

EV SSC BIOLOGY

Chapter-3: Cell Division

Ques. ► 1

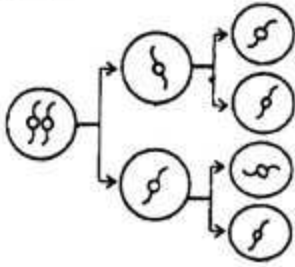


Fig : E

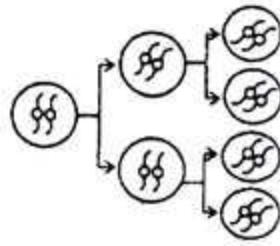


Fig : F

[Ctg.B.-17]

- What is Histology? 1
- Write the role of synapse to carry nervous stimulation. 2
- What will happen when the division of Figure-F is uncontrolled? Explain. 3
- Give the comparative analysis between the division of Figure E and F. 4

Answer to the question no. 1

a Histology is the study of science where the structure, orientation and functions of cells and tissues of plants and animals are discussed.

b Synapse is the connection between a neuron's axon and another neuron's dendrite. Through the synapse nerve stimulus from a neuron is transmitted to the next neurons by electro-chemical signaling system. Without synapse, it won't be possible for signals to pass through the organs and make a response.

c The figure F represents mitosis cell division process. Tumor or cancer occurs when cells goes uncontrolled mitosis division. Due to mitosis, numbers of cells are increased but the division is strongly controlled, unless some factors interrupt the regulation of cell division and abnormal cell growth occurs, which is named as tumor. Tumor leads to cancer.

A virus named papilloma can cause cancer. Its two virulent genes E_6 and E_7 displaces two crucial protein molecules involved in the controlling of cell division. Thus tumor occurs.

d The figure E and F represents meiosis and mitosis cell division process, respectively. There comparative discussion is mentioned below-

	Mitosis	Meiosis
1.	Mitosis occurs in somatic cells	Meiosis occurs in germ cells
2.	The mother cell's nucleus gets divided to create two daughter cells	The mother cell's nucleus gets divided to create four daughter cells
3.	Here, nucleus and chromosomes divide only once	Here, chromosomes divide once but nucleus divides twice
4.	The daughter cells have same number of chromosomes as the mother cell	The daughter cells get half of the chromosomes compared to the mother cell
5.	No crossing over event occurs here	Crossing over is important in meiosis

Ques. ► 2

Observe the following two figures and answer the questions :



Fig-A

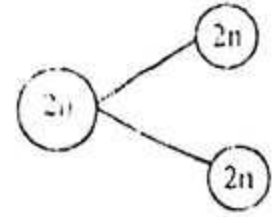


Fig-B

[S.B.-17]

- What is Ribosome? 1
- Why is meiosis called reductional division? 2
- Explain the structure of fig 'A'. 3
- The process of fig 'B' is very significant for living body. — Analyze it. 4

Answer to the question no. 2

a Ribosome is a cell organelle that helps in formation of proteins.

b During meiosis division, the nucleus is divided twice whereas the chromosomes are divided once. As a result, the daughter cells get half other number of chromosomes compared to their mother cell. Due to the decrease in chromosome numbers in the progeny cells, meiosis is specially called as reductional division.

c In the stem, cell organelle mitochondria is shown in figure A.

It contains two membranes, and each membrane is composed of phospholipid bilayers and proteins. The inner membrane has infoldings called cristae. These foldings are studded with small round bodies known as oxysomes. Oxysome contains various enzymes. The space enclosed by the inner membrane is matrix containing a highly concentrated mixture of hundreds of enzymes, ribosomes, RNA (0.5%), proteins (73%), lipid (25%) and mitochondrial DNA. The main function of mitochondria is to help organism produce energy from food through cellular respiration.

d The B figure of the stem represents mitosis cell division. Through this process of division, an eukaryotic cell, stage by stage, divides into two identical daughter cells. In this process, nucleus and chromosomes are divided only once and two identical daughter cells are produced with the same type of chromosomes in number, physical and structural features as their mother cell contains. Mitosis occurs in somatic cells and through this division, as the number of cells increases, the plants and animals grow in length and breadth. The process usually take place in the somatic cells of animals and in the meristems of the plant parts growing, such as the tip of stems and roots, plumule and radicle, developing leaves, buds etc.

The significance of mitosis in the living body of organisms is immense. The balance in between the nucleus and cytoplasm of a cell in terms of volume and amount is maintained by the process of cell division mitosis. Through mitosis, the growth in the body multicellular organisms occurs. All the multicellular organisms start their life from a single cell zygote. The repeated division of this single cell produces innumerable cells and thus an organism grows to its complete level. As the number and feature of chromosome remain unchanged in the cells produced through mitosis, growth in organisms takes place systematically. Mitosis plays a role in maintenance of

normal size, shape and volume of cells. Unicellular organisms reproduce through mitosis. Mitosis plays an important role in the vegetative reproduction of organisms and increasing the number of reproductive cells. Mitosis is essential in the body of living organisms to form new cells continuously for growth and healing of injuries. The life span of some cells is specific and they are, accordingly, replaced through the process of mitosis. As identical cells are produced through mitosis, qualitative features in the living world remain unchanged. Mitotic errors may result in abnormal mass of cells called tumours, with or without cancer cells.

Ques. ▶ 3

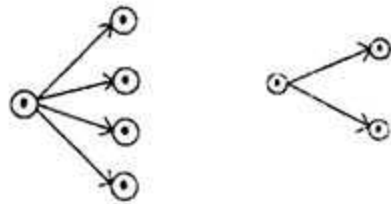


Fig : X

Fig : Y

[B.B.-17]

- What is cell division? 1
- What do you understand by prokaryotic cells? 2
- Mention the features of the fourth stage of the process mentioned in figure : Y. 3
- Explain the significance of the process mentioned in the figure : X in maintaining the individuality of species.

Answer to the question no. 3

a The process in which the number of cells in an organism gets increased to ensure its growth and reproduction is called cell division.

b Prokaryotic cells are those which do not contain a properly formed nucleus. They also lack organelles or other internal membrane-bound structures. For example- bacteria, cyanobacteria etc. are prokaryotic organisms. Cytoplasm of a prokaryotic cell does not contain any mitochondria, plastid or endoplasmic reticulum etc. but contains ribosomes.

c The figure Y shows the process of mitosis cell division. The fourth phase of this process is named as anaphase, characteristics of which is mentioned below-

- At the very beginning of anaphase, the centromere of chromosome is divided to give off two daughter chromosomes.
- Chromosomes migrate from the equator to the two opposite poles of the cell due to the repulsion created between them during this phase.
- The cleaved centromere moves first to the pole while the chromatids trail behind.
- Chromosomes resemble the shapes V, L, J or I depending on the position of centromere in the chromosome.
- At the end of the stage anaphase, the daughter chromosomes are positioned to the two opposite poles of mitotic spindle and their elongation is initiated.

d The figure X in the stem represents meiosis cell division. Meiosis helps maintain the uniqueness of a species.

Meiosis maintains the purity of a species by keeping the total number of chromosomes constant in an organism. Primordial germ cells of diploid (2n) plants or animals undergo meiosis and produces four haploid reproductive cells. In this process the chromosome number becomes half in daughter cells. Later, the haploid male and female gametes fuse to form diploid zygote which transforms into new organism through repeated mitotic cell division events.

Again, zygote of haploid plant undergo meiosis cell division to produce haploid progeny. Thus meiosis keeps the chromosome number of a species constant. Moreover, genetic diversity is also found in species of organisms as the exchange of genes occurs during meiosis.

Ques. ▶ 4



Figure-X

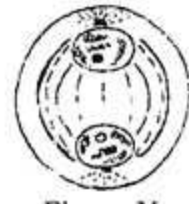


Figure-Y

[R.B.-16]

- What is the scientific name of our national flower? 1
- Why is pituitary gland called main gland? 2
- Draw the immediate late stage of the figure "X". 3
- Describe what problems may arise if the figure 'Y' does not accomplish properly. 4

Answer to the question no. 4

- Scientific name of our national flower is *Nymphaea nouchali*.
- Pituitary gland is situated beneath the fore brain. This small gland controls all other glands. Pituitary gland secretes several hormones. These hormones regulate the activities of other endocrine glands. For this reason pituitary gland is the main gland.
- The fig 'A' in the stem is the metaphase of mitosis and its next stage is Anaphase. The figure of Anaphase stage is given below:

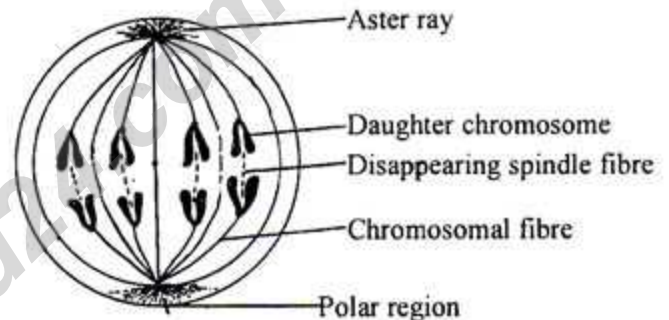
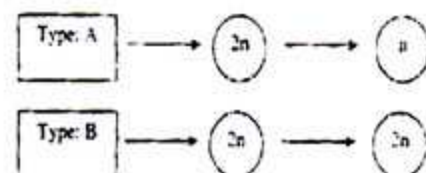


Fig: Anaphase

d The 'B' stage in the stem is the Telophase stage of an animal cell division. Telophase is the last stage of Mitotic cell division. By this stage of mitosis two daughter nuclei are formed and it initiates the division of the cell into two daughter cells. If the telophase does not occur properly, several problems may arise. If this stage of cell division does not occur, two daughter nuclei and thereby two daughter cells will not be produced. As a result growth of the animal body will be ceased and development and differentiation will not take place. For this reason normal development of animal body will be hampered and reproductive organs will not develop. As a result reproduction of animals will be hampered. As a result of mitosis uniform number of chromosomes in the body cells is maintained. If this B-stage does not take place properly, the number of chromosomes in the daughter cells will be different. For this, the life process of the organism will be changed. Mitosis is also essential for healing up the wounds due to accident. If the B stage of stem does not take place properly, healing up of wounds will not take place. Besides this, if the telophase stage does not take place properly, irregular and abnormal cells will be produced and it may create tumour or cancer cell. Cancer cells may cause death of the organism. So, it is necessary to take place the B stage properly without which several problems including death may occur.

Ques. ▶ 5



[Mymensingh Girls' Cadet College, Mymensingh]

- What is Interphase?
- What do you mean by somatic cell?
- Explain the process occurs in Type-A.
- According to above two stems which is responsible for qualitative features of organisms remain unchanged? Analyze it.

Answer to the question no. 5

a Interphase is the phase where a cell prepares itself before the starting of the cell division.

b Somatic cell is the type of cell that takes part in the organisation of the body of an organism. This cell divides through the process of binary fission and mitotic division. Moreover, these cells take part in the organisation of different organs and organ systems.

c The stem A indicates meiosis. In this process of cell division, four daughter cells are produced from a cell. Nucleus divides twice and chromosome divides once in this process, and number of chromosomes becomes half in the daughter cells. Two consecutive divisions occur in the process meiosis. The first and the second division are called meiosis-I and meiosis-II respectively. In the first division meiosis I, the number of chromosome in a daughter cell becomes half than that of its mother cell, and the second division is simply a mitosis.

d Type B is responsible for unchanged qualitative features on an organism. As identical cells are produced through mitosis, qualitative features in the living world remain unchanged. The balance in between the nucleus and cytoplasm of a cell in terms of volume and amount is maintained by the process of cell division mitosis. All the multicellular organisms start their life from a single cell zygote. The repeated division of this single cell produces innumerable cells and thus an organism grows to its complete level. As the number and feature of chromosome remain unchanged in the cells produced through mitosis, growth in organisms takes place systematically.

Ques. ▶ 6 In one type of cell division the chromosome number remain equal and in another type of cell division the chromosome number is reduced to half in the newly produced cells. There are some similarities and dissimilarities between both of them. [Barishal Cadet College, Barishal]

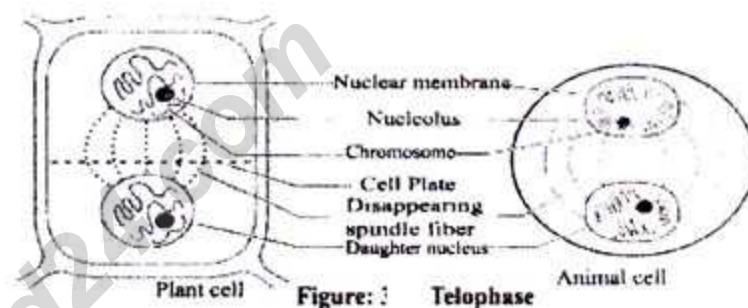
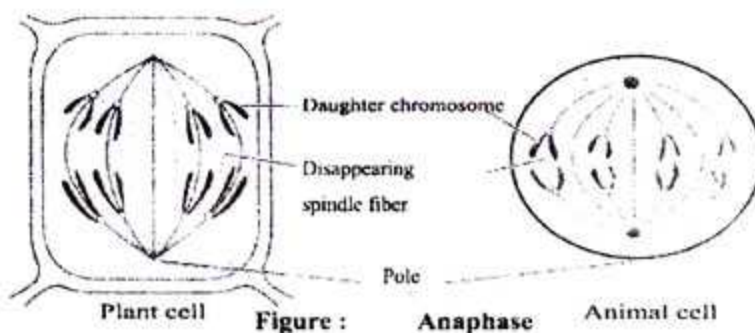
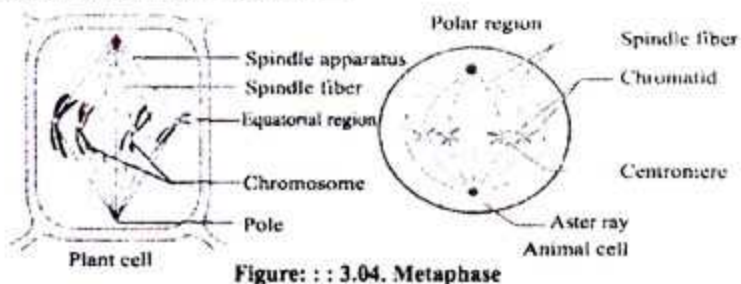
- What is meiosis cell division?
- Write down the difference between amitosis and mitosis cell division.
- Draw the labeled diagram of the last three stage of 1st type of cell division mentioned in the stem.
- “The two type of cell divisions mentioned in the stem are essential for the plant life”— Analyze it.

Answer to the question no. 6

a Mitosis is a form of eukaryotic cell division that produces two daughter cells with the same genetic component as the parent cell.

b Amitosis is a simple method of cell division (also called direct cell division) which occurs without formation of spindle fibers and appearance of chromosomes. In amitosis, the nuclear membrane remains intact, whereas karyokinesis. On the other hand, Mitosis is a form of eukaryotic cell division that produces two daughter cells with the same genetic component as the parent cell. Spindle formation occurs in mitosis.

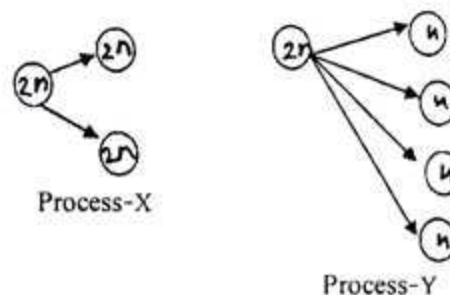
c 1st type of cell division that mentioned in the stem is mitosis cell division. Diagram of the last three stages of mitosis cell division are drawn below —



d The two type of cell divisions that mentioned in the stem are mitosis and meiosis respectively. Both of them are essential for plant life. This as analyzed below —

The mitosis cell division helps in vegetative growth in plants. It also helps in healing of wounds. The vegetatively reproducing plants reproduce by mitosis. It is through mitosis that a plant is able to stay healthy because it ensures that tissues and cells which are damaged are replaced on time. Any errors that occur during the process of mitosis are always transmitted to the daughter cells, hence, affecting the resultant plant. On the other hand, meiosis is important because it ensures that all organisms produced via sexual reproduction contain the correct number of chromosomes. Meiosis in flowering plants and other green organisms. Sexual eukaryotes generate gametes using a specialized cell division called meiosis that serves both to half the number of chromosomes and to reshuffle genetic variation present in the parent. Every sex cell made from meiosis has a unique combination of chromosomes. This means that no two sperm or egg cells are genetically identical.

Ques. ▶ 7



[RAJUK Uttara Model College, Dhaka]

- What is traction fibre?
- Why ATP is called biological coin?
- Write the differences between the process X and Y.
- Explain what problems may emerge if the process expressed in the Fig-Y does not accomplish?

Answer to the question no. 7

a Traction fiber is defined as a spindle fiber of a dividing cell that extends from a pole to the chromosomal centromere and along which a daughter chromosome moves to the pole of the spindle.

b ATP is called Biological coin or energy coin because all physiological functions, from muscle contraction to sensitivity, swallowing to digesting food, respiration to speaking, shouting to smiling and, physical growth to reproduction, controlling body temperature to maintain natural cell volume: everything is completed by energy released from the breaking down of the chemical bond of ATP. The food we eat is oxidized, and the energy released from this oxidization is used to create ATP through phosphorylation. It breaks down when energy is needed and combines taking energy from food. This is like a rechargeable battery. ATP stores energy and supplies energy for other reactions when necessary.

c Process "X" mentioned in the stem is known as mitosis cell division and process "Y" mentioned in the stem is known as meiosis cell division. The differences between mitosis and meiosis cell division are given below —

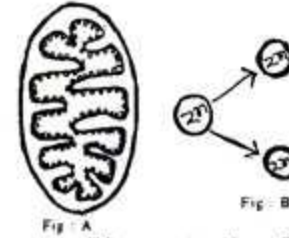
Traits	Mitosis	Meiosis
1. Type of Reproduction	Asexual	Sexual
2. Genetic similarity	Similar	Different
3. Number of Divisions	One	Two
4. Mother Cells	Can be haploid or diploid	Always diploid
5. Number of Daughter Cells produced	2 diploid cells	4 haploid cells
6. Chromosome Number	Remains the same	Reduced by half
7. Takes Place in	Somatic cells	Reproductive mother cells
8. Crossing over	No, crossing over cannot occur	Yes, mixing of chromosomes can occur
9. Function	Cellular reproduction and general growth and repair of the body	Genetic diversity through sexual reproduction

d Process "Y" mentioned in the stem is known as meiosis cell division. The problems may emerge if the process meiosis does not accomplish is explained below —

In mitosis, the number of chromosomes in the daughter cells remains the same as that of the in the mother cell. Mitosis is essential for the growth and asexual reproduction of organisms. In sexual reproduction, the union of male and female gametes is required. If the number of chromosomes in the reproductive cells would be the same as the somatic cell, the zygote would contain twice the number of chromosomes than that of the somatic cell. Suppose the number of chromosomes in a somatic reproductive cell of an organism is 4. In the zygote the number of chromosomes would be 8, and so the new organisms will have body cells with 8 chromosomes, that is, twice that of its mother organism. If every life cycle of an organism continues that way, the number of chromosome would be doubled again and again. If the number of chromosome is increased life cycle after life cycle, the offspring will be fundamentally different. In sexual reproduction, even through the union of male and female gametes, the number of chromosomes remains the same generation after generation as the number

of chromosomes become half in the reproductive cells than that of the mother cell. As the meiosis cell division occurs, the features in the species of living organisms remain the same from generation to generation. Because of meiosis, the chromosome number in organisms remains constant. Besides, genetic diversity is also found in species of organisms as the exchange of genes occurs during meiosis.

Ques. 8 Answer the questions in the light of following figures.



[Viqarunnisa Noon School and College, Dhaka]

- What is Anisogamous? 1
- Why Mitochondria is called power house of the cell? 2
- Describe the structure of 'A' of the stem. 3
- Process 'B' is very significant for living organism – Analyze. 4

Answer to the question no. 8

a Anisogamy is a form of sexual reproduction that involves the union or fusion of two gametes, which differ in size and form.

b Every organism requires energy to perform its metabolic and physiological activities. The process of energy production takes place in mitochondria where all necessary enzymes and molecules are present to produce energy in the form of ATP. This is why mitochondria is called the powerhouse of cell.

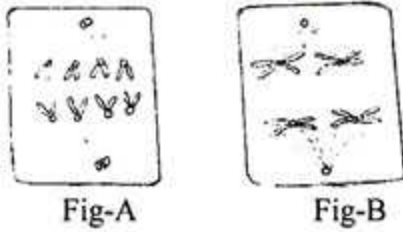
c Figure "A" of the stem represents a mitochondria which is a feature of eukaryotic cells.

Mitochondria are made of two membranes. The outer membrane covers the organelle like a skin. The inner membrane folds over many times and creates layered structures called cristae. Each membrane is composed of phospholipid bilayers and proteins. Cristae are studded with small round bodies known as oxysomes. The fluid contained in the mitochondria is called the matrix which contains a highly concentrated mixture of hundreds of enzymes, ribosomes, RNA and mitochondrial DNA. The folding of the inner membrane increases the surface area inside the organelle. Since many of the chemical reactions happen on the inner membrane, the increased surface area creates more space for reactions to occur. Mitochondria is called the powerhouse of cell because cellular respiration occurs here.

d The stem is showing the mitosis process. The significance of mitosis cell division in the living world is unlimited. Some of them are described here:

- Growth of the body: Growth of the body of a living being takes place by mitotic division. A unicellular zygote is transformed to a human body consisting of millions of cells. A small zygote forms a large Banyan tree.
- Maintaining equality of chromosome number: By this division the number and properties of a chromosome in each cell of a multicellular body remain constant.
- Keeping the size and shape constant: By this division the definite shape and size of the cell remain constant.
- Healing of injuries: By producing new cells this process repairs various types of damages of multicultural organisms.
- Formation of sex organs: By this process sex organs are formed. As a result, continuity of reproductive sequence is maintained.
- Qualitative stability: Qualitative stability is maintained by mitosis.

Ques. ► 9



[Dhaka Residential Model College, Dhaka]

- What is foetus? 1
- What do you mean by C³ and C⁴ Plant? 2
- Distinguished between the cell division process of fig-A and fig-B? 3
- Analyze the significance of above two types of cell division in living world. 4

Answer to the question no. 9

a A foetus is the prenatal stage between the embryonic stage and birth. Foetus develops in the uterus for 38-40 weeks.

b C₃ plants are those plants where the first product of photosynthesis is a 3-carbon compound i.e. phosphoglyceric acid (PGA) while C₄ plants are those plants where the first product of photosynthesis is a 4 carbon compound i.e. oxaloacetic acid (OAA). In the light independent stage of photosynthesis, some plants follow C₃ pathway (Calvin pathway) and some follow C₄ (Hatch-Slack).

c Figure A and B represents meiosis and mitosis cell division process, respectively. Distinguishable features of mitosis and meiosis are listed in the following table —

Mitosis	Meiosis
i. It occurs in mainly body cells of living organism.	i. It occurs in generative mother cells.
ii. Two daughter cells are produced from one mother cell.	ii. Four daughter cells are produced from one mother cell.
iii. Both the nucleus and the chromosome of mother cell divide once.	iii. The nucleus of mother cell divides twice but the chromosome divides once.
iv. The number of chromosomes in daughter cells are equal to mother cell.	iv. The number of chromosomes become half in daughter cell.
v. Crossing over does not occur.	v. Crossing over occurs.
vi. It helps in growth.	vi. It helps in reproduction.

d **Importance of mitosis:** Growth and development of multicellular organisms happen due to mitosis cell division. In this division, progeny cells maintain mother cell's shape, size and properties. But uncontrolled cell division causes tumor, cancer etc.

