Question Bank

Cell Division and Structure of Chromosome

1. Name the following :

(i) The suicidal bag of the cell.

(ii) The scientist who coined the term “cell”.

(iii) Site of protein synthesis in a cell.

(iv) The plastids containing green pigment.

(v) Chemical constituent of cell wall.

(vi) The supporting skeletal framework of the cell.

(vii) The structure which initiates cell division in animal cells.

(viii) The plastids found in the cells of yellow-coloured petals.

(ix) The process by which living organisms obtain energy for their life activities.

(x) The parts which act as bearers of hereditary units.

(xi) The organelle most vital for the survival of a cell.

(xii) The cell organelle concerned with transmission of hereditary characters from parents to offsprings.

(xiii) Any one structure found only in animal cells.

(xiv) Any structure other than the cell wall, which is found only in plant cells.

Ans. (i) Lysosome **(ii)** Robert Hooke

(iii) Ribosome **(iv)** Chloroplast

(v) Cellulose **(vi)** Endoplasmic reticulum

(vii) Centrosome **(viii)** Chromoplast

(ix) Respiration **(x)** Chromosomes

(xi) Nucleus **(xii)** Nucleus

(xiv) Centrosome **(xiv)** Plastids

2. Given below is an example of a certain structure and its special functional activity. e.g. kidney and excretion.

Write similarly the functions of the following :-

(i) Ribosomes and _____

(ii) Chloroplast and _____

(iii) Cell wall and _____

(iv) Chromatin and _____

(v) Nucleolus and _____

Ans. (i) Protein synthesis

(ii) Photosynthesis

(iii) Protection

(iv) Inheritance of acquired characters

(v) Protein synthesis

3. Complete the following statements by choosing the correct alternatives out of those given in the brackets:

(i) Anabolism + Catabolism = _____ [Respiration, Breathing, Metabolism]

(ii) All _____ cells do not have membrane-bound organelles. [Eukaryotic /Prokaryotic /Virus]

(iii) The energy currency of the cell is_____. [DNA, ATP, RNA]

(iv) _____ chromosome pairs are found in human body cells. [23, 46, 16]

(v) Membrane-bound non-living structures in a cell are _____. [Organelles/Ergastic substances/Vacuoles]

(vi) All living cells contain_____. [Protoplasm/Plastids/Centriole]

(vii) The part of cell associated with heredity is _____. [Centrosome/Chromosome/Nucleolus]

(viii) The largest cell in the living world is the _____.

Ans. (i) Metabolism **(ii)** Prokaryotic

(iii) ATP **(iv)** 23

(v) Vacuoles **(vi)** Protoplasm

(vii) Chromosome **(viii)** Egg of ostrich

4. Mention if the following statements are true or false.

(i) Energy currency of the cell is DNA.

(ii) All plant cells contain centrosome.

(iii) In animal cells, carbohydrates are stored in the form of starch.

(iv) Cells of the inner lining of our cheek cells have a prominent nucleus in the periphery.

(v) All animal cells contain a cell wall.

(vi) Cell wall is made of protein.

(vii) Centrosome occurs in animal cells.

(viii) Protoplasm is the part of the cell which surrounds the nucleus.

Ans. (i) False (ATP) **(ii)** False (cell wall)

(iii) False (glycogen) **(iv)** False (centre)

(v) False (cell membrane) **(vi)** False (cellulose)

(vii) True **(viii)** False (Cytoplasm)

5. Each of the statements given below, is followed by four options. Select the most appropriate option in each case :

(a) A cell is best defined as.

(i) the smallest part of a living being.

(ii) the body part that can be seen only under a microscope.

(iii) the starting point in the life of all organisms.

(iv) the structural and functional unit of life.

(b) The pair correctly matched in regard to a cell organelle and its function, is

(i) Ribosome – Synthesis of protein.

(ii) Endoplasmic reticulum – Production of ATP.

(iii) Golgi body – Carries hereditary information.

(iv) Mitochondria – Destroy foreign substances.

(c) A cell organelle found only in plant cells is

(i) centrosome **(ii)** plastid

(iii) mitochondria **(iv)** ribosomes.

Ans. (a) (iv) **(b)** (i) **(c)** (ii)

6. Choose the correct alternative from those given within brackets.

(a) The additional outermost non-living layer of a plant cell is called (cell membrane / cell wall).

(b) The chromatin fibres are found in (cytoplasm/nucleoplasm).

(c) Animal cells do not contain (centrosome/plastids).

Ans. (a) cell wall **(b)** nucleoplasm **(c)** plastids

7. Match the organelles in Column I with the functions in Column II

Column I (Organelle)	Column II (Function)
(a) Mitochondria	**(i)** Rigidity to the cell
(b) Plasma membrane	**(ii)** Synthesis of proteins
(c) Cell wall	**(iii)** Intracellular digestion
(d) Chloroplasts	**(iv)** Differential absorption
(e) Ribosomes	**(v)** Trap solar energy
(f) Golgi apparatus	**(vi)** Production of ATP
(g) Lysosome	**(vii)** Secretion of enzymes
(h) Nucleus	**(viii)** Division of cells

Ans. **(a)** (vi) **(b)** (iv) **(c)** (i)
(d) (v) **(e)** (ii) **(f)** (vii)
(g) (iii) **(h)** (viii)

8. Given below is an example of a certain structure and its special functional activity, e.g., kidney and excretion.

Write similarly the functions of the following :

(a) Chloroplast and .....

(b) Cell wall and .....

(c) Chromatin and .....

(d) Nucleolus and .....

Ans. (a) Photosynthesis

(b) Rigidity of cell

(c) Transfer of hereditary characters

(d) Chromosome formation

9. Differentiate between plant cell and an animal cell.

Ans. Difference between plant cell and animal cell.

Plant Cell	**Animal Cell**
(a) Usually larger, with distinct outlines.	Usually smaller, with less distinct outlines.
(b) A definite cell wall, made up of cellulose	No cell wall.
(c) Cytoplasm not so dense.	Cytoplasm denser and more granular.
(d) Only a thin lining of cytoplasm, mostly pushed to the periphery.	Vacuoles, if any, are small and temporary.
(e) Usually contains plastids.	Do not contain plastids.
(f) Centrosome is not present.	Centrosome and centrioles are present.

10. Mention any three differences between a living cell and a brick in a wall, based on considering them as units of structure and function.

Ans.

Living cell	**Bricks in a wall**
(i) Structural and functional unit of life.	Structural unit of wall.
(ii) Growth takes place in living cell.	Growth does not take place in individual brick.
(iii) Living cell divides to increase their number through cell division.	Bricks don't have the capacity to break through division.

11. List any six features found in both plants and animals.

Ans. **(i)** Presence of nucleus.

(ii) Presence of cell membrane.

(iii) Presence of cell mitochondria.

(iv) Presence of cell endoplasmic reticulum.

(v) Presence of cell ribosomes.

(vi) Presence of cell lysosomes.

12. Do you think the cells of an elephant would be larger than the cells of a rat? Explain briefly.

Ans. Cells of an elephant should be larger than the cells of a rat. As elephant has a very large size in comparison to rat, its metabolic activities would also be much more in comparison to rat. That's why more energy is needed, more mitochondria should be present in a cell and so other cell organelles. Thus, cells should be larger than the rat cells.

13. Describe any five activities of an organism which are the outcome of the cell activities.

Ans. (i) Growth by cell division by centrosome.

(ii) Respiration by mitochondria.

(iii) Reproduction by chromosomes.

(iv) Cell's defense by lysosomes.

(v) Secretion of enzymes by golgibody.

14. State one main function of each of the following :

(i) Chromosomes

(ii) Mitochondria

(iii) Ribosomes

(iv) Cell wall

(v) Cell membrane

Ans. (i) Chromosome : Chromosomes are composed of hereditary units called genes which carry genetic information from one generation to the next.

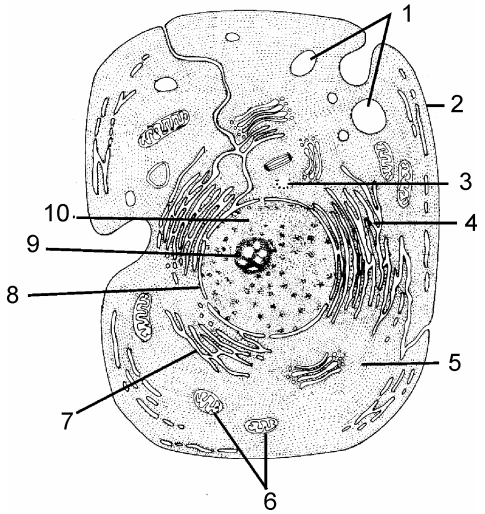
(ii) Mitochondria : It is the site of respiration during which energy is released in the form of ATP. This energy is utilised in all the metabolic processes of the cell.

(iii) Ribosomes : Ribosomes are the sites of protein synthesis.

(iv) Cell wall : The cell wall, which is only found in the plant cell, gives rigidity, shape and protection to the cell.

(v) Cell membrane : The cell membrane allows only the required materials to pass inside the cell, thereby giving protection to the cell.

15. The figure given below represents a generalised animal cell as observed under an electron microscope.



(i) Name the parts labelled 1-10.

(ii) Which parts of a cell are concerned with the following?

(a) Liberation of energy

(b) Synthesis of proteins

(c) Transmission of hereditary characters from parents to offspring.

(iii) Mention three features found only in plant cells and one found in animal cells.

Ans. (i) 1. Lysosomes; **2.** Cell membrane;

3. Centriole; **4.** Ribosomes;

5. Cytoplasm; **6.** Mitochondria;

7. Endoplasmic reticulum; **8.** Nuclear membrane;

9. Nucleolus; **10.** Nucleoplasm

(ii) (a) Mitochondria **(b)** Ribosome **(c)** Nucleus

(iii) Three features found only in plant cells : cell wall, plastids, vacuole.

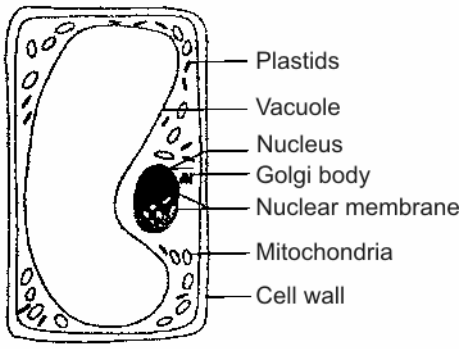
One feature found only in animal cells : centriole.

16. Given below are diagrammatic sketches of a generalised animal cell and a generalised plant cell.

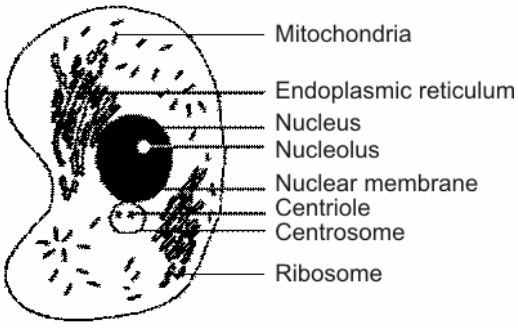
(a) Write at the place provided against A and B, whether it is a plant cell or an animal cell. Give two reasons in support of your answer for each.

(b) Label the parts indicated by guidelines.

Ans. (a) Plant cell because **(i)** it has large vacuole **(ii)** plastids



(b) Animal cell because, it has **(i)** centrosome and **(ii)** no plastids



17. Name the cell part which is

(i) composed of cellulose _____

(ii) made up of an irregular network of tubular double membrane _____

(iii) clear space with some substances in solution

Ans. (i) Cell wall **(ii)** Endoplasmic reticulum **(iii)** Vacuoles

18. How was it proved in case of Amoeba that the key to the life of a cell is its nucleous?

Ans. If the nucleus from another amoeba is transplanted in an enucleated amoeba, the receipient survives while the donor (enucleated) amoeba dies.

19. Name the following :

(i) Meiocytes of gonads.

(ii) Chiasmata occurs in this stage.

(iii) The phenomenon in which exchange of chromosomal material takes place.

(iv) The pairing of homologous chromosomes.

(v) A particular type of protein present in DNA.

(vi) The cells in which meiosis takes place.

(vii) The protein containing framework joining paired homologous chromosomes.

(viii) The organism in which Polytene chromosome was seen for the first time.

(ix) Histone protein and DNA togetherly form this structure.

(x) A diagramatic representation of a Karyotype of a species.

Ans. (i) Gonocytes, **(ii)** Diplotene,

(iii) Crossing-over **(iv)** Synapsis

(v) Histone, **(vi)** Meiocytes

(vii) Synaptonemal Complex **(viii)** *Chironomus*

(ix) Nucleosome **(x)** Idiogram.

20. Complete the following statements by choosing the correct alternative out of those given within bracketes.

(i) Meiosis takes place in the _____ cells (Somatic/Reproductive)

(ii) Division of cytoplasm is _____ (Karyokinesis/Cytokinesis)

(iii) In _____ phase, no change occurs in DNA content (S/G_1)

(iv) _____ is essentially reverse of prophase. (Anaphase/Telophase)

(v) Movement of chromosomes occur in _____ . (Prophase / Anaphase)

(vi) 'V' shaped chromosome having the centromere in the centre is called _____. (Acrocentric / Metacentric)

(vii) Disc shaped structure found in the centromere is _____. (Kinetochore / Centromere)

(viii) DNA is a _____ helix structure. (Double / single)

Ans. (i) Reproductive **(ii)** Cytokinesis

(iii) G_1 **(iv)** Telophase

(v) Anaphase **(vi)** Metacentric

(vii) Kinetochore **(viii)** Double.

21. Mention if the following statements are true or false. If false, rewrite the wrong ones by changing only the words printed in bold face.

(i) Mitosis is also known as reductional cell division.

(ii) Plastids and endoplasmic reticulum disappear during prophase of mitosis and meiosis.

(iii) Karyokinesis refers to the division of the nucleus.

(iv) Before undergoing cell division, the amount of DNA in the cell is reduced to half.

(v) Crossing over occurs in mitosis.

(vi) In mitosis prophase is of short duration.

(vii) Histone is a particular type of fatty acid.

(viii) RNA contains thymine.

(ix) Mitosis requires lesser time than meiosis.

(x) Terminal meiosis is also known as gametic meiosis.

Ans. (i) False (Meiosis),

(ii) False (Nucleolus and nuclear membrane)

(iii) True,

(iv) False (Doubled),

(v) False (Meiosis),

(vi) True

(vii) False (Protein)

(viii) False (Uracil)

(ix) True

(x) True

22. Define the following :

(i) Mitosis **(ii)** Meiosis

(iii) Cell cycle **(iv)** Heterotypic division

Ans. (i) Mitosis : It is a type of nuclear division that results in two daughter cells each having a nucleus containing the same number and kind of chromosomes of the mother cell.

(ii) Meiosis : It is a type of nuclear division that gives rise to four reproductive cells (gametes), each with half the chromosome number of the parent cell.

(iii) Cell cycle : Every cell capable of division passes through a sequence of stages known as cell cycle.

(iv) Heterotypic division : The first meiotic division of cell where reduction in chromosome number takes place and this leads to two haploid cells is known as the heterotypic division.

23. Differentiate between the following : —

(i) Mitosis and Meiosis

(ii) G_1 phase and G_2 phase

(iii) Amitosis and Mitosis.

(iv) Chromosome and chromatid.

(v) Centrosome and centromere.

(vi) Aster and spindle fibres.

(vii) Haploid and Diploid

Ans. (i)

MITOSIS	MEIOSIS
1. Occurs in somatic cells.	**1.** Occurs in the reproductive cells of the body.
2. Cells divide once each time.	**2.** The process is divided into two stages meiosis I and meiosis II.
3. Referred to as equational division, because the daughter cells have identical genetic material and number as the mother cell.	**3.** Referred to as reduction division as the daughter cells have half the number of chromosomes as the mother cell.
4. Two daughter cells are formed.	**4.** Four daughter cells are formed as a result of each cell cycle.
5. Prophase is of short duration and is not divided into any substage.	**5.** Prophase is long and divided into five substages : **(a)** leptotene **(b)** zygotene **(c)** pachytene **(d)** diplotene **(e)** diakinesis.
6. During prophase each chromosome is double-stranded.	**6.** During prophase I, chromosomes are single-stranded but in pairs.
7. No synapsis or crossing over and thus no exchange of genetic material between the homologous chromosomes occurs.	**7.** Synapsis and crossing over take place, leading to exchange of genetic material between the inner non-sister chromatids of a pair of homologous chromosomes.
8. During metaphase : **(a)** The chromosomal centromeres remain directed towards the equator and the arms of the chromosomes remain directed towards the poles. **(b)** The centromere splits and the sister chromatids move to the opposite poles.	**8. (a)** The centromeres of the chromosomes remain directed towards the pole while the chromatids remain directed towards the equator. **(b)** The centromere does not divide and each chromosome of a homologous pair moves to the opposite pole with its centromere.
9. At anaphase, each chromosome is made of a single chromatid.	**9.** At anaphase, each chromosome is made up of two chromatids joined at the centromere.
10. Telophase stage always occurs.	**10.** Telophase I may be occasionally omitted.
11. Mitosis requires lesser time.	**11.** Meiosis requires longer time.

(ii)

G_1 PHASE	G_2 PHASE
1. It is called first gap phase.	It is a second gap or growth phase.
2. No change occurs in its DNA content.	Amount of DNA is double than G_2 phase.
3. It is close to the 'S' phase or synthetic phase.	This phase is close to M phase.
4. It is most variable with regards to duration. It either occupies 30 - 50 per cent of the cell cycle or lacks entