

Q. No. 2 Part (i) Mendel's Law OF SEGREGATION:

"The traits of organism are determined by two alleles which separate at gametes but reunite again at fertilization."

Example: consider two pea plants (true breeding) having different seed shapes i.e. round R and wrinkled r.

A cross between these plants will produce filial generation F_1 which contains gametes of both parents, the trait of F_1 generation is determined by alleles i.e.

(RR) $(rr) \rightarrow P_1$

\downarrow \downarrow
 (R) $(r) \rightarrow$ gametes

Punnet Square:

r (sperms)

(eggs) R

	r
R	Rr

$\rightarrow F_1$

Thus, trait of F_1 generation is Round seeds plants which is determined by alleles.

Q. No.: 2 Part (ii)

EXTERNAL FERTILIZATION	INTERNAL FERTILIZATION
(i) Type of fertilization which takes place <u>outside</u> the body of an organism.	Type of fertilization which takes place <u>inside</u> the body of an organism.
(ii) Chances of survival of offspring is <u>less</u> .	Chances of survival of offspring is <u>more</u> .
(iii) Takes place in <u>water</u> ^{bodies} ↓	Takes place in <u>terrestrial</u> areas.
(iv) <u>More</u> gametes (sperms and eggs) are produced.	<u>Less</u> gametes (sperms and eggs) are produced.
(v) Examples :	Examples :
It occurs in frogs, fishes etc.	It occurs in mammals such as humans etc.

Q. No. 2 Part (iii) THREE CHARACTERISTICS OF Insect-Pollinated:

(i) They have large brightly colored petals to attract insects.

(ii) They have scented petals with nectar to attract insects towards them.

(iii) They have not much pollen grains because insects carry them efficiently.

(iv) Anther is located inside the flower, stiff and firm to rub against insects.

(v) Stigma is located inside the flower and is sticky to catch pollen grains.

Q. No. 2 Part (iv) ROLE OF LUNGS IN GASEOUS EXCHANGE:

Lungs are respiratory organs containing the respiratory surface (ie through which gaseous exchange takes place) called 'alveoli'. Alveolus is surrounded by capillaries where real respiratory works takes place as ~~oxy~~ blood and air are side by side. Inner surface of alveolus has moisture and Oxygen is dissolved in this moisture which diffuses to blood capillaries whereas carbodi-
-oxide diffuses in alveoli and then expelled out.

Thus, gaseous exchange takes place by 'diffusion'. Also, the contraction and relaxation of lungs helps in inhalation and exhalation of air. Lungs are protected by ribs and are present in 'thoracic cavity' and they are involved in gaseous exchange.

Q. No. 2 Part (v)

→ Sources OF VARIATIONS:

→ Some of the sources of variations are;

(i) Mutation in germ-line cells which will form gametes.

(ii) Fertilization in which one of millions sperm fuse with egg.

(iii) Gene flow which is transfer of gene from one population to the other (mostly through migration)

(iv) Independent assortment of chromosomes forming different combinations of chromosomes in gametes.

(v) Crossing over produces genetic recombination in gametes.

Q. No. 2 Part (vi)

Bone	CARTILAGE
(i) Bone is <u>hard</u> and tough (i.e. rigid).	• Cartilage is <u>soft</u> and flexible.
(ii) Blood vessels are <u>present</u> in bones.	• Blood vessels are <u>absent</u> in cartilage.
(iii) Bone marrow is <u>present</u> in bones.	• Bone marrow is <u>absent</u> in cartilage.
(iv) Matrix (i.e. ground substance) is made up of <u>proteins</u> and <u>minerals</u> .	• Ground substance is made up of <u>proteins</u> only. "

Q. No. 2 Part (vii)

• COMPOSITION OF CHROMATIN MATERIAL:

Chromatin material is made up of 'DNA' and 'histone protein.' Chromatin is a thread like structure found in nucleus of eukaryotic cell whereas it is present in cytoplasm of prokaryotes.