Importance of meiosis: Germ cells are created in meiosis cell division. Chromosome number of mother cell becomes half in daughter cells. But the characteristics are maintained within the species. Meiosis plays direct role in the alternation of generation. Crossing over occurs in meiosis for this variation is seen in species.

Ques. ► 10

A	Through cell division a fertilized egg forms a living body composed of numerous cells.
B	Male and female gametes are developed through cell division

[Shaheed Bir Uttam Lt. Anwar Girls' College, Dhaka]

- What is called interphase? 1
- What do you mean by Amitosis cell division? 2
- Mention three significant differences between A & B. 3
- Analyze the significance of A in the life of a living organism. 4

Answer to the question no. 10

a Interphase is the phase of the cell cycle in which a typical cell spends most of its life. During this phase, the cell copies its DNA in preparation for mitosis.

b Amitosis cell division is a direct type of cell division wherein the nucleus and the cytoplasm go through a simple mass division into two parts. This type of cell division is found in bacteria, blue green algae, yeast etc.

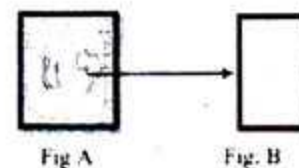
c "A" indicates mitosis cell division and "B" indicates meiosis cell division. Three significant differences between mitosis cell division and meiosis cell division are given below —

Traits	Mitosis	Meiosis
1. Type of Reproduction	Asexual	Sexual
2. Chromosome number	Remains the same	Reduced by half
3. Function	Cellular reproduction and general growth and repair of the body	Genetic diversity through sexual reproduction

d "A" indicates mitosis cell division. Significance of mitosis cell division in the life of a living organism is given below —

The significance of mitosis in the living body of organisms is immense. The balance between the nucleus and cytoplasm of a cell in terms of volume and amount is maintained by mitosis. Through mitosis, the growth in the body of multicellular organisms occurs. All multicellular organisms start their life from a single cell zygote. The repeated division of this single cell produces innumerable cells and thus an organism grows to completion. It may seem that if the cells multiply one at a time it would take a long time to take the complete shape of a living being (the human body has 30 trillion cells). But this is not true. All cells are capable of mitosis when provided with necessary nutrients. If each cell division takes one day to complete, the number of cells necessary for human beings can be created in 40-50 days. As the number and feature of chromosomes remain unchanged in cells produced through mitosis, growth in organisms takes place systematically. Mitosis plays a role in the maintenance of the size, shape and volume of cells. Unicellular organisms reproduce through mitosis. Mitosis plays an important role in the vegetative reproduction of organisms and increasing the number of reproductive cells. It is essential to form new cells for growth and healing of injuries. The life span of some cells is predetermined and they are, accordingly, replaced through the process of mitosis. As identical cells are produced through mitosis, qualitative features of the living world remain unchanged.

Ques. ► 11



[Bangladesh International School & College, Dhaka]

- What is Karyokinesis? 1
- What is the role of kinetochores in cell division? 2
- By using the fig mentioned fig "B" of the stem draw and explain the cell division related with gamete formation. 3
- Explain Fig "A" of the stem and compare the stage between the stage just before and after the stage mentioned in the stage. 4

Answer to the question no. 11

- a** Karyokinesis is the division of nucleus during cell division.
- b** Kinetochores are protein structures assembled on centromeres and link the chromosomes with mitotic spindles. At prometaphase stage the function of kinetochores in centromeres of chromosomes is to get attached with some fibers of spindle apparatus.
- c** Figure B represents chromosome.
- Cell division related with gamete formation:** Meiosis mainly occurs in the primordial germinal cells during the development of gametes. In the anthers and ovules of flowering plants, and in the testes and ovaries of animals meiosis occurs. During the development of pollens from diploid pollen mother cells in mosses and ferns, meiosis occurs in their zygotes. Block picture shows the stapes of gamete formation is given below,

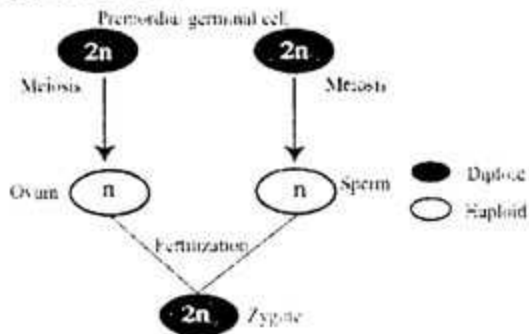
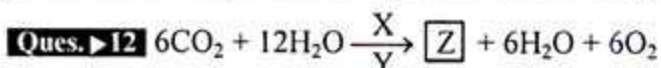


Fig: Stages involved in gamete formation

- d** Figure A in the stem indicated metaphase stage of mitosis cell division. Stages involved before and after this stage is prometaphase and anaphase.
- Metaphase:** At the onset of the stage, all the chromosomes complete their assembling at the equator, middle plane from the two poles. The centromere of each chromosome remains on the equator but the two arms take position towards the poles. In this stage, chromosomes look most short and thick.
- Difference between prometaphase and anaphase is given below:

Feature	Prometaphase	Anaphase
Chromosome location	Chromosomes start assembling on the equatorial plane.	Each chromosome splitting into two moves to two poles, and so the
Centriole	Present	Absent
Final Process	At the end of the stage prophase, nuclear membrane and nucleolus being disintegrated begin to disappear.	At the end of the stage anaphase, the daughter chromosomes are totally pulled to the two poles and start their elongation



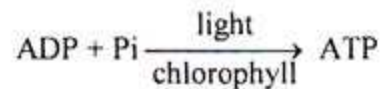
[BIAM Model School and College, Dhaka]

- What is osmoregulation? 1
- Why Hyena is called scavenger? 2
- Explain, how does Z produce in plant body? 3
- In absence of X and Y what effects will be observed in above reaction? Give your opinion. 4

Answer to the question no. 12

- a** The physiological processes that an organism uses to maintain water balance is termed as osmoregulation.
- b** The kind of animals who like more to eat dead bodies of other organisms than the living body of are called scavengers. They keep the environment clean by eating the dead bodies of different organisms. Hyena does the same thus it is known as scavenger.

- c** 'Z' in the stem indicates **carbohydrate**. In green plants, the process of the formation of carbohydrates is called photosynthesis. There are light dependent phase and light independent phase in photosynthesis. In **Light dependent phase**, solar energy is transformed into chemical energy. Through this process ATP (Adenosine triphosphate) and NADPH+H⁺ (reduced nicotinamide adenine dinucleotide phosphate) are produced.



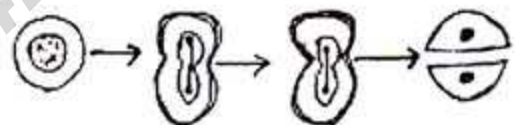
No light is directly required in the **light independent phase**, but the process can be carried out in the presence of light. In this phase, carbohydrates are produced by the reduction of CO₂ with the help of ATP and NADPH+H⁺ produced in the light phase.

- d** 'X' and 'Y' in the reaction represents **light** and **chlorophyll**.

Role of light in photosynthesis: Light is the source for production of carbohydrates from H₂O and CO₂. Sunlight takes part in the development of chlorophyll. With the effects of sunlight and stomata being opened, CO₂ can enter leaves, and take part in the production of food carbohydrates.

Role of chlorophyll in photosynthesis: Only chlorophyll can capture solar energy. Photosynthesis is dependent on the rate of regeneration of chloroplasts or the components of chloroplasts. Thus, if these two components are absent, then photosynthesis will never take pace.

Ques. ► 13



[BIAM Laboratory School and College, Bogura]

- What is karyokinesis? 1
- Why is the Mitosis cell division called Educational division? 2
- Show the differences between cell division process showed in the stem and Mitosis cell division process. 3
- Analyze the impact in living of organism, if the cell division mentioned in the stem will not be occurred? 4

Answer to the question no. 13

- a** Division of nucleus is called karyokinesis.
- b** In mitosis cell division, chromosome number of mother cell and daughter cell remains equal. Qualitative features of the chromosome of mother cell are transferred to the daughter chromosome without any change. Again the size and shape of the daughter cell is just like the mother cell. For such reasons, mitosis cell division is called equational cell division.
- c** Cell division process in the above mentioned stem is amitosis. There are some differences between amitosis and mitosis cell division. These are shown below:

Amitosis cell division	Mitosis cell division
(i) It is a simple process of cell division.	(i) It is a serial complex process.
(ii) In this process, the mother nucleus directly divides into two parts.	(ii) In this process, at first nucleus divides and then cytoplasm divides.
(iii) This type cell division occurs in prokaryotic cell division. Such as - bacteria, yeast etc.	(iii) This division takes place in somatic cells of organisms. Such as eukaryotic plants and animals.

- d** The cell division process mentioned in the stem is amitosis. Amitosis process is very important in living world. Unicellular prokaryotic organisms increase in number through this cell

division such as— bacteria, fungi etc. If these prokaryotic organisms did not increase in number through amitosis then those organisms must have extinct from this world. As a result the ecosystem would have disturbed. These prokaryotic organisms work as the decomposers in this ecosystem. All this prokaryotic organisms i.e. micro-organisms decompose the dead body into fundamental elements which are easily taken by the plants as food from soil and keeps the ecosystem active. Yeast a kind of fungi is used in bakery. Besides, some useful bacteria are used to produce antibiotic in making life saving drugs. Therefore, if amitosis didn't occur then it wouldn't have possible to produce these life-saving drugs.

