electric current produced from electrochemical cells (batteries) is known as the .... current. — 24- direct

25) $Na^+Cl^- + Ag^+ \ldots \rightarrow \ldots + Na^+NO_3^-$ — 25- $Ag^+NO_3^- / AgCl$

26) Decompose the compounds by heat into its simple components is called .... reaction — 26- thermal decomposition.

27) Volt is the potential difference between terminals of a conductor when work done of .... to transmit a quantity of Charge of .... between them. — 27- one joule - one Coulomb

2) Complete

التاريخ: / /

علوم مع غادة صلاح

28) Electric current produced from dry cell is due to change ... energy to ... energy — 28- Chemical - electric

29) The scientists ... and ... discovered the means of how the gene controls the appearance of a trait — 29- Badel - Tatum

30) The current intensity is measured by using ..., but voltmeter is used for measuring the ... — 30- ammeter - potential difference

31) $Cu(OH)_2 \xrightarrow{\Delta} \ldots + \ldots$ — 31- $CuO + H_2O\uparrow$

32) At the beginning of the chemical reaction, the concentration of reactants is ... % — 32- 100 %

33) Garden pea plant can be easily ... — 33) artificially - pollinated

34) On connecting two charged conductors, the electric current passes from the conductor with ... potential to the conductor with ... potential — 34- high - Low

35) Zinc reacts with diluted hydrochloric acid forming a salt called ... — 35) Zinc chloride (Salt of an acid)

36) The ... hormone promotes the growth of endometrium. — 36) progesterone

37) The ... is used to measure the electromotive force of a battery. — 37- Voltmeter

38) The ... current can be transferred for short distances only, while the ... current can be transferred for short and long distances. — 38- direct - alternating

MITKEES

2) complete

التاريخ: / /

علوم مع غادة صلاح

39) Radioactive wastes should be buried away from ... path and areas may be exposed to ... — 39- Underground water - earthquakes and volcanoes

40) The skill of swimming is one of the ... traits, while blood group is one of the ... traits. — 40- acquired - hereditary

41) The ... apparatus is used to store the electric energy. — 41- UPS

42) The resistance is measured by using ... and has a measuring unit known as ... — 42- Ohmmeter - Ohm

43) The ..., genetic and ... effects are due to exposure to a small dosage of radiation for a long time — (43) Physical - cellular

44) During the chemical reaction, the concentration of the reactants ... gradually, while the concentration of the resultants ... gradually. — (44) decreases - increases

45) The ... project discovered that more than ... % of the DNA is similar in humans. — (45) human genome - 99%

46) The pea plant is easy to ... and its life cycle is ... — 46- be planted - short

47) the speed of chemical reaction can be practically measured by the rate of ... of reactants or the rate of ... of resultants. — 47- disappearance - appearance

48) Endocrine glands secrete more than ... hormones in the human body. — 48- 50

49) On reaching adulthood stage, ... glands are activated by hormones secreted from pituitary gland. — 49- Sexual

50) Pancreas is located between the ... and ... — 50- Stomach - Small intestine

MITKEES

2) Complete

التاريخ: / / علوم مع غادة صلاح

51) ... are considered one of the most important safety means in cars (at) emergencies. — 51 Air bags

52) The scientist Henri Becquerel discovered ..... phenomenon. — 52 radioactivity

53) The mechanical energy can be converted into electric energy by ..... — 53 dynamo

54) ... energy is used in the medical field diagnose and treat some diseases like cancer. — 54 Nuclear

55) Sodium chloride powder reacts ... than a cube of sodium chloride of the same mass. — 55 faster

56) ... $\xrightarrow{\text{Electric spark}}$ $2Na + 3N_2\uparrow$ — 56 $2NaN_3$

57) Nitrogen pentoxide breaks up into nitrogen dioxide gas and ... — 57 Oxygen gas

58) The living organism that carries an impure trait is called. — 58 hybrid individual

59) From the peaceful uses of nuclear energy in the agricultural field is ..... — 59 to eliminate pests or to improve some plants races

60) The speed of chemical reactions ..... due to the increase of temperature. — 60 increases

61) Oxidation and reduction are two ..... processes. — 61 Concurrent

62) The ... effects of radiation are results of changing the sex chromosomes of the cells — 62 genetic

2) Complete

التاريخ: / / علوم مع غادة صلاح

63) The ... effects of radiation cause changes in the cells composition — 63 Cellular

64) Mendel covered the stigmas of the flowers to prevent the ..... pollination. — 64 Cross

65) The potential difference between the two terminals of a conductor is ..... propotional to the intensity of the electric current passing through it at a constant temperature. — 65 directly

66) From the factors affecting the speed of the chemical reaction are ... and ... — 66 catalysts concentration of reactants

67) Mendel removed the stamens from the flowers of the plants to prevent ..... pollination. — 67 self

68) $2Al + 6HCl \xrightarrow{dil.} \ldots + 3H_2\uparrow$ — 68 $2AlCl_3$

69) $2HgO \xrightarrow{\Delta} \ldots + \ldots$ — 69 $2Hg + O_2\uparrow$

70) When Sodium atom ($_{11}Na$) combines with Chlorine atom ($_{17}Cl$), ... is considered as an oxidizing agent, while ... is considered as a reducing agent. — 70 Chlorine Sodium

71) The electric current intensity passing through a conductor is ... proportional to the resistance of a conductor and ..... proportional to the potential difference between the two terminals of a conductor. — 71 inversely directly

2) Complete

التاريخ: / /

موضوع الدرس:

72) sodium reacts with water giving ... and ... gas evolves.

73) the catalyst changes the speed of the reaction but don't affect either its ... or ...

74) Volt = $\frac{\text{Joule}}{\text{...}\times\text{...}}$

75) Nuclear energy can be used in agricultural field to ... and to improve ...

72) sodium hydroxide hydrogen

73) beginning — stopping

74) Ampere × second

75) eliminate pests some plant races

3) Give reasons

1) Red precipitate is formed on adding a piece of magnesium to copper sulphate solution

1) Occurrence of reaction between magnesium and copper Sulphate solution.

Because magnesium comes before copper in C.A.S., so it replaces copper in copper sulphate solution.

$Mg + CuSO_4 \rightarrow MgSO_4 + Cu\downarrow$

2) The scientist Mendel chooses the pea plant to conduct his researches (experiments)

Due to :

- It is easy to be planted and it grows fast.
- Its life cycle is short.
- Its flowers are hermaphrodite, so it can be self-pollinated.
- It can easily be artificially pollinated (human intervention)
- It produces large numbers of plants in a generation.
- It has several pairs of easily recognized contrasting traits.

Give reasons

التاريخ: / /

موضوع الدرس: rheostat

3) Some electric circuits contain (variable resistance) To control the electric current intensity passing through the circuit and the potential difference in the different parts of the circuit.

4) The rate of the reaction of hydrochloric acid with the iron filings is faster than that with a piece of iron of the same mass.

Because the surface area in case of iron filings is larger than that in case of iron piece and the speed of chemical reactions increases by increasing the surface area.

5) the ability to wrap (roll) the tongue is from the dominant characteristics in human.

- Because the gene of the ability to roll the tongue dominates over the gene of the non-ability to roll the tongue if they are both present together in an individual.

6) A variable resistor (sliding rheostat) is connected in the electric circuit.

the same answer of n°=(3).

7) Copper does not react with hydrochoric acid (HCL), whereas Zinc reacts with hydrochloric acid (HCl)

Because copper comes after hydrogen in C.A.S. So it can't replace hydrogen in acids, while Zinc comes before hydrogen in C.A.S so it replaces hydrogen in acids.

$Zn + 2HCl \xrightarrow{dil.} ZnCl_2 + H_2\uparrow$

8) The radioactive wastes should be buried away from underground water's path.
To not pollute water.

9) The speed of the chemical reaction increases as the concentration of the reactants increases.
Because by increasing the number of reactants molecules, the number of probable collisions between them increases, so the speed of the reaction increases.

10) Iodine salt is preferred than the normal salt.
Because iodine salt is rich in iodine element that enters in the thyroxin hormone's structure.

11) Some persons have enlarged thyroid gland.
Due to decrease or increase in the secretion of thyroxin hormone.

12 Pancreas is a double function gland.
- Because the pancreas secretes the insulin hormone and the glucagon hormone and the function of each hormone contradicts the function of the other hormone.

13 A gas evolves on putting a piece of aluminium (in) diluted hydrochloric acid.
- Because aluminium comes before hydrogen in C.A.S. (so) it replaces hydrogen of diluted acids.

$2Al + 6HCl \xrightarrow{dil.} 2AlCl_3 + 3H_2\uparrow$

MITKEES

14) Food preservation in the freezer of the refrigerator
- Because the low temperature in the fridge slows down the speed of chemical reactions done by bacteria which cause the rot of food.

15) When a pure yellow pod pea plant crossed with a pure green pod, the whole produced individuals were green pods.
Because the trait of green pods dominates over the trait of yellow pods in the pea plant according to the principle of complete dominance.

Polonium

16. Radium is considered as a radioactive element.
- Because the nucleus of its atom contains (a) number of neutrons more than the number required for its stability which causes the presence of excess energy emitted in a form of invisible (unseen) radiation.

17) In Mendel's experiment to study the seed colour of pea plant, he removed the stamens of their flowers before the anther becomes mature.
To insure that the plant doesn't be self-pollinated.

18) When red mercuric oxide is heated, a silvery precipitate is formed.
- Due to decomposition of red mercuric oxide by heat into mercury (silvery precipitate) and oxygen gas evolves.

MITKEES $2HgO \xrightarrow{\Delta} 2Hg + O_2\uparrow$

19) Speed of chemical reaction increases with rise in temperature
Because by increasing the temperature, the number of probable collisions between reactants molecules increases, so the speed of reaction increases.

20) Mendel's first law is called the law of segregation of factors.
To segregate the two factors of hereditary trait from each other when formation of gametes.

21) Gold does not react with acids
Because gold comes after hydrogen in C.A.S. so it can't replace hydrogen of acids.

22) It is better to use the alternating current rather than the direct current.
Because it can be transferred for long distances through wires.
It can be changed into a direct current

23) The exposure to radiation has genetic effects
Because radiation causes changes in the sex chromosomes composition for living organisms.

24) Electric current will not flow between two charged conductors have the same electric potential
Because there is no potential difference between them.

25) Reactions between ionic compounds are fast whereas, reactions between covalent compounds are slow.
Because the reactions of ionic compounds take place between ions, while the reactions of covalent compounds take place between molecules.

26) The wide eyes trait dominates over the narrow eyes trait in human.
Because the gene of wide eyes dominates over the gene of narrow eyes if they are both present together in an individual.

27) The electric charges transfer from a charged conductor to another charged conductor.
Due to the presence of (potential difference) between them.

28) Some elements are called radioactive elements
Because they spontaneous release unseen radiations as a result of their atom's nuclei contain a number of neutrons more than the required number for their stabilization.

29) Some people who depend mainly on eating rice have deficiency in vitamin (A).
Because rice doesn't contain pro-vitamin (A) known as carotene which is converted into vitamin (A) inside the body.

30) The area chosen for storing radioactive wastes should be steady.
To prevent the spread of radiation to other areas.

31) Although aluminium comes before Zinc in chemical activity series, but it takes a longer time to react with hydrochloric acid practically.
Due to the presence of a layer aluminium oxide (Al_2O_3) on aluminium surface, which takes time to separate from aluminium, which delays the starting of occurrence of the reaction.

32) On adding silver nitrate solution to sodium chloride solution, a white precipitate is formed.
Due to formation of silver chloride salt which doesn't dissolve in water.
$NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl\downarrow$.

33) Some electric cells are connected in the electric circuit in series.
To obtain high e.m.f.

34) The nuclei of radioactive elements are unstable.
Due to their excess energy as a result of their atoms' nuclei containing neutrons more than required for their stabilization.

35) Burning of the steel scourers used for cleaning aluminium (in a jar full of oxygen) is faster than (its burning in atmospheric air).
Due to increasing the speed of the chemical reaction by increasing the concentration of oxygen gas.

36) The voltmeter is connected between the two poles of battery.
To measure the e.m.f of a battery.

4- What happens when ... ? what would happen Whe

1- The human body exposed to a large dosage of radiation for a short time.
This may lead to the damage of:
. Bone marrow . Spleen . Digestive system
. central nervous system.