• CHROMATIN TO CHROMOSOME: Coiling and supercoiling of chromatin forms chromosome i.e. chromosome is the condensed form of chromatin.

• NOTE:

Chromatin is present in open configuration in cell at the time of interphase (non-dividing phase of cell).

Q. No. 2 Part (viii) Role OF Vitamin A in vision:

Rod cells present in the retina of eye are sensitive to dim light. These cells are made by combination of 'Vitamin A' and 'protein opsin' which makes a pigment 'Rhodopsin'. These rods cells helps in vision during dim light and Vitamin A is essentially needed ~~to~~ in the formation of pigment Rhodopsin (ie important pigment of rod cells). So, deficiency of Vitamin A can cause "night blindness". Therefore, Vitamin A is needed for good vision as it is involved in Rhodopsin formation (which breaks up in light to generate impulse while again join in dark). Thus, Vitamin A should be intake in adequate amounts.

Q. No. 2 Part (ix)

Possible Actions To Control Pollution:

(i) Combustion of fossil fuels should be reduced as they release harmful compounds and renewable sources of energy should be used i.e. wind, solar etc.

(ii) Cutting of trees and deforestation should be stopped as plants regulates CO_2 concentration in atmosphere and also cleans the air.

(iii) Unplanned urbanization should be controlled which leads to cities becoming polluted and unsuitable for organisms.

(iv) ~~Directly~~ Industries should not release toxic compounds directly into water bodies as it cause death of ^{life} marine

Q. No. 2 Part (x) ^(a) ADRENALINE Importance: It is a hormone secreted by 'medulla' of 'adrenal glands' in emergency situations i.e. fight, flight. It causes increase in heartbeat, blood pressure and blood flow to limbs. Such conditions prepare body to face any emergency situation.

^(b) PARATHORMONE: It is a hormone secreted by the 'parathyroid gland'. It has a function opposite to calcitonin i.e. it deposits calcium from bones to blood. It also regulates the level of potassium ions in body.

^(c) THYROXIN: It is a hormone produced by the largest gland of body i.e. 'Thyroid gland' (about 20-60gms). It is an iodine containing compound. Thyroxin regulates basic metabolism, breakdown food to produce energy, maintains body temperature through metabolism and helps in body growth.

Q. No. 2 Part (xi)

Narrow-Spectrum Antibiotics	Broad-Spectrum Antibiotics
i) The antibiotics that act against <u>limited</u> variety of bacteria are narrow-spectrum antibiotics.	The antibiotics that act against a <u>wide variety</u> of bacteria are called broad-spectrum antibiotics.
ii) They are <u>not</u> most commonly used and are <u>not</u> that expensive.	They are <u>most</u> commonly used and are expensive.
iii) They are effective for <u>less</u> types of bacteria.	They are effective for <u>more</u> types of bacteria.
iv) Examples: Sulphonamides, tetracyclines etc.	Examples: penicillin etc.

Use for rough work

BINARY FISSION

→ DEFINITION: Binary fission means "splitting into two".
"It is a process in which offsprings are produced asexually from a single parent by mitosis."

→ TYPE OF REPRODUCTION: Binary fission is an "asexual reproduction".

→ ASEXUAL REPRODUCTION: It is a type of reproduction in which offsprings are produced from a single parent and it does not involve the fusion of nuclei of two gametes. It takes less time to produce offsprings which are genetically identical to parent organism.

→ IMPORTANCE OF BINARY FISSION: Binary fission is the simplest method of asexual reproduction which occurs with remarkable speed under (controlled) ideal conditions.

• Binary fission occurs in bacteria, amoeba, some invertebrates etc.

→ BINARY FISSION IN PROKARYOTES:

→ PROKARYOTES: Organisms which lack ~~the~~ membrane bounded nucleus in their cells are prokaryotes. Their genetic material is dispersed in cytoplasm. e.g; bacteria.

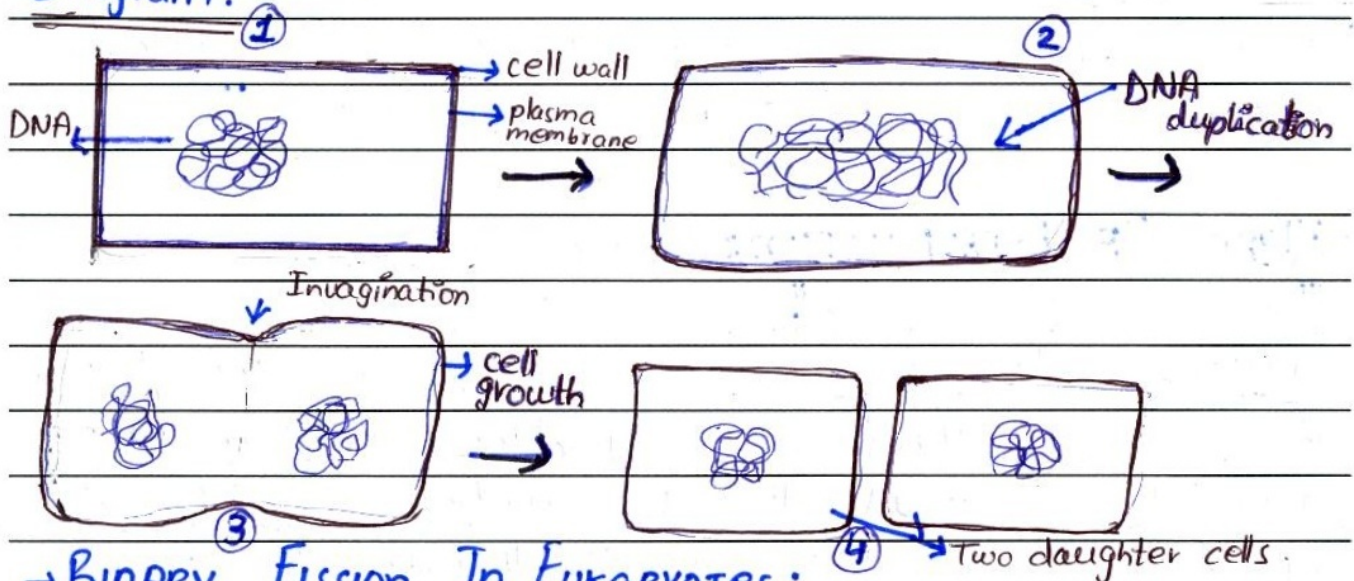
→ BINARY FISSION IN BACTERIUM (PROKARYOTE): In the process of binary fission, a bacterium duplicates its chromosome and then grows in size by mitosis.

• The bacterium then divides into two daughter cells which grow and divide again.

• Some bacteria divide every "twenty minutes".

Q. No. 3 (Page 2) • The division of bacterium into two cells takes place by invagination of cell covering (membrane)

Diagram:



→ **BINARY FISSION IN EUKARYOTES:**

→ **EUKARYOTES:** "Organisms having membrane bounded nucleus (containing genetic material) are eukaryotes".

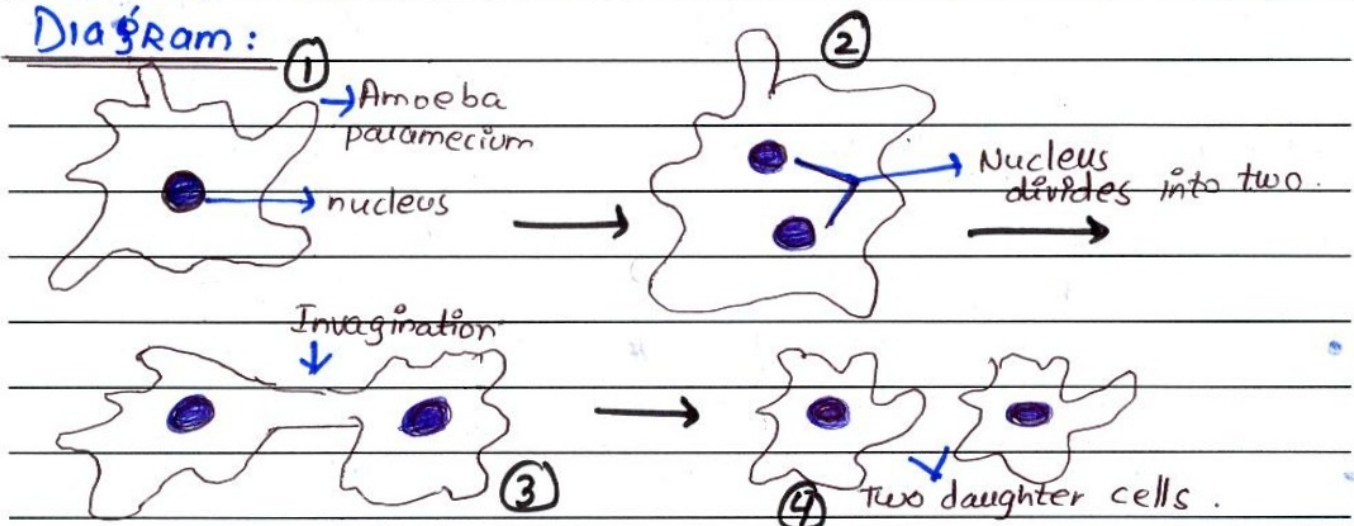
→ **Binary Fission In EUKARYOTE (Amoeba):** Amoeba is a unicellular eukaryote. In amoeba, the nucleus of parent cell divides by mitosis into two nuclei.

• The growth of cell then takes place by mitosis.

• The two daughter cells are then produced through invagination of membrane.

• The daughter cells then grow and reproduce again asexually by mitosis (through process of binary fission).

Diagram:



Genetic Engineering AND AGRICULTURE

→ Genetic Engineering :

→ Definition : "Genetic engineering is the altering the genetic constitution of an organism by modifying its own gene or introducing the gene from different species."

→ Objectives OF Genetic Engineering:

- (i) Have clones of gene.
- (ii) To produce particular proteins and RNA molecules.
- (iii) To boost the growth and yield of crops and farm animals.
- (iv) To produce many products of interest such as insulin, human growth hormone etc.
- (v) To isolate the particular gene to treat genetic defects through gene therapy.

⇒ Achievements OF Genetic Engineering;

There are many achievements of genetic engineering in our different aspects of life such as medical, agriculture, industry, environment productivity enhancement etc.

→ Achievements OF Genetic Engineering In AGRICULTURAL CROPS:

(i) ENHANCED PRODUCTIVITY: Genetic engineering has increased the agricultural produce, reduce need of pesticides, enhance nutrient composition and food quality.

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(ii) Resistance To Caterpillars (Insects): Genetic engineering has cause plants to become insect resistance through various techniques. e.g; scorpion poison is combined with cabbage. This Genetically modified cabbage is lethal to caterpillars but harmless to humans.

(iii) Resistance Against Pathogens: Through techniques of genetic engineering, certain genes are inserted into crops/plants that gives them resistance against pathogens such as virus, fungi and other disease causing agents.

(iv) Resistance Against Herbicides: Through genetic engineering, plants are given resistance against herbicides. Herbicides resistance allows the farmers to kill most weed from their crops without damaging their crops.

(v) Vaccines Against Diseases: Genetic engineering techniques have produce certain ^{and drugs} vaccines to protect core plants suffering from viruses, pathogenic diseases etc.

(vi) More Crops Production And Diversity: Genetic engineering has benefitted agricultural sector alot by improving the quality and quantity of crops production. Through genetic engineering, certain varieties can be introduced in ecosystem.

Note: Genetic engineering has benefitted farmess and agricultural sector alot.

AIR POLLUTION

→ POLLUTION:-

"Anything which is released into the environment and cause adverse effects on living things. This is called pollution" **OR**

"The contamination of environment is called pollution"

→ Types: The most common types of pollution are;

(i) Air pollution

(ii) Land pollution

(iii) Water pollution

(iv) Noise pollution etc.

→ AIR POLLUTION:

• DEFINITION: "The contamination of atmosphere mostly due to human activities is called air pollution"

• Causes: Some of the main sources/causes of air pollution are:

(i) Natural Disasters : Certain natural processes also cause air pollution such as volcanos (they emit clouds of dust and smoke which contain dangerous gases), forest fire (which release gases and smoke), dust storms (which release dust particles and contaminate environment / atmosphere) and termites (which release methane into atmosphere and methane is responsible for global warming) etc.

(ii) Human Activities : (i) Deforestation is cutting of trees which increases the level of carbondioxide in air and carbondioxide cause global warming (warming of air).

(ii) Combustion of fossils (fuels, oil, gas) release large amounts of toxic gases and substances into air such as carbon monoxide (CO), nitrous

Q. No. 5 (Page 2) oxides (NO, NO₂) etc.

(iii) Automobile exhaust is a major air pollution cause in urban areas, it releases gases such as carbon monoxide etc which contaminate air.

(iv) Industrial processes release toxic substances and oxides of sulphur and nitrogen (SO₂ and NO₂) which are responsible for acid rain.

(v) Using non-environment friendly things like aerosol sprays, refrigerants etc which release chlorofluorocarbons into that cause global warming.

⇒ METHODS TO CONTROL AIR POLLUTION:

Certain steps should be taken to reduce air pollution:

(i) Use of fossil fuels should be limited and use of renewable energy sources i.e. sun, wind, air etc should be promoted.

(ii) Non-environment friendly equipments should not be used.

(iii) The industrial processes should be minimized to avoid excess release of toxic gases into air.

(iv) Trees should be grown as much as possible and deforestation should be avoided because trees balance the concentration of carbon dioxide in air and also clean and purify the air.

(v) Catalytic converters should be used in automobiles to avoid exhaust of automobiles. ∴ Using catalytic converter minimize the level of toxic gases release by automobiles.

(vi) Incineration process should be avoided.

→ Note: Only then, we will be able to build a healthy environment.

Skeleton

DEFINITION: The most articulated (arc-shape structures) called bones which give shape, support and movement (~~to~~ ^{the} body) present in complex organisms is called skeleton."

Components:

Human skeleton is composed of two types of connective tissue i.e. Bone and cartilage.

Parts:

It has two parts;

- (i) Axial skeleton
- (ii) Appendicular skeleton

Bones:-

There are '206' bones in human skeleton.

ROLE OF SKELETON IN SUPPORT AND MOVEMENT:

Importance OF Skeleton:

(i) The human skeleton gives mobility to the body by allowing the movements of limbs, forelimbs and ~~joints~~ bones etc.

(ii) It gives shape and support to body.

(iii) It helps in body movement and keep the body balance. Without this, complex organism would collapse from its own weight.

(iv) It is also involved in formation of blood cells (i.e. red blood cells, white blood cells).

Bone marrow: produces about 95% of body blood cells.

(v) The bones (i.e. ribs) present (~~in~~ ^{the} ~~lungs~~) helps in the breathing process. (i.e. exhalation and

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inhalation).

(vi) Ribs (12 pairs) are present on each side of vertebral column. They protect the vital organs such as lungs, heart, etc.

(vii) Human skeleton is like a machine holding ~~the~~ limbs together and allowing movement of organism from one place to another.

(viii) Human skeleton is flexible allowing different movements.

(ix) It is composed of joints which holds the skeleton together and give mobility to skeleton.

(x) Human body also gives the particular shape to the body and supports the body in various aspects.

(xi) Human skeleton allows the bending and straightening of different bones (~~due to move~~) giving flexibility to body.

→ Muscles In Human Skeleton: Muscles are arranged in the form of antagonistic pairs i.e. the action of one muscle is opposed by other and vice versa. This allows them to produce opposing effects.

⇒ Note: Human skeleton is the most complex and organized supporting system in the world.