So, from the above brief description it can be understood that, if the mentioned amitosis cell division didn't take place then our living would have faced different negative aspects.

Ques.►14



[Sirajganj Collectorate School and College, Sirajganj]

- What is cell division? 1
- What do you understand by prokaryotic cells? 2
- Mention the features of the fourth stage of the process mentioned in figure : Y. 3
- Explain the significance of the process mentioned in the figure: X in maintaining the individuality of species. 4

Answer to the question no. 14

a The process in which the number of cells in an organism gets increased to ensure its growth and reproduction is called cell division.

b Prokaryotic cells are those which do not contain a properly formed nucleus. They also lack organelles or other internal membrane-bound structures. For example- bacteria, cyanobacteria etc. are prokaryotic organisms. Cytoplasm of a prokaryotic cell does not contain any mitochondria, chloroplast or endoplasmic reticulum etc. but contains ribosomes.

c The figure Y shows the process of mitosis cell division. The fourth phase of this process is named as anaphase, characteristics of which is mentioned below —

- At the very beginning of anaphase, the centromere of chromosome is divided to give off two daughter chromosomes.
- Chromosomes migrate from the equator to the two opposite poles of the cell due to the repulsion created between them during this phase.
- The cleaved centromere moves first to the pole while the chromatids trail behind.
- Chromosomes resemble the shapes V, L, J or I depending on the position of centromere in the chromosome.
- At the end of the stage anaphase, the daughter chromosomes are positioned to the two opposite poles of mitotic spindle and their elongation is initiated.

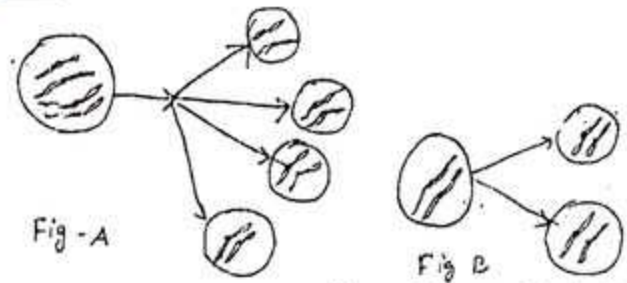
d The figure X in the stem represents meiosis cell division. Meiosis helps maintain the individuality of a species.

Meiosis maintains the purity of a species by keeping the total number of chromosomes constant in an organism. Primordial germ cells of diploid (2n) plants or animals undergo meiosis and produce four haploid reproductive cells. In this process the chromosome number becomes half in daughter cells. Later, the haploid male and female gametes fuse to form diploid zygote which transforms into new organism through repeated mitotic cell division events.

Again, zygote of haploid plant undergoes meiosis cell division to produce haploid progeny. Thus meiosis keeps the chromosome number of a species constant. Moreover, genetic diversity is also found in species of organisms as the exchange of genes occurs during meiosis.

Thus it maintains the individuality of a species.

Ques.►15



[Memon Grammar School, Chattogram]

- What is neuron? 1
- What is meant by Eukaryotic cell? 2
- Explain the role of Figure "A" to keep the genetic inheritance. 3
- Analyze the comparison between the figure 'A' and fig 'B' as per as stem. 4

Answer to the question no. 15

a Neuron is the structural and functional unit of nervous system.

b In eukaryotic cell, nucleus is well structured that means nuclear materials are well organized and surrounded by a nuclear membrane. Chromosomes are organized with DNA, histone protein and other components. Along with ribosome, other cell organelles are present in the cell.

c The figure A refers to meiosis type of cell division. They play important role in maintaining genetic inheritance.

Meiosis cell division is shown in figure A. In this process, an eukaryotic cell divides to form four daughter cells. Nucleus divides twice and chromosomes divide once in this process. So, chromosome number of daughter cell becomes half of that in mother cell. Male and female gametes of diploid organisms taking part in sexual reproduction is formed through meiosis. As a result, due to the fusion of male and female gametes in sexual reproduction, the chromosome number remains constant to generation from generation. Crossing over occurs through this type of division. As result organisms under species goes through variation and distinction. Thus genetic inheritance is maintained.

d The figure A refers to meiosis cell division and B refers to mitosis cell division. The comparisons between these two cell divisions are as follows:

	Mitosis	Meiosis
1.	Mitosis occurs in somatic cells	Meiosis occurs in germ cells
2.	The mother cell's nucleus gets divided to create two daughter cells	The mother cell's nucleus gets divided to create four daughter cells
3.	Here, nucleus and chromosomes divide only once	Here, chromosomes divide once but nucleus divides twice
4.	The daughter cells have same number of chromosomes as the mother cell	The daughter cells get half of the chromosomes compared to the mother cell
5.	No crossing over event occurs here	Crossing over is important in meiosis