2- Heating of sodium nitrate.
A yellowish white substance of sodium nitrite is formed and oxygen gas evolves.
$2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2\uparrow$

3- Adding silver nitrate solution to sodium chloride solution
A white ppt. of silver chloride is formed.
$NaCl + AgNO_3 \rightarrow NaNO_3 + AgCl\downarrow$

4) Replacing dilute hydrochloric acid by concentrated hydrochloric acid when reacting with magnesium
The speed of chemical reaction increases

5) Two pure individuals bearing two pairs of contrasting traits are crossed.
The trait of each pair is inherited independently and all individuals of the first generation appear carrying the dominant traits Only
and in the second generation, the dominant trait and the recessive trait appear at a ratio of 3:1

6) The dominant gene exists with another for the same characteristic.
The dominant trait appears.

7) to the number of collisions When the temperature of the reaction is raised up.
Increasing the number of collisions by increasing the temperature.

8) When manganese dioxide (MnO_2) is added in a test tube that contains hydrogen peroxide.
The rate of decomposition of hydrogen peroxide increases.

9) If there is a mating between two individuals resulting in producing 50% dominant individuals and 50% recessive individuals.
The dominant individuals are hybrid.

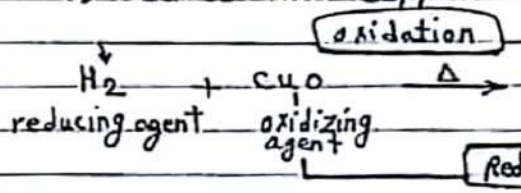
10) When the potential difference increases between two ends of a conductor with a fixed resistance in the closed circuit
the current intensity in the conductor increases.

11) to the colour of solution as time passes When adding sodium hydroxide solution to blue copper sulphate solution (without equations)
A colourless solution of sodium sulphate and a blue ppt. of copper hydroxide are formed.

12) When heating most metal sulphates (without equations)
They decompose into metal oxide and sulphur trioxide

13) A gene failed to produce its own enzyme.
The chemical reaction which results in a protein showing a specific hereditary trait will not occur.

14) passing of hydrogen gas through a hot copper oxide.
Hydrogen is oxidized into water, while copper oxide is reduced into copper.



15) Replacing a piece of iron with iron fillings of the same mass when reacting with the same volume of diluted acids.
The speed of chemical reaction increases.

16- When heating blue copper hydroxide.
A black substance of copper oxide is formed and water vapour evolves.
$Cu(OH)_2 \xrightarrow{\Delta} CuO + H_2O\uparrow$

17- If you put a small piece of sodium to flask contains water.
An ignition occurs accompanied by a strong pop sound
$2Na + 2H_2O \rightarrow 2NaOH + H_2\uparrow + heat$

18- When the glands that secrete hormones have ducts The blood will not be the only way for the hormones to reach their sites of action.

19- If the secretion of growth hormone is increased at childhood.
A continuous growth in the limb's bones, so the person becomes a giant.

20- To the human when thyroxin hormone secretion increases.
The human will suffer from exophthalmic goiter

21- Increasing the temperature of chemical reaction.
The speed of the chemical reaction increases.

22- two charged conductors of different electric potential are touched.
The electric current will flow from the conductor that has high potential to that (of) low potential.

23- Exposure of human body cells to small dosage of radiation for a long period of time.
This will lead to:
- physical effects . Genetic effects . cellular effects

24- Increasing the quantity of electricity which flows through a cross-section of the conductor (in) one second
The electric current intensity will increase.

25- When two electrically charged conductors touch, where the electric potential of the first conductor is higher than the electric potential of the second conductor.
The electric current will flow from the conductor that has higher electric potential to the other until their electric potential become equal.

26- If the resistance used (in) verifying Ohm's law is burnt related to the ammeter and voltmeter readings.
The reading of the ammeter = Zero, while the reading of the voltmeter does not change.

27- The length of the rheostat wire increases in the electric circuit (related to the electric current intensity)
- the electric current intensity will decrease.

28- If the pancreas decreases its secretion of the insulin hormone.
The level of glucose sugar in blood increases (or) human will suffer from diabetes disease.

29- When the glucose sugar level is increased in blood
- Pancreas responses by secreting insulin hormone to reduce the percentage of glucose sugar in blood.

30- When the estrogen hormone doesn't secreted at adulthood stage in a female.
- the female secondary sex characters are not appeared.

31- The atom nucleus of an element contains a number of neutrons more than the number required for its stability.
Its energy increases, so it emits unseen (invisible) radiations to reach a more stable composition

32- you keep food outside the refrigerator for a long time.
- food becomes rotten due to increasing chemical reactions done by bacteria.

33- Putting two effervescent tablets in two beakers, one of them contains cold water and the other contains hot water.
- An effervescence happens, and the effervescence occurred in case of hot water is faster than that in case of cold water.

34- Heating the solution resulting from the reaction between hydrochloric acid and sodium hydroxide.
Water (H_2O) evaporates and sodium chloride (NaCl) remains.

35- Two conductors having the same electric potential are connected together by a wire.
- No electric current will pass through them, because there is no potential difference between them.
(Potential difference = Zero)

36- When man takes a little amount of iodine in his food?
This leads to decreasing in secretion of thyroxin hormone and this leads to that the human suffers from simple goiter.

37- Changing the chemical composition of blood hemoglobin
- It becomes incapable of carrying oxygen to all body cells.

التاريخ : / / موضوع الدرس :

(5) Rewrite the following statements after correcting the underlined words:

1- Mendel's first law is called the law of independent assortment of hereditary factors	1- Segregation of factors
2- Nitrogen pentoxide breaks up into nitrogen dioxide gas and nitrogen gas.	2- Oxygen
3- The reaction of ionic compounds is slower than that of covalent compounds.	3- faster
4- The scientist Mendel has found out that the hereditary traits are transmitted from the parents to the offspring by means of hereditary factors, they are now called the enzymes.	4- genes.
5- In electric generator (dynamo), the heat energy converts to electric energy.	5- Kinetic
6- Mendel choose eleven main traits of pea plant to conduct his experiments	6- seven
7- When adding magnesium pieces to copper sulphate solution, a black precipitate is formed	7- red
8- The electromotive force of three identical cells connected in parallel is twice the electromotive force of one cell	8- equal to
9- $2Na + 2H_2O \rightarrow 2NaOH + O_2\uparrow + Heat$	9- H_2

التاريخ : / / موضوع الدرس :

(5) Correct the underlined words

10- Mendel removed the petals from the pea plant flowers before the anther becomes mature	10- stamens
11- In dry cell, mechanical energy is converted into electric energy.	11- chemical
12- Metals substitute hydrogen of water to produce metal carbonate and hydrogen gas evolves.	12- hydroxide
13- The ratio of gametes "TR" in a pea plant whose genetic structure TtRr is 75%.	13- 25%
14- Some traits are not transmitted from one generation to another and they are called the hereditary traits.	14- acquired traits
15- The mixed pollination between pea plants with pure yellow seeds and pea plants with pure green seeds, produces pea plants with pure green seeds.	15- hybrid yellow
16- The rate of a chemical reaction increases when the temperature of the reaction is constant	16- increased
17- When adding silver nitrate solution to sodium chloride solution, a red precipitate of silver chloride is formed.	17- White

التاريخ : / / موضوع الدرس :

(5) Correct

18- Acquired traits are transmitted from one generation to another — 18- hereditary

19- Most metal carbonates decompose by heat into metal and carbon dioxide — 19. metal oxide

20- The electric current intensity is inversely proportional to the potential difference — 20- directly

21- The unit of measuring the electromotive force (e.m.f.) is the coulomb — 21- Volt

22- The ammeter connected in parallel in an electric circuit. — 22- series

23- The scientist MendeLeev is the founder of heredity. — 23- Mendel

24- Sodium is monovalent because it gains one electron — 24- Loses

25- Electron is considered an energy store in the atom. — 25- Nucleus

26- The change in the Volume of the reactants and resultants at a unit time is known as the speed of chemical reaction. — 26- concentration

27- Alternating electric current used in electroplating process. — 27- Direct

28- The two hereditary factors are similar in hybrid individual. — 28- pure

29- The attached ear lobe is from daminant traits in the human. — 29- free

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(5) Correct

30- from the dominant traits in the human being is the attached (ear) Lobe — 30- the recessiv

31- The radioactivity phenomenon was discovered by the Scientist Ohm. — 31- Henri Becquerel

32- from the peaceful uses of nuclear energy in the medical field is converting Sand to silicon sheets — 33- the industria

33- The Scientist Mendel is considered the founder of physics. — 33- heredity

(6) Problems

1) Calculate the electric current intensity due to the flow of quantity of electricity of (6000) coulomb through a cross section of a conductor for (5) minutes.

(1) $I = \frac{q}{t} = \frac{6000}{5 \times 60}$

$= 20$ ampere

2) Calculate the work done to transfer an electric charge of 20 coulomb through a conductor, if the potential difference between its ends (is) 50 volt

Work (W) = Potential difference (V) × quantity of electricity (q)

$= 5.0 \times 20$

$= 100$ joule

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3) A quantity of Charge 360 coulomb passes in a conductor through time of one hour, calculate the electric voltage for the electric source if the resistance of the conductor is 2200 ohm.

$q = I \times t$

$360 = I \times 3600$

time = 60 x 60 = 3600 sec.

$I = \frac{360}{3600} = 0.1$ ampere

$R = \frac{V}{I}$

$V = R \times I = 2200 \times 0.1 =$ 220 volt

4) Calculate the quantity of electricity passing in a conductor of a resistance 2200 Ohm for two minutes if the potential difference between its terminals equals 220 volt.

$R = 2200$ Ohm $t = 2 \times 60 = 120$ sec. $V = 220$ volt

$I = \frac{V}{R} = \frac{220}{2200} = 0.1$ ampere

$\therefore I = \frac{q}{t}$

$\therefore q = I \times t = 0.1 \times 120 = 12$ Coulomb.

التاريخ : / / موضوع الدرس :

1) A battery consists of three electric cells, the e.m.f. of each cell is 3 volt. Calculate the e.m.f. when the cells are connected:

1) In series

$E_{(battery)} = n \times E_1$

e.m.f. = 3 x 3 = 9 volt

2) In parallel

$E_{(battery)} = E_1$

e.m.f. = 3 volt

(write the Law used in each case)

2) Which one of the following figures represents a part of an electric circuit that contains an ammeter and a voltmeter connected in right way:

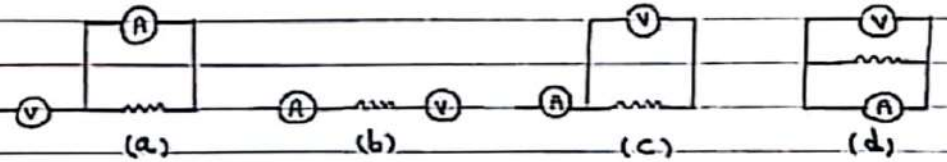
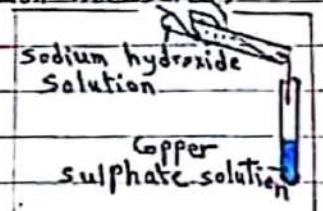


Fig. (c)

3) In the opposite figure:

How is the rate of this reaction measured?



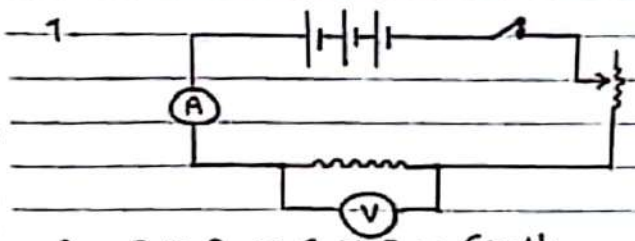
By disappearance rate of the blue colour of copper sulphate solution or the appearance rate of the blue colour of copper hydroxide ppt.

التاريخ : / / موضوع الدرس :

4) If you have a voltmeter, an ammeter, a switch, a fixed resistance, a rheostat, connecting wires and three electric cells connected in series:

① Draw an electric circuit to illustrate the relation between the current intensity and the potential difference.

② If you know that the e.m.f. of each cell in the previous circuit is 2volt, find the value of the fixed resistance if the reading of the ammeter was 6 ampere.



2- e.m.f. = 2 × 3 = 6 volt.

$R = \frac{V}{I} = \frac{6}{6} = 1$ Ohm.

5) The following figures show two graphs for two different types of an electric current:

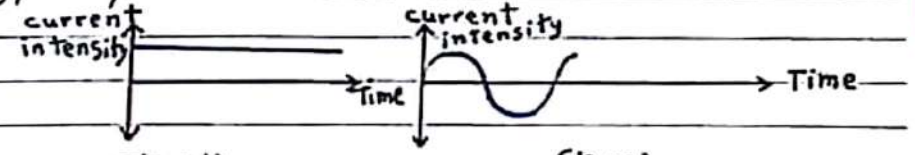


fig.(1) fig.(2)

① Which of the two graphs espresses the current which is able to transmit for long distances?

② Mention the type of the current you choose and the source from which it is produced.

① fig.(2) ② Alternating Current MITKEES it is produced from dynamo

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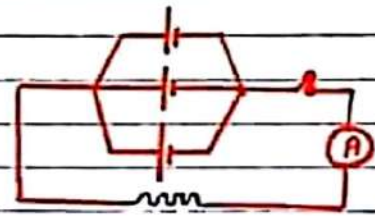
6) There are three identical electric cells whose e.m.f. = 6 volt are connected in the electric circuit by a certain method and the total resistance = 4 Ohm (Ω). Show by drawing and solving how the circuit is connected to obtain a current = 1.5 ampere.

$R = \frac{V}{I}$ $V = R \times I = 4 \times 1.5 =$ 6 volt



7) Complete

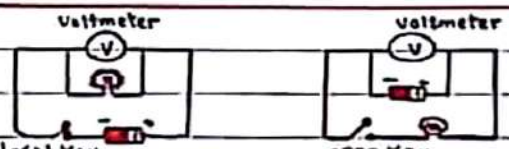


fig.(1) fig.(2)

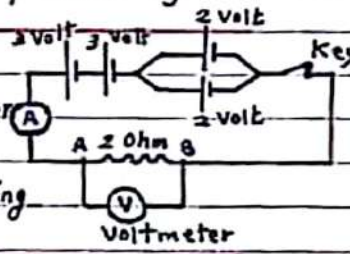
The voltmeter is used to measure .....

fig.(1) The potential difference between the two ends of a conductor

fig.(2) The electromotive force of a battery.

8) In the opposite figure, calculate:

1. The reading of the ammeter
2. The work done to transfer the electric charge between (A) and (B) during 2 minutes.



1- V = 2 + 3 + 3 = 8 Volt $I = \frac{V}{R} = \frac{8}{2} = 4$ amp.

2- q = I × t = 4 (2 × 60) = 480 coulomb.

W = V × q = 8 × 480 = 3840 joule.

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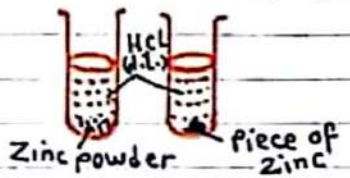
9) From the opposite figures. Show:

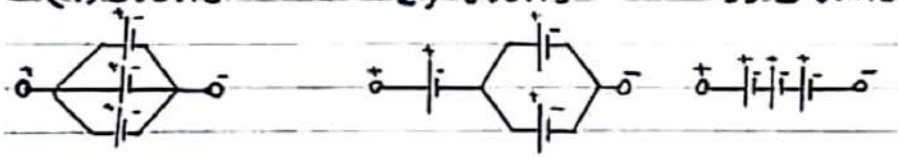


① The type of the chemical reaction
② The factor that affects the speed of this reaction.
③ Write the balanced symbolic chemical equation express this reaction.

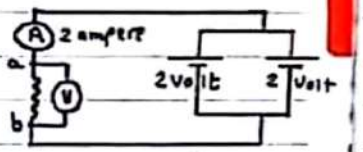
1- Simple substitution reaction [A metal substitutes the hydrogen of acid]
2- The effect of surface area on the speed of a chemical reaction.
3. $Zn + 2HCl \xrightarrow{dil.} ZnCl_2 + H_2\uparrow$

10) You have three electric cells, the electromotive force of each cell is 3 volt, show by drawing only how you connect them to obtain electromotive force of:

(1) 3 volts (2) 6 volts (3) 9 volts



11) From the opposite circuit, find the work done required to transfer a quantity of electric charge between points (a) and (b) through 5 minutes if the electromotive force of each cell is two volt and the reading of ammeter is two ampere.



$q = I \times t = 2 \times (5 \times 60) = 600$ Coulomb.

work done $(W) = V \times q = 2 \times 600 = 1200$ joule

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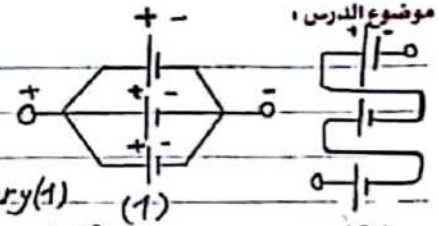
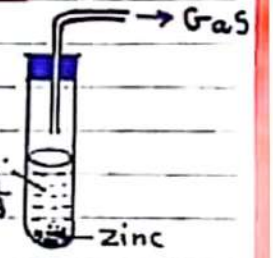
12) From the opposite figures:



Which figure gives higher Voltmeter reading, when the Voltmeter is connected with battery (1) or when it is connected with battery (2)? Why? (Given that all the cells are similar)

Battery (2) because the cells are connected in series, where e.m.f. of battery (2) equals the Sum of e.m.f. of cells formed it, while e.m.f. of battery (1) equals the e.m.f. of one cell

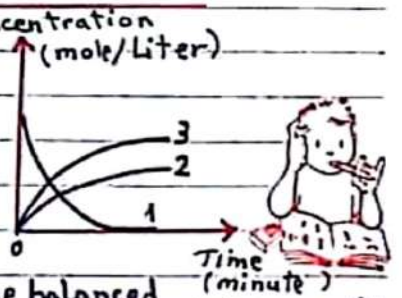
13) In the opposite figure:



On adding diluted hydrochloric acid to zinc, a gas is evolved.
1- What is the name of the evolved gas?
2- What do you observe if zinc is replaced by copper?

1- Hydrogen gas (H_2)
2- No reaction occurs, because copper comes after hydrogen in C.A.S so it can't replace hydrogen of acids

14) The opposite graph represents the rate of rapid decomposition of (X) compound as in the following equation: $2X \rightarrow 2Y + Z$



① Replace the numbers on the figure by suitable substance (X, Y, Z) From the equation ① X ② Z ③ Y

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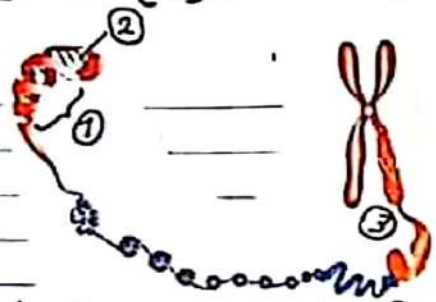
② Write the balanced symbolic equation of this reaction
$2N_2O_5 \rightarrow 4NO_2 + O_2\uparrow$

التاريخ: / /

15) Study the opposite figure, then answer:
1) Give the name of ①, ② and ③
2) Mention the name of the structural units of number ①.
3) Mention the name of chemical structure of number ③



1) ① The gene ② DNA ③ the chromosome.
2) Nucleotides.
3) DNA binds with protein.

16) From the opposite figure, answer the following questions:
1. What is the name of the gland (X)?
2. Mention the most important secretions of this gland.

① Thyroid gland ② Thyroxin hormone _ calcitonin hormone.

17) From the opposite figure:
1. a. What is the name of the evolved gas from the reaction?
b. How do you discover it?
2. a. Write the balanced chemical equation for the reaction
b. What is the type of the reaction?

1. a. Carbon dioxide (CO_2)
b. By passing it into clear limewater, it becomes turbid.
2. a. $Na_2CO_3 + 2HCl \xrightarrow{dil.} 2NaCl + H_2O + CO_2\uparrow$
b. double substitution reaction (Reaction between an acid and a salt)

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18) If you have copper sulphate solution, pieces of magnesium, sodium nitrate, test tubes and a flame. Show by balanced symbolic equations how to get:

1. Copper metal	2. Oxygen gas
① $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$	② $2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2\uparrow$

19) What is the reducing agent in the following two reactions? (mention the reason).

1. $CuO + H_2 \xrightarrow{\Delta} Cu + H_2O$	2. $2Na + Cl_2 \rightarrow 2NaCl$
1. Hydrogen (H_2), because it takes oxygen from copper(oxide).	2. Sodium (Na), because it loses one electron.

20) From the two chemical reactions, answer the following questions:
- $(A) + AgNO_3 \rightarrow$ precipitate $+ (B)$
- $2(B) \xrightarrow{\Delta} 2NaNO_2 + (D)$

1. Write the chemical formula of (A) and (B).
2. What is the name of gas (D) and how do you discover it?
3. Write the chemical formula of the precipitate and its colour.

1. (A): NaCl (B) $NaNO_3$
2. Gas (D): oxygen gas by approaching a burning match, the glowing of match increases.
3. AgCl - white ppt.

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21) When hydrogen passes through hot copper oxide, hydrogen takes the oxygen away from copper oxide and (water is formed) and (copper oxide turns into copper)

1) Show this by symbolic balanced chemical equation with writing the conditions of the reaction.

2) Determine the substance which is oxidized - reduced.

1) $H_2 + CuO \xrightarrow{\Delta} Cu + H_2O$

2) The substance which is oxidized : Hydrogen.

∴ The substance which is reduced : Copper oxide.

---

22) What is the type of ... ?

1- Process : $Ag^{+1} + e^- \rightarrow Ag$

2- The reaction between an acid and an alkali to form salt and water

① Reduction process ② Neutralization reaction.

---

23) Study the following reactions, then answer:

$A \xrightarrow{\Delta ①} H_2O + CuO$ $\quad 2Na + 2H_2O \xrightarrow{②} 2NaOH + B$

$CuO + B \xrightarrow{\Delta ③} H_2O + C$

① Write the chemical formula for A, B and C.

② What is the type of chemical reactions ①, ② and ③ ?

③ What is the name of the process that happens to black copper oxide ? And why ?

---

1. ⓐ $Cu(OH)_2$ ⓑ H_2 ⓒ Cu

2. ① Thermal decomposition reaction.
② Simple Substitution reaction
③ Oxidation and reduction reaction.

3- Reduction, because (MITKEES) it loses oxygen.

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24) Extract the unsuitable words, then write the link between the rest.

1- Diagnose some diseases - Eliminate pests - Drilling for petroleum - Ohmmeter.

2- Pressure - Potential difference - Electric resistance - Current intensity.

3- Convert mechanical energy to electric energy - Produce alternating current - Produce direct current - used in lighting of houses.

4- Ability to roll the tongue - Attached ear lobe - Curly hair - wide eyes.

1- Ohmmeter (Peaceful uses of nuclear energy)

2- Pressure (Ohm's Law).

3- Produce direct current (Electric generators).

4- Attached ear lobe (Dominant traits in human).

---

25) Under what conditions do the elements become naturally radioactive ?

When the number of neutrons is more than the number required for its stability.

26) Compare between

	Controlled radioactive industrial	Uncontrolled industrial radioactive
Their uses	like these which are done in nuclear reactors and are used in safe uses	like these which are done in nuclear bombs and are used in military uses

(MITKEES)

التاريخ: / / موضوع الدرس:

27) Compare between

	Ordinary rice	genetically modified rice
the vitamins exist in both of them	It doesn't contain Pro-vitamin (A).	It contains Pro-vitamin (A)

28) Explain the importance of:

Electric transformer: It is used to reduce the electric potential.

29) Mention only one use for the uncut electric charger device:

It is used to store the electric energy and provides the electric devices with the electric current, so as to continue operating when there is no electric current at home.

30) Mention the importance of the air bags.

They are considered one of the most important safety means in cars at emergencies.

31) Mention the scientific idea of producing rice that contains carotene.

Modifying the genetic composition of the rice crop by inserting the genes that result in the creation of the pro-vitamin (A) compound inside the tissue that stores starch in rice grains.

32) Mention the physical quantity which is measured by the following unites.

1) Joule/Coulomb : Potential difference.

2) Coulomb/Second : Electric current intensity.

التاريخ: / / موضوع الدرس:

33) Study the following biological diagram, then answer the questions:

The decrease of the blood sugar level → Effect on → organ (1) → secretes glucagon hormone which effects on → organ (2) → causes → increase of the blood sugar level into normal

a) What is the name of organ (1) ?

b) What is the name of organ (2) ?

a) Pancreas b) Liver

34) Mention the disease or the disorder results due to:

1) The decrease in the growth hormone secretion at childhood stage.

2) The increase in the growth hormone secretion at childhood stage.

3) The insulin hormone deficiency

1) Dwarfism 2) Gigantism 3) Diabetes

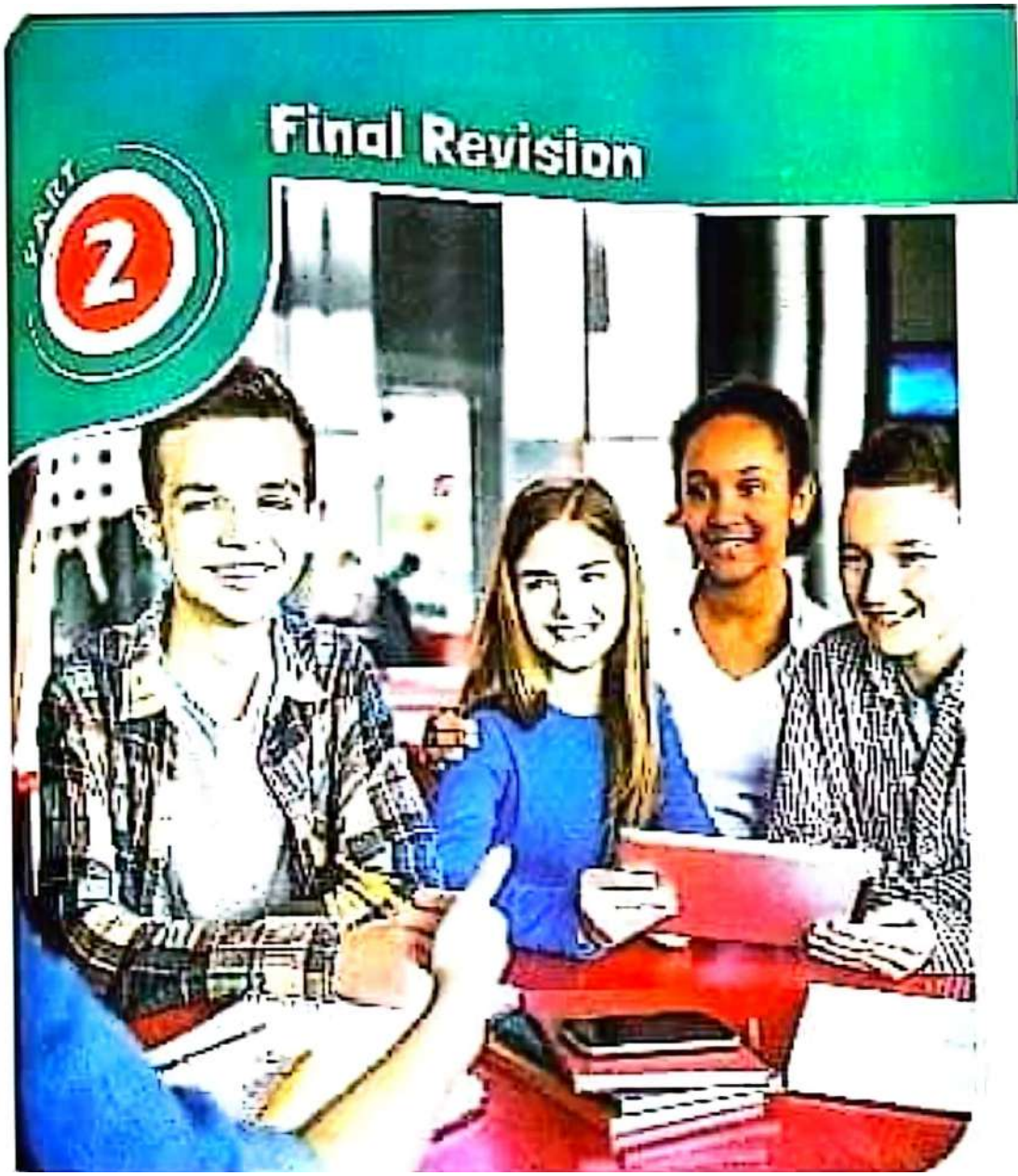
Final revision

علوم

مع غادة صلاح

Prep. 3

t2



Final Revision on Unit 1

1 Definitions (or scientific terms) : What do you mean by ... ?

1. Chemical reaction :	It is the breaking up of bonds in molecules of the reactants and formation of new bonds in the molecules of resultants (products) from the reaction.
2. Thermal decomposition reactions :	They are chemical reactions which involve the breaking up of the compounds by the effect of heat into its simple elements or simpler compounds than the original ones.
3. Chemical activity series :	It is the arrangement of metals in a descending order according to the degree of their chemical activity.
4. Simple substitution reactions :	They are chemical reactions in which one of the elements substitutes another less active element in a solution of one of its compounds.
5. Double substitution reactions :	They are chemical reactions in which double substitution (exchange) occurs between the ions (radicals) of two different compounds to give two other new compounds.
6. Neutralization reaction :	It is a reaction between an acid and an alkali to form salt and water.
7. Oxidation process :	A chemical process which causes the increase in the oxygen percentage or the decrease in the hydrogen percentage in a substance. **OR :** A chemical process where the atom loses an electron or more.
8. Reduction process :	A chemical process which causes the decrease in the oxygen percentage or the increase in the hydrogen percentage in a substance. **OR :** A chemical process where the atom gains an electron or more.
9. Oxidizing agent (factor) :	It is the substance which gives oxygen or takes hydrogen away during a chemical reaction. **OR :** It is the substance which gains an electron or more during a chemical reaction.
10. Reducing agent (factor) :	It is the substance which takes oxygen away or gives hydrogen during a chemical reaction. **OR :** It is the substance which loses an electron or more during a chemical reaction.

rate

11. The speed of chemical reaction :	It is the change in the concentration of the reactants and the resultants in a unit time.
12. Catalyst :	It is a substance which changes the rate of the chemical reaction without changing or being used up.
13. Positive catalytic reactions :	They are chemical reactions in which the catalyst increases their speeds.
14. Negative catalytic reactions :	They are chemical reactions in which the catalyst decreases their speeds.
15. Enzymes :	They are chemical substances produced by the body of living organism act as catalysts that increase the speed of biological reactions.

2 Importance or uses :

1. Catalysts :	They change (increase or decrease) the speed of chemical reactions.
2. Manganese dioxide :	A positive catalyst that increases the speed of decomposition of hydrogen peroxide.
3. Enzymes :	They act as catalysts that increase the speed of biological reactions.
4. Oxidase enzyme:	It increases the speed of decomposition of hydrogen peroxide.

3 Chemical equations :

Thermal decomposition reactions.

Show by using balanced chemical equations the effect of heat on the following compounds

1- Mercuric oxide
2- Copper hydroxide
3- Copper carbonate
4- Copper sulphate
5- Sodium nitrate

1. $2HgO \xrightarrow{\Delta} 2Hg + O_2\uparrow$
   (Red colour) *(Silver colour)*
2. $Cu(OH)_2 \xrightarrow{\Delta} CuO + H_2O\uparrow$
   (Blue colour) *(Black colour)*
3. $CuCO_3 \xrightarrow{\Delta} CuO + CO_2\uparrow$
   (Green colour) *(Black colour)*
4. $CuSO_4 \xrightarrow{\Delta} CuO + SO_3\uparrow$
   (Blue colour) *(Black colour)*
5. $2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2\uparrow$
   (White colour) *(Yellowish white colour)*

PART 2

Illustrate by balanced chemical equations the reaction of ..... with ...

6. $2NaN_3 \xrightarrow{\text{Electric spark}} 2Na + 3N_2\uparrow$
(Sodium azid) (Sodium) (Nitrogen gas)

7. $2Na + 2H_2O \longrightarrow 2NaOH + H_2\uparrow + heat$

8. $Zn + 2HCl \xrightarrow{dil.} ZnCl_2 + H_2\uparrow$

9. $2Al + 6HCl \xrightarrow{dil.} 2AlCl_3 + 3H_2\uparrow$

10. $Mg + CuSO_4 \longrightarrow MgSO_4 + Cu\downarrow$
(Blue colour) (Colourless) (Red ppt.)

11. $Fe + 2HCl \xrightarrow{dil.} FeCl_2 + H_2\uparrow$

12. $Mg + 2HCl \longrightarrow MgCl_2 + H_2\uparrow$

Simple substitution reactions.

Neutralization reaction

13. $HCl + NaOH \longrightarrow NaCl + H_2O$

a gas turbids Lime water

14. $Na_2CO_3 + 2HCl \xrightarrow{dil.} 2NaCl + H_2O + CO_2\uparrow$

Na Cl

15. $NaCl + AgNO_3 \longrightarrow NaNO_3 + AgCl\downarrow$
(White ppt.)

Explain how can you get by Symbolic balanced chemical equations a white precipitate

16. $2NaOH + CuSO_4 \longrightarrow Na_2SO_4 + Cu(OH)_2\downarrow$
(Blue colour) (Blue ppt.)

Double substitution reactions.

Oxidation – Reduction Reaction

17. $H_2 + CuO \xrightarrow{\Delta} H_2O + Cu$
Reducing agent — *Oxidizing agent*
Oxidation: $H_2 \rightarrow H_2O$
Reduction: $CuO \rightarrow Cu$

18. $2Na + Cl_2 \longrightarrow 2Na^+ Cl^-$
Reducing agent — *Oxidizing agent*
Oxidation: $2Na \rightarrow 2Na^+$
Reduction: $Cl_2 \rightarrow 2Cl^-$

Oxidation and reduction reactions.

19. $2N_2O_5 \longrightarrow 4NO_2 + O_2\uparrow$

4 Important tables :

1 Chemical activity series :

2 Formulae and colours of some elements and compounds :

Element or Compound	Formula	Colour
Copper	Cu	Red
Mercuric oxide	HgO	Red
Mercury	Hg	Silver
Copper hydroxide	$Cu(OH)_2$	Blue
Copper sulphate	$CuSO_4$	Blue
Copper oxide	CuO	Black
Copper carbonate	$CuCO_3$	Green
Sodium nitrate	$NaNO_3$	White
Sodium nitrite	$NaNO_2$	Yellowish white
Silver chloride	AgCl	White ppt.

7 Comparisons :

1 Heating of metal oxide and metal hydroxide :

Heating of metal oxide	Heating of metal hydroxide
Metal oxide decomposes by heat into metal and oxygen gas evolves. *Ex.:* $2HgO \xrightarrow{\Delta} 2Hg + O_2\uparrow$	Metal hydroxide decomposes by heat into metal oxide and water vapour. *Ex.:* $Cu(OH)_2 \xrightarrow{\Delta} CuO + H_2O\uparrow$

2 Simple substitution reactions and double substitution reactions :

P.O.C.	Simple substitution reactions	Double substitution reactions
Definition :	They are chemical reactions in which one of the elements substitutes another less active element in a solution of one of its compounds.	They are chemical reactions in which double substitution (exchange occurs between the ions (radicals) of two different compounds to give two other new compounds.
Types :	* A metal substitutes the hydrogen of water. * A metal substitutes the hydrogen of diluted acid. * A metal substitutes another one in its salt solution.	* An acid with an alkali. * An acid with a salt. * A salt solution with another salt solution.

3 Oxidation and reduction processes :

P.O.C.	Oxidation	Reduction
Traditional concept :	A chemical process which causes the increase in the oxygen percentage or the decrease in the hydrogen percentage in a substance. $H_2 \xrightarrow{\text{Oxidation}} H_2O$	A chemical process which causes the decrease in the oxygen percentage or the increase in the hydrogen percentage in a substance. $CuO \xrightarrow{\text{Reduction}} Cu$
Electronic concept :	A chemical process where the atom loses an electron or more. $Na \xrightarrow{\text{Oxidation}} Na^+ + e^-$	A chemical process where the atom gains an electron or more. $Cl_2 + 2e^- \xrightarrow{\text{Reduction}} 2Cl^-$

4 Oxidizing agent and reducing agent :

Oxidizing agent	Reducing agent
* It is the substance which gives oxygen or takes hydrogen away during a chemical reaction. * It is the substance which gains an electron or more during a chemical reaction. * A reduction process occurs to it.	* It is the substance which takes oxygen away or gives hydrogen during a chemical reaction. * It is the substance which loses an electron or more during a chemical reaction. * An oxidation process occurs to it.

5 Covalent compounds and ionic compounds :

Covalent compounds	Ionic compounds
They are slow reacting compounds, because they don't break up into ions.	They are fast reacting compounds, because they break up into ions.
The reaction takes place between molecules.	The reaction takes place between ions.

8 Activities :

Activity 1 The effect of surface area on the speed of chemical reaction :

Procedures :

1. Bring two flasks, then put in one of them iron filings and in the other a piece of iron has the same mass.
2. Pour equal amounts of dil. HCl acid in both flasks.
3. Compare between the speed of the two reactions.

Equation of the reaction :

$$Fe + 2HCl \xrightarrow{dil.} FeCl_2 + H_2\uparrow$$

Observation :

The rate of reaction of hydrochloric acid with iron filings is faster than that in case of a piece of iron.

Explanation :

The surface area of iron filings exposed to the reaction with acid is more than the surface area of the iron piece, so the reaction in case of iron filings ends in a short time than that in case of iron piece.

Conclusion :

The speed of chemical reaction increases by increasing the surface area of the reactants exposed to the reaction.

Activity 2 The effect of reactants concentration on the speed of chemical reaction :

Procedures :

1. Bring two flasks, then put in each of them a piece of magnesium ribbon.
2. Put a small amount of dil. HCl in one of them, and put the same amount of conc. HCl in the other.
3. Compare between the number of the evolved bubbles (the amount of the gas formed) after a certain period of time in the two reactions.

Equation of the reaction :

$$Mg + 2HCl \longrightarrow MgCl_2 + H_2\uparrow$$

Observations :

1. The number of the evolved bubbles in case of using conc. hydrochloric acid is more than that in case of dil. hydrochloric acid.
2. The rate of the reaction of magnesium ribbon with conc. hydrochloric acid is faster than that in case of dil. hydrochloric acid.

Explanation :

The number of molecules of acid in concentrated solution is more than that its number in diluted solution which leads to increasing the number of probable collisions between reactant molecules, so the speed of chemical reaction increases.

Conclusion :

The speed of chemical reaction increases by increasing the concentration of the reactants.

ACTIVITY 3 The effect of temperature on the speed of chemical reaction :

Procedures :

1. Bring two glass beakers have two equal volumes of water, one of them is hot and the other is cold.
2. Add an effervescent tablet to each glass beaker.
3. Compare between the speed of occurrence of effervescene in the two beakers.

Observation :

The effervescence happens in case of hot water is faster than that in case of cold water.

Explanation :

The speed of the reactant molecules in case of hot water is greater than that its speed in case of cold water which leads to increasing the number of probable collisions between reactant molecules, so the speed of the chemical reaction increases.

Conclusion :

The speed of chemical reaction increases by increasing the temperature of the reaction.

PART 2

ACTIVITY 4 The effect of catalyst on the speed of chemical reaction :

Procedures :

1. Bring a glass beaker and put in it an amount of hydrogen peroxide, then add a little amount of manganese dioxide powder to it.
2. Compare between the number of the evolved bubbles before and after adding manganese dioxide.

Observation :

Increasing the number of the evolved bubbles on adding manganese dioxide powder to hydrogen peroxide.

Explanation :

Manganese dioxide is a catalyst that increases the speed of decomposition of hydrogen peroxide into water and oxygen that evolves as bubbles.

Conclusion :

The speed of chemical reaction increases by adding a catalyst.

ACTIVITY 5 The effect of enzymes on the speed of chemical reaction :

Procedures :

1. Bring a glass beaker, then add an amount of hydrogen peroxide in it.
2. Put a piece of sweet potato in the glass beaker.
3. Compare between the number of the evolved bubbles before and after adding a piece of sweet potato.

Observation :

Increasing the number of the evolved bubbles on adding a piece of sweet potato to hydrogen peroxide.

Explanation :

Oxidase enzyme in sweet potato acts as a catalyst which increases the rate of decomposition of hydrogen peroxide into water and oxygen.

Conclusion :

The speed of chemical reaction increases by adding an enzyme.

9 Main points :

1 Types of chemical reactions :

- Thermal decomposition reactions.
- Substitution reactions.
- Oxidation and reduction reactions.

2 The difference of chemical reactions in the speed of their occurrence :

Chemical reaction	The speed of its occurrence
• Reaction of fireworks.	• Very fast (It occurs in very short time).
• Reaction of oil with caustic soda to form soap.	• Relatively slow (It occurs in short time).
• Reaction of rusting of iron.	• Very slow (It needs several months).
• Reaction of formation of petroleum oil inside the Earth.	• Too slow (It needs millions of years).

3 Factors affecting the speed of chemical reaction :

- The nature of the reactants.
- The concentration of the reactants.
- The temperature of the reaction.
- Catalysts.

4 The nature of the reactants :

The nature of the reactants is related to :

1. The kind of bonding in the reactants.
2. The surface area of the reactants exposed to reaction.

5 The kind of bonding in reactants :

There are two kinds of compounds :

1. Covalent compounds
2. Ionic compounds

6 Common properties of catalysts :

1. They change the speed of reaction but don't affect either its beginning or stopping.
2. They are used in a small amounts which are often enough to complete the reaction.
3. They are bonded to reactants during the reaction but get separated from them (quickly) to form the resultants at the end of the reaction.
4. They decrease the energy needed for the reaction.
5. No chemical change or decrease in mass occur to the catalyst after ending the reaction.

10 Science, Technology and Society :

Most of modern cars are equipped with :

1. Air bags.
2. Catalytic converter .

1 Air bags :

Importance	Idea of operation
- They are considered as one of the most important safety means in cars at emergencies.	- On the occurrence of a car accident (crash) or a sudden drop in the speed of the car, an electric spark is generated works on decomposition and explosion of the substance of sodium azid forming sodium and nitrogen gas evolves. - The bag gets inflated by nitrogen gas at an extreme speed (within only 40 mm second), then it gets vacuumed rapidly to ensure clear vision and proper movement of the driver. $2NaN_3 \xrightarrow{\text{Electric spark}} 2Na + 3N_2\uparrow$ Sodium azid → Sodium + Nitrogen gas

2 Catalytic converter :

Structure	Importance	Idea of operation
- It is composed of ceramic cells (similar to bee cells) covered with a thin layer of a catalytic metal as platinum or palladium.	- It helps in the treatment of harmful gases emitted from the car engine.	- Ceramic cells are similar to bee cells which increase the surface area of the catalytic substance exposed to the current of the emitted gases from the engine so as to economize the use of expensive metals. - The catalysts increase the speed of reactions of the treatment of the harmful gases emitted from the engine.

Final Revision on Unit 2

1 Definitions (or scientific terms) :

1. Electric current :	It is the flow of electric negative charges (electrons) through a conductor.
2. Electric current intensity :	It is the quantity of electric charges in coulomb flowing through a cross-section of the conductor in one second.
3. The ampere :	- It is the electric current intensity passing through a circuit when a charge of one coulomb passes through a given cross-section in one second. - It is the current intensity passing through a conductor whose resistance is one ohm and the potential difference across its terminals is one volt.
4. The coulomb :	It is the quantity of charge transferred by a constant current of intensity one ampere in time of one second.
5. Electric potential of a conductor :	It is the condition (state) of an electric conductor that shows the transfer of the electricity from or to it when it is connected to another conductor.
6. Potential difference across a conductor :	It is the value of the work done to transfer a quantity of charge (one coulomb) between the two ends of this conductor.
7. The volt :	- It is the potential difference across two terminals of a conductor on doing a work of one joule to transfer a quantity of charge of one coulomb. - It is the potential difference across the two terminals of a conductor whose resistance is one ohm and the current intensity passing through it is one ampere.
8. The electromotive force (e.m.f.) :	It is the potential difference between the two poles of the electric source when the circuit is open.
9. The electric resistance :	- It is the obstruction (opposition) that the electric current faces during its passing through a conductor. - It is the ratio between the potential difference across the two ends of a conductor and the current intensity passing through it.
10. The ohm :	- It is the resistance between two points of a conductor that has an electric current passing through it of intensity one ampere when the potential difference between these points is one volt. - It is the resistance of a conductor which allows passing of an electric current intensity of one ampere when the potential difference across its terminals is one volt.

PART 2

11. The variable resistance :	It is the resistance which can be varied in order to control the current intensity and the potential difference in the different parts of the circuit.
12. Ohm's law :	The electric current intensity passing through a conductor is directly proportional to the potential difference across it at a constant temperature.
13. Electrochemical cells :	They are the cells in which the chemical energy is converted into electric energy.
14. Electric generators (Dynamoes) :	They are the devices in which the mechanical (kinetic) energy is converted into electric energy.
15. Direct electric current (D.C.) :	It is an electric current which has a constant intensity and flows in one direction in the electric circuits.
16. Alternating electric current (A.C.) :	It as an electric current which has a variable intensity and flows in two opposite directions in the electric circuits.
17. Radioactive elements :	They are elements whose atoms' nuclei contain a number of neutrons more than the number required for its stability.
18. Radioactivity phenomenon (Natural radioactivity) :	It is the spontaneous decay of the atoms' nuclei of radioactive elements that are present in nature in an attempt to achieve a more stable composition.
19. Artificial radioactivity :	It is the radiation or nuclear energy that is either released during nuclear reactions or nuclear bombs.
20. Radiation pollution :	It is the increase of the amount of radiation in the environment.
21. Physical effects due to radiation :	They are changes that appear on a living being, as a result of exposure to radiation.
22. Genetic effects due to radiation :	They are changes in the sex chromosomes composition which result in abnormal birth.
23. Cellular effects due to radiation :	They are changes in the cells composition which lead to destroying the cells.
24. Isotopes :	They are atoms of the same element with the same number of protons and with different number of neutrons.
25. Rem :	It is the measuring unit of absorbed radiation.

2 What is meant by.....?

1. An electric charge of 20 coulomb flows through a cross-section of a conductor in 5 second :	This means that the electric current intensity passing through this conductor is $\frac{20}{5} = 4$ ampere.
2. The electric current intensity passing through a conductor is 1.5 ampere :	This means that the quantity of electric charge that passes through the conductor in one second equals 1.5 coulomb.

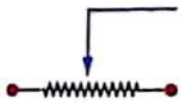
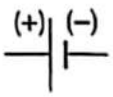
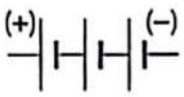
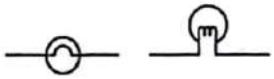
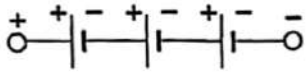
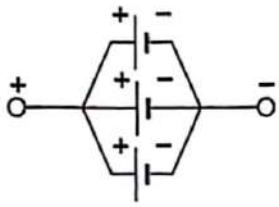
3. A work of 10 joule is done to transfer a charge of 5 coulomb between two points :	This means that the potential difference across the two points equals $\frac{10}{5} = 2$ volt .
4. The potential difference across two points of a conductor is 5 joule/coulomb :	This means that the work done to transfer one coulomb between two ends of this conductor is 5 joule .
5. The electromotive force of an electric cell is 1.1 volt :	This means that the potential difference between the two poles of the electric cell when the circuit is open is 1.1 volt .
6. The resistance of a conductor is 2 ohm :	This means that the ratio between the potential difference across the two ends of the conductor and the current intensity passing through it is 2 ohm .
7. The potential difference across a conductor of resistance 3 ohm is 6 volt :	This means that the current intensity passing through this conductor is $\frac{6}{3} = 2$ ampere .
8. The current intensity passing through a conductor of resistance 1 ohm is 5 ampere :	This means that the potential difference across the two terminals of the conductor is 5 volt .
9. An electric current of 3 ampere flows through a conductor and the potential difference across its terminals is 15 volt :	This means that the resistance of this conductor equals 5 ohm .

3 Measuring units :

Physical quantity	Measuring unit
- The potential difference (V) between two points. - The (e.m.f.) of an electric cell.	Volt
The quantity of electricity (q).	Coulomb
The time (t).	Second
The work (W).	Joule
The intensity of the electric current (I).	Ampere
The electric resistance (R).	Ohm
The absorbed radiation.	Rem

5 Important symbols :

The symbols in the electric circuit :

<table>
<tr><td rowspan="2">(1) Voltmeter</td><td rowspan="2">(2) Ammeter</td><td colspan="2">(3) Resistance</td></tr>
<tr><td>Fixed</td><td>Variable (Rheostat)</td></tr>
<tr><td>  </td><td>  </td><td></td><td>  </td></tr>
<tr><td colspan="2">(4) Key</td><td colspan="2">(5) Electric source</td><td rowspan="2">(6) Electric lamp</td></tr>
<tr><td>Open</td><td>Closed</td><td>Electric cell</td><td>Battery</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="3">(7) Series connection of electric cells</td><td colspan="3">(8) Parallel connection of electric cells</td></tr>
<tr><td colspan="3">  </td><td colspan="3">  </td></tr>
</table>

6 Importance or uses :

1. Ammeter :	It is used for measuring the electric current intensity.
2. Voltmeter :	**It is used for measuring :** a. The potential difference across two ends of a conductor. b. The electromotive force of the battery.
3. Ohmmeter :	It is used for measuring the electric resistance.
4. Rheostat :	It is used to control the current intensity and potential difference in the electric circuit.
5. The simple cell or the dry cell :	• It changes the chemical energy into electric energy. • It produces direct current.
6. The electric generator (Dynamo) :	• It changes the kinetic energy into electric energy. • It produces alternating current.
7. Direct current :	It is used in electroplating processes and in operating of some electric machines (appliances).

8. Alternating current :	It is used in lighting houses and in operating of electric appliances.
9. Connection of dry cells in series :	To obtain a battery, the e.m.f. of it is high.
10. Connection of dry cells in parallel :	To obtain a battery, the e.m.f. of it is low.
11. The uses of nuclear energy in the :	
a. Medical field :	– To treat and diagnose diseases like cancer.
b. Agricultural field :	– To eliminate pests and to improve some plants races.
c. Industrial field :	– To convert sand to silicon sheets which is used in manufacturing of computer processors and programmed electric circuits that are used in electric appliances. – To discover defects in the manufactured products.
d. Electricity generation field :	– To heat water to produce steam used to operate turbines and to generate electricity.
e. Space exploration field :	– It is used as a nuclear fuel for rockets that fly in the space.
f. Drilling field :	– For drilling of petroleum and underground water.

7 Scientists and their contributions :

Ohm :	He deduced the relation between the electric current and the potential difference which is known as after him by Ohm's law.
Henri Becquerel :	• He discovered the radioactivity phenomenon. • He discovered the emission of unseen rays from the uranium element that has the ability to penetrate solid objects.
Dr. Aly Mostafa Moshrafa :	• He has great theories in the fields of atom and radiation. Basics of manufacturing the atomic bomb were based on his theories. • He gave his objection to this matter and called for the necessity of exploiting the atom and radiation for the benefit of humanity.

10 Comparisons :

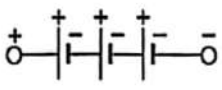
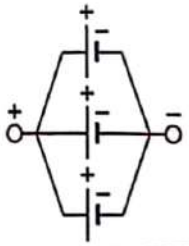
1 Ammeter and voltmeter :

Points of comparison	Ammeter	Voltmeter
1. Used for measuring :	The current intensity (I) in an electric circuit.	a. The electromotive force (e.m.f.) of an electric source. b. The potential difference (V) between two points in an electric circuit.
2. Measuring unit :	Ampere	Volt
3. Its symbol in the electric circuit :		
4. Type of connection in the electric circuit :	Series connection.	Parallel connection.

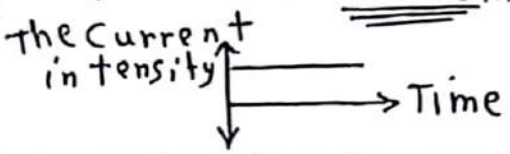
2 Electric current intensity, potential difference and electric resistance :

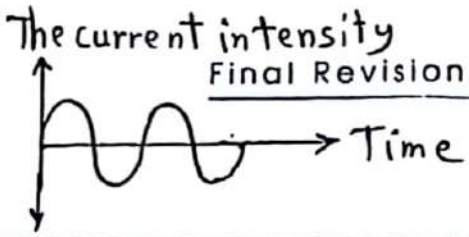
Points of comparison	Electric current intensity (I)	Potential difference (V)	Electric resistance (R)
1. Definition :	It is the amount of electric charges passing through a given cross-section of the conductor in one second.	It is the work done in joules to transfer a unit charge (one coulomb) through a wire of a conductor.	It is the ratio between the potential difference across the conductor and the current intensity passing through it.
2. Measuring unit :	Ampere	Volt	Ohm
3. The apparatus used :	Ammeter	Voltmeter	Ohmmeter
4. Law used :	Current intensity (I) $= \frac{\text{quantity of charge (q)}}{\text{time in seconds (t)}}$	Potential difference (V) $= \frac{\text{work done (W)}}{\text{quantity of electricity (q)}}$	Resistance (R) $= \frac{\text{potential difference (V)}}{\text{current intensity (I)}}$

3 Series connection and parallel connection :

Points of comparison	The series connection	The parallel connection
The produced e.m.f. :	• The (e.m.f.) of a group of similar dry cells connected in series = the number of the cells (n) × the electromotive force of one cell. $E_{(battery)} = n \times E_1$ • The (e.m.f.) of a group of different dry cells connected in series = the sum of the (e.m.f.) of these cells. $E_{(battery)} = E_1 + E_2 + E_3 + ...$ • It is used to obtain high (e.m.f.).	• The (e.m.f.) of a group of similar dry cells connected in parallel = the (e.m.f.) of one cell. $E_{(battery)} = E_1$ • It is used to obtain low (e.m.f.).
The diagrammatic figure :		

④ Compare by drawing





④ Direct current and alternating current :

Direct current (D.C.)	Alternating current (A.C.)
1. It is unidirectional and has constant intensity.	1. It is variable in both direction and intensity.
2. It is produced from the electrochemical cells.	2. It is produced from the electric generators.
3. It cannot be changed into an alternating current.	3. It can be changed into a direct current.
4. It cannot be transferred for long distances.	4. It can be transferred for long distances.
5. It is used in electroplating processes and in operating of some electric appliances.	5. It is used in lighting houses and in operating electric appliances.

⑤ Nuclear reactions and nuclear bombs :

Nuclear reactions	Nuclear bombs
They can be controlled.	They can't be controlled.
They are used in safe uses.	They are used in military uses.

⑥ Genetic effects and cellular effects produced from radiation :

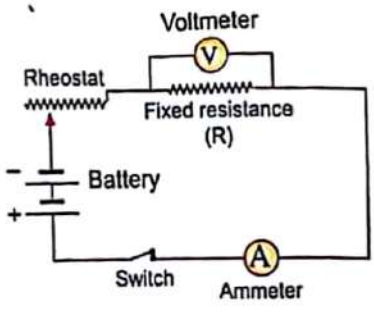
Genetic effects	Cellular effects
They are changes in the sex chromosomes composition which result in abnormal birth.	They are changes in the cells composition.

11 Activities :

Activity 1 To discover the relation between current intensity and potential difference :

Steps :

1. Connect an electric circuit (as shown in the fig.) which consists of a battery, a rheostat, a voltmeter (V), a conductor (has fixed resistance), an ammeter (A), and a switch.



2. Close the switch, then adjust the variable resistance (rheostat) till find the suitable reading of the voltmeter and the ammeter.
3. Repeat the previous step several times by changing the variable resistance each time and record your reading in a table.

4. Calculate the value of $\frac{V}{I}$ in each case.

Exp. No.	Ammeter reading I (ampere)	Voltmeter reading V (volt)	$R = \frac{V}{I}$
1	0.1	1	10
2	0.2	2	10
3	0.3	3	10

Observation :

The ratio = $\frac{\text{Potential difference (V)}}{\text{Current intensity (I)}}$ = **Constant value.**

i.e. $V \propto I$ $\quad\quad$ $\therefore V = \text{Constant} \times I$

The constant value is given by the symbol (R) and it is equal to the resistance of the conductor. $\quad\quad$ $\therefore V = R \times I$

Conclusion :

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

ACTIVITY 2 To measure the electromotive force (e.m.f.) of electric cells connected in series :

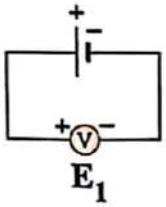
Tools :

Three similar dry cells, voltmeter, connecting wires.

Procedures :

1. • Connect an electric circuit which consists of one cell and a voltmeter as shown in Fig. (a)
   • Record the reading of the voltmeter (let it be E_1).

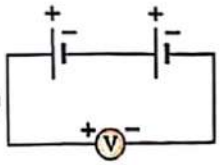
Fig. (a)



E_1

2. • Connect another similar cell to the first cell in series as shown in Fig. (b).
   • Record the reading of the voltmeter in this case (let it be E_2).

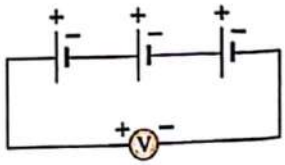
Fig. (b)



E_2

3. • Connect another similar cell in series as shown in Fig. (c).
   • Record the reading of the voltmeter in this case (let it be E_3).

Fig. (c)



E_3

Observations :

- The reading of voltmeter in the second case is twice the e.m.f. in the first case.

i.e. (E_2) is twice (E_1).

- The e.m.f. in the third case is three times the e.m.f. in the first case.

i.e. (E_3) equals three times (E_1).

Conclusion :

1. The electromotive force of a group of **different** dry cells connected **in series** = the sum of the electromotive forces of these cells.

$$\therefore E_{(battery)} = E_1 + E_2 + E_3 + \ldots\ldots\ldots$$

2. The electromotive force of a group of **similar** dry cells joined **in series** = the number of the cells (n) × the electromotive force of one cell.

$$\therefore E_{(battery)} = n \times E_1$$

ACTIVITY 3 To measure the electromotive force (e.m.f.) of electric cells connected in parallel :

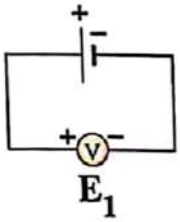
Tools :

Three similar electric cells, voltmeter, electric conducting wires.

Procedures :

1. • Connect an electric circuit containing one cell and a voltmeter as shown in Fig. (a).
   • Record the reading of the voltmeter (let it be E_1).

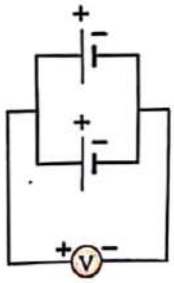
Fig. (a)



E_1

2. • Connect another cell parallel to the first as shown in Fig. (b).
   • Record the reading of the voltmeter in this case (let it be E_2).

Fig. (b)



E_2

3. • Connect the third cell in parallel to the circuit as shown in Fig. (c).

• Record the reading of the voltmeter in this case (let it be E_3).

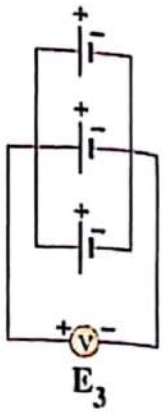


Fig. (c)

Observation :

The reading of the voltmeter (e.m.f.) is the same in each case.

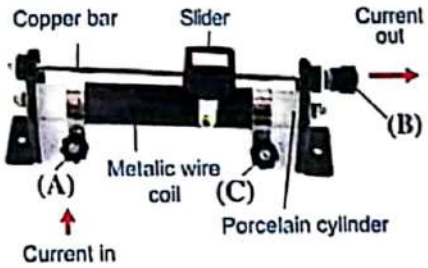
Conclusion :

The e.m.f. of a group of similar dry cells which are connected in parallel is equal to the e.m.f. of one cell.

$$\therefore E_{(battery)} = E_1$$

12 Main points :

1. There are several physical properties of the electric current as : the **potential difference, current intensity** and **electric resistance**.
2. Electric current **doesn't flow** between two conductors, their electric potential are **equal**.
3. **The variable resistance (Rheostat).**



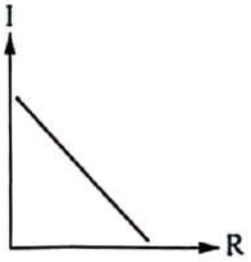
"The variable resistance" (Rheostat)

4. **The relation between the potential difference (v) and the current intensity (I) at constant temperature.**

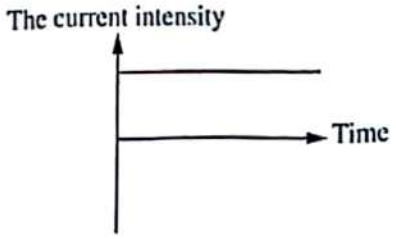
• Directly relationship.

5 The relation between the current intensity (I) and the resistance (R) at constant potential difference.

- Inversly relationship.

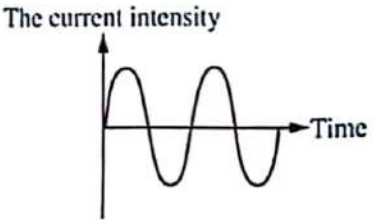


6 A diagram representing direct current.



Graphical representation of the direct current

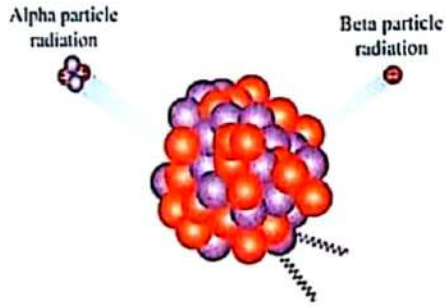
7 A diagram representing alternating current .



Graphical representation of the alternating current

8 Examples of radioactive elements :

- Radium
- Uranium
- Cesium
- Polonium
- Rubidium
- Selenium
- Zirconium



Radioactivity phenomenon Gamma ray

9 Types of radioactivity :

- Natural radioactivity.
- Artificial radioactivity.

10 Sources of radiation pollution :

- Natural radiation sources as natural radioactive elements and cosmic radiation.
- Artificial radiation sources as that are produced due to explosion of nuclear bombs or due to the nuclear reactors.

11 Means of protection from radiation pollution :

a. Not to be exposed to more than a dose of 5 rem in one day.
b. Workers with radioactive elements should wear protective gloves, clothes and masks.
c. Radioactive wastes must be away from underground water's path and animals that live in caves.
d. Issue laws for nuclear stations to cool the hot wastes before throwing them in seas and lakes.
e. The area chosen for storing radioactive wastes should be steady and away from animals that live in caves.

1 Definitions (or scientific terms) : what do you mean(by)--

1. Hereditary traits :	They are the traits that are transmitted from one generation to another.
2. Acquired traits :	They are the traits that aren't transmitted from one generation to another.
3. Genetics :	It is a science that researches the transmission of the hereditary traits from one generation to another by studying the similarities and differences between the parents and the offspring.
4. Law of segregation of factors (Mendel's first law) :	When two pure individuals of any pair of hereditary traits are different from each other, only the dominant trait appears in the first generation, while the two traits appear in the second generation at a ratio of 3 (dominant trait) : 1 (recessive trait).
5. The principle of complete dominance :	It is the appearance of a dominant hereditary trait in the individuals of the first generation when two individuals are crossed, one of them carries a pure trait contrasting the trait carried by the other individual.
6. Gametes :	They are cells by which the hereditary traits are transmitted from parents to their offspring.
7. Dominant trait :	It is the trait that appears when aggregation of two similar factors (genes) of the dominant trait or one factor (gene) of the dominant trait with a factor (gene) of the recessive trait.
8. Recessive trait :	It is the trait that appears only when aggregation of two similar factors (genes) of the recessive trait.
9. Dominant gene :	It is the gene that its trait appears when it exists with a similar dominant gene or with a recessive gene for the same trait.
10. Recessive gene :	It is the gene that its trait appears only when it exists with a similar recessive gene for the same trait.
11. Pure individual :	It is the individual that carries a similar pair of genes either dominant trait or recessive trait, so the dominant trait (pure) or recessive trait appears on the individual.
12. Hybrid individual :	It is the individual that carries a different pair of genes, one is dominant trait and the other is recessive trait, so the dominant trait (impure) appears on the individual.
13. Law of independent assortment of hereditary factors (Mendel's second law) :	When two pure different individuals bearing a pair or more of alternative (contrasting) traits are crossed, the trait of each pair is inherited independently of the others and appears in the second generation at a ratio of 3 (dominant trait) : 1 (recessive trait).

14. Genes :	They are parts of DNA present on the chromosomes and they are responsible for appearing the individual's hereditary traits.
15. Chromosome :	It chemically consists of a nucleic acid called DNA combined with protein.
16. Human genome :	It is a genetic map that shows the complete set of genes present on the human chromosomes.

2 Scientists and their contributions (efforts) :

Gregor Mendel :	He is the founder of heredity.
Watson and Crick :	They make a model of DNA molecule which is composed of two strands coiled around each other forming a double helix shape.
Badel and Tatum :	They discovered the means of how the genes control the appearance of genetic traits.

3 Importance or uses :

1. Genes :	They control the appearance of hereditary traits of the living organism.
2. Genetically modified rice :	Solving the problem of malnutrition caused by deficiency of vitamin (A).
3. Human genome project :	• Determination all the human genes and identification their various functions. • Identification the genes responsible for the various diseases like cancer, diabetes, vascular diseases, mental diseases. • Determination the effect of various mutations on the function of the genes. • Understanding the human biology and identify the single differences between one person and another.

4 Important tables :

1 Some dominant and recessive traits in pea plant :

Trait	Dominant	Recessive
Stem height :	Tall	Short
Flower position :	Side	End
Flower colour :	Red	White
Pod (fruit) shape :	Swollen	Sinuous
Pod (fruit) colour :	Green	Yellow
Seed shape :	Smooth	Wrinkled
Seed colour :	Yellow	Green

2 Some dominant and recessive traits in the human being :

Trait	Dominant	Recessive
Tongue :	The ability to roll the tongue	The inability to roll the tongue
Ear lobe :	Free ear lobe	Attached ear lobe
Nature of hair :	Curly hair	Straight hair
Colour of hair :	Black hair	Light coloured hair
Size of eyes :	Wide eyes	Narrow eyes
Colour of eyes :	Brown eyes	Coloured eyes (blue, green, grey)
Check dimples :	Dimples	No dimples
Facial freckles :	No freckles	Freckles

3 Symbols of some genetic traits in pea plant :

Trait	Symbol of the trait		
	Dominant in plants		Recessive in plants
	Pure	Hybrid	
*** Stem height :**	TT	Tt	tt
	Tall stem		Short stem
*** Colour of flowers :**	RR	Rr	rr
	Red flowers		White flowers
*** Colour of pods :**	GG	Gg	gg
	Green pods		Yellow pods
*** Colour of seeds :**	YY	Yy	yy
	Yellow seeds		Green seeds
*** Shape of seeds :**	SS	Ss	ss
	Smooth seeds		Wrinkled seeds

5 Important laws and solved problems :

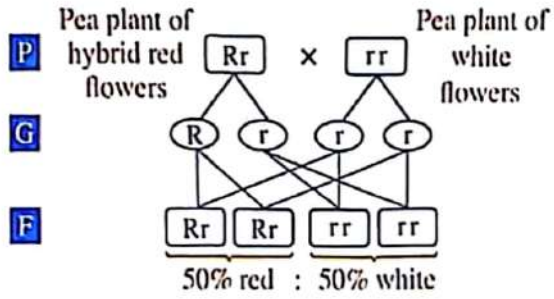
1 Mendel's first law (law of segregation of factors) :

When two individuals of any pair of hereditary traits are different from each other, only the dominant trait appears in the first generation, while the two traits appear in the second generation at a ratio of 3 (dominant trait) : 1 (recessive trait).

Problems

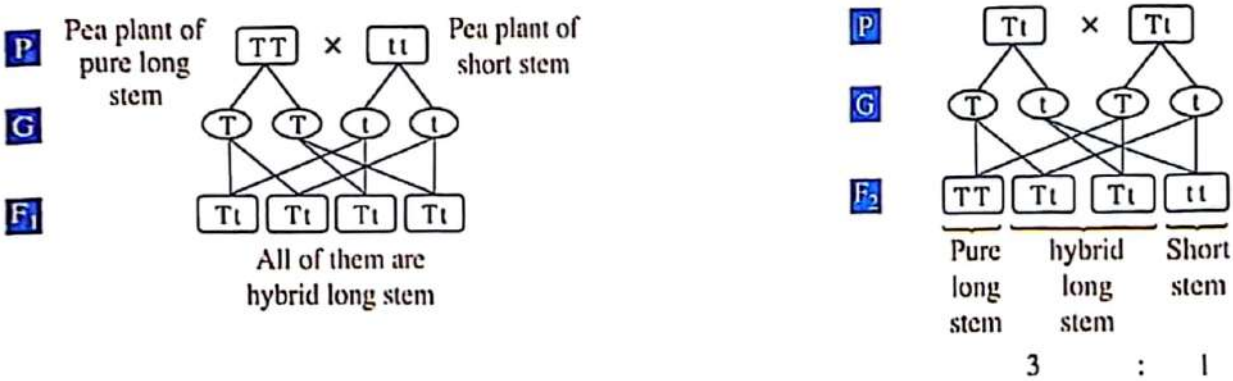
Problem 1 *If crossing takes place between two pea plants, one of them of hybrid red flowers and the other of white flowers. Explain on the bases of genetic principles, the results of such crossing. Mention the ratio of the obtained offspring.*

Solution



Problem 2 *Using symbols to express the results of mating between a short stem pea plant (tt) and pure long stem pea plant (TT).*

Solution



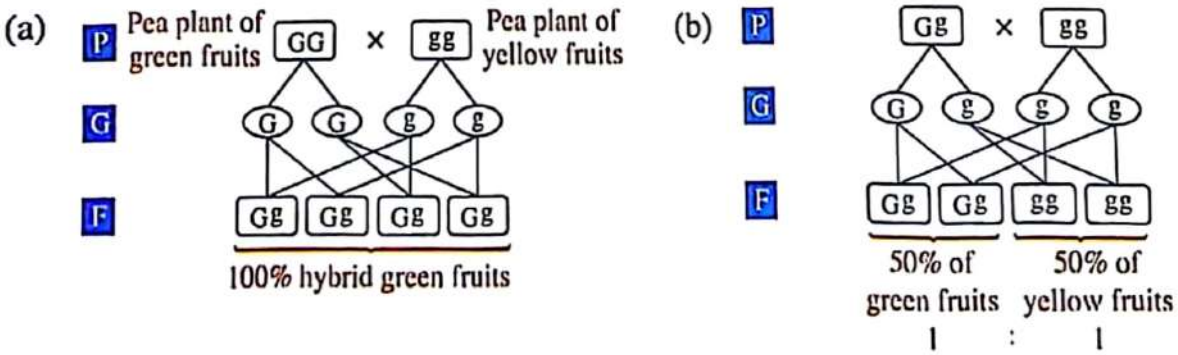
Problem 3 *If you know that the dominant colour of the pea plant fruit is the green colour (G) and the recessive colour of the pea plant fruit is yellow colour (g).*

(a) Mention on genetic bases the results of this crossing.

(b) - What are the results of crossing an individual resulted from the previous crossing and a plant with yellow fruits ?

- Mention the ratio of offspring.

Solution



2 Mendel's second law (law of independent assortment of hereditary factors) :

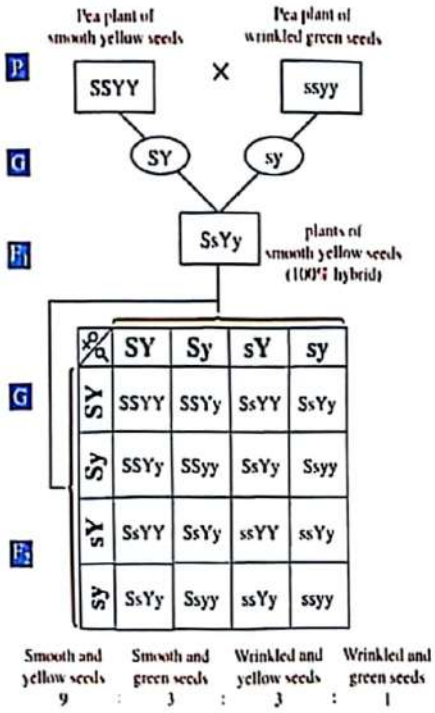
When two pure different individuals bearing a pair or more of alternative (contrasting) traits are crossed, the trait of each pair is inherited independently of the others and appears in the second generation at a ratio of 3 (dominant trait) : 1 (recessive trait).

PART 2

Problems

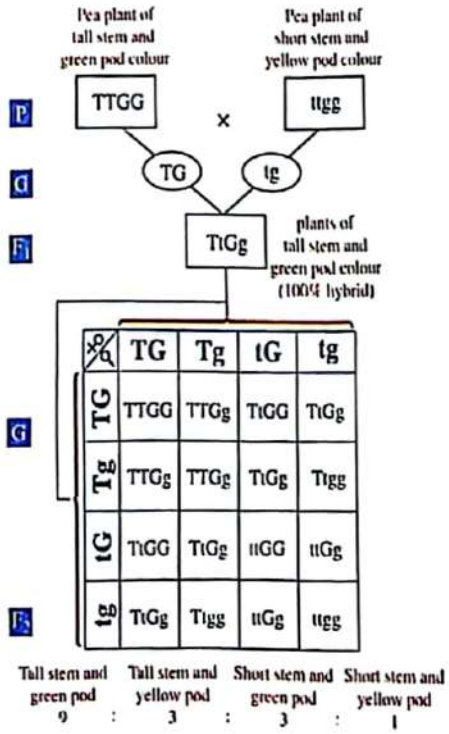
Problem 1 *If crossing takes place between two pea plants, one of them of smooth yellow seeds (SSYY) and the other of wrinkled green seeds (ssyy). Explain on genetic principles the genetic structure for the first and second generations.*

Solution



Problem 2 *Using symbols to express the results produced from crossing between a pea plant of tall stem & green pod colour (TTGG) and another one of short stem & yellow pod colour (ttgg). [Illustrating : Parents - Gametes - First generation - Second generation in each crossing].*

Solution



8 Comparisons :

1. The hereditary traits and the acquired traits :

The hereditary traits	The acquired traits
They are the traits that are transmitted from one generation to another. ***Ex. :*** • Hair colour. • Skin colour. • Number of fingers. • The blood groups.	They are the traits that aren't transmitted from one generation to another. ***Ex. :*** • Skill of playing football. • Learning of swimming. • Speaking in many languages. • Learning of walking in children.

2. The dominant trait and the recessive trait :

Points of comparison	The dominant trait	The recessive trait
Definition :	It is the trait that appears when aggregation of two similar genes of the dominant trait or one gene of the dominant trait with a gene of recessive trait.	It is the trait that appears only when aggregation of two similar genes of recessive trait.
Example :	The trait of yellow colour seeds of pea plant.	The trait of green colour seeds of pea plant.
The ratio of its appearance according to Mendel's first law :	It appears at a ratio of 100% in the first generation and at a ratio of 75% in the second generation.	It disappears in the first generation and appears at a ratio of 25% in the second generation.
Purity of the trait :	It is pure or impure.	It is always pure.

3. The pure individual and the hybrid individual :

The pure individual	The hybrid individual
It is the individual that carries a similar pair of factors, either dominant or recessive, so the dominant trait (pure) or recessive trait appears on the individual.	It is the individual that carries a different pair of factors, one is dominant and the other is recessive, so the dominant trait (impure) appears on the individual.

9 Main points :

1 Mendel's assumptions (hypotheses) to explain the results of its experiments.

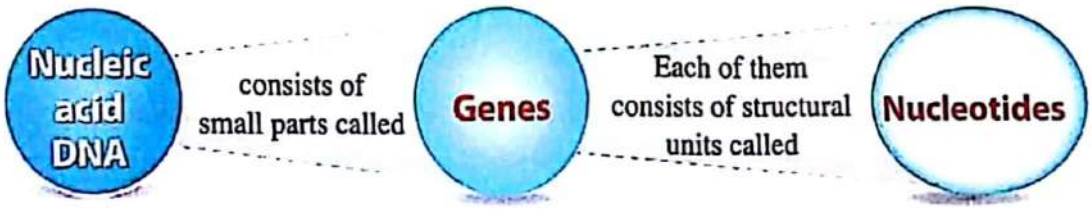
1. The hereditary traits are transmitted from the parents to the offspring by hereditary factors carried by **Gametes**.
2. Every hereditary trait is controlled by two hereditary factors, one from the father and the other from the mother.
3. The two hereditary factors of each trait are separated when the gametes are formed, where each gamete carries only one factor from these two factors.
4. During fertilization process, the two hereditary factors aggregate again. If the two factors are :
   - Similar (**or homozygous**), so the produced trait (dominant or recessive) is pure and the individual that carries this trait is called **pure individual**.

Dominant factor	+	Dominant factor	⟶	Pure dominant trait
Recessive factor	+	Recessive factor	⟶	Pure recessive trait

   - **Different (or heterozygous)**, so the produced trait (dominant) is impure and the individual that carries this trait is called **Hybrid individual**.

Dominant factor	+	Recessive factor	⟶	Impure dominant trait

2 Composition of nucleic acid DNA



3 How do the genes perform their functions ?
Or
Explain the mechanism of action of the gene.

4 Science, technology and society :

*** The resultants of the human genome project :**

- The project showed human similarity in more than 99% from the sequence of nucleotides of DNA, despite the small percentage of the differences, but they affect to a great extent the acceptance of the individual to the harmful environmental effects like bacteria, viruses, poisons, chemicals, medicines and various treatments.

Final Revision on Unit 4

1 Definitions (or scientific terms) :

1. Hormone :	It is a chemical substance (or a chemical message) that controls and organizes most of the vital activities and functions in the bodies of living organisms.
2. Endocrine glands :	They are ductless glands that secrete their hormones directly in blood without passing through ducts.
3. Target cells :	They are the cells that the hormones affect and they are almost located away from the endocrine gland that secretes the hormone.
4. Hormone disorder :	It is the increase or decrease in the secretion of one of the hormones as a result of a disorder in the action of the endocrine gland responsible for it abnormally.
5. Dwarfism :	The body stops growing, so the person becomes a dwarf as a result of decreasing the secretion of the growth hormone at childhood.
6. Gigantism :	A continuous growth in the limb's bones, so the person becomes a giant as a result of increasing the secretion of the growth hormone at childhood.
7. Diabetes :	A disease caused due to the decrease in the secretion of the insulin hormone, which leads to increasing the level of glucose sugar in blood and its existence with the urine.
8. Exophthalmic goiter :	A disease causes an enlargement of thyroid gland accompanied by loss of weight, tension and exophthalmoses as a result of increasing the secretion of thyroxin hormone.
9. Simple goiter :	A disease causes an enlargement of thyroid gland and the neck as a result of decreasing the secretion of thyroxin hormone.

2 Importance : /role /function

1. Hormones :	They control and organize most of the vital activities and functions in the bodies of living organisms.
2. Endocrine glands :	They secrete the hormones in the human body.
3. Pituitary gland :	It secretes hormones that regulate the activities of most of other endocrine glands, so it is called the master gland or the main gland.

4. Growth hormone :	– It controls the speed of growth rate of body muscles, bones and other organs. – It determines the height that the person will reach when becomes a fully grown.
5. Mammary glands activating hormones :	They activate the mammary glands to secrete milk during breast feeding process.
6. Thyroid stimulating hormone :	It stimulates thyroid gland to secrete its hormones.
7. Activating hormones of sexual glands :	• Regulates the growth and the development of sex organs. • Activates the sexual glands to secrete their hormones near to adulthood stage.
8. Thyroid gland :	It secretes thyroxin hormone and calcitonin hormone.
9. Thyroxin hormone :	It plays a main role in food assimilation processes in the body, where it liberates the energy necessary for the human body from food.
10. Iodine salt :	It is rich in iodine element that enters in thyroxin hormone's structure.
11. Calcitonin hormone :	It controls the level of calcium in blood.
12. Adrenalin hormone :	It stimulates body's organs to respond to emergencies.
13. Pancreas gland :	It secretes digestive juices that help in digestion process and it also secretes insulin and glucagon hormones which regulate blood sugar level in blood.
14. Insulin hormone :	It stimulates the storage of glucose sugar in the liver.
15. Glucagon hormone :	It stimulates the release of glucose sugar from the liver.
16. Estrogen hormone :	It appears the female secondary sex characters.
17. Progesterone hormone :	It promotes the growth of endometrium (the lining of uterus).
18. Testosterone hormone :	It appears the male secondary sex characters.

5 Comparisons :

1 Pituitary gland and thyroid gland :

Points of comparison	Pituitary gland	Thyroid gland
Location :	It is located below the brain.	It is located in the front surface of the neck on both sides of the trachea.
Description :	It is a small gland in the size of a pea seed and it consists of two lobes.	It consists of two lobes, linked together by a small part.
Function :	It secretes hormones that regulate the activities of most of other endocrine glands.	It secretes thyroxin hormone which plays an important role in food assimilation processes in the body, and calcitonin hormone which controls the level of calcium in the blood.

2 Dwarfism and gigantism :

Points of comparison	Dwarfism	Gigantism
Reason :	Decrease in secretion of the growth hormone at the childhood.	Increase in secretion of the growth hormone at the childhood.
Feature of disorder :	The body stops growing, so the person becomes a dwarf.	A continuous growth in the limbs' bones, so the person becomes a giant.

3 Simple goiter and exophthalmic goiter :

Points of comparison	Simple goiter	Exophthalmic goiter
Reason :	Decrease in secretion of the thyroxin hormone due to the lack of iodine from food as it enters in the hormone's structure.	Increase in secretion of the thyroxin hormone with large amounts.
Symptoms of the disease :	Enlargement of thyroid gland and the neck.	Enlargement of thyroid gland accompanied by lose of weight, tension and exophthalmoses.

4 Insulin hormone and glucagon hormone :

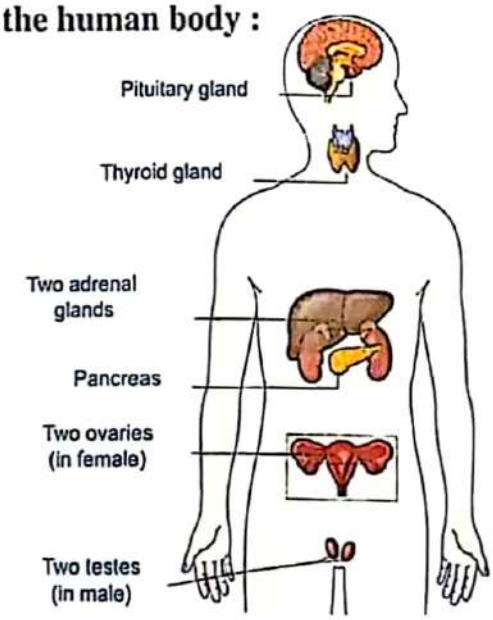
Points of comparison	Insulin hormone	Glucagon hormone
Reason for secretion :	It secretes when the level of glucose sugar increases in the blood.	It secretes when the level of glucose sugar gets lower than its normal level in the blood.
Function :	It stimulates the storage of glucose sugar in liver.	It stimulates the release of glucose sugar from the liver.

5 Testes and ovaries :

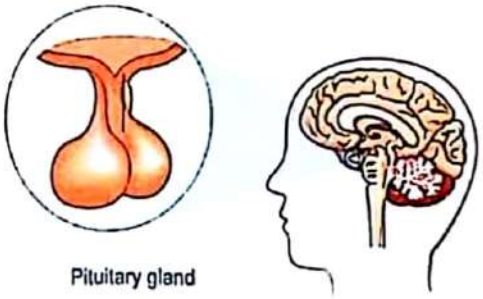
Points of comparison	Testes	Ovaries
The produced hormones :	Testosterone hormone.	Estrogen and progesterone hormones.
The function :	It appears the male secondary sex characters.	- Estrogen appears the female secondary sex characters. - Progesterone promotes the growth of endometrium (the lining of uterus).

6 Important drawings :

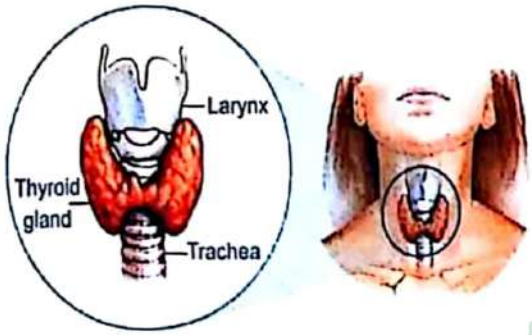
1 The most important endocrine glands in the human body :



2 Pituitary gland :



3 Thyroid gland :



4 Pancreas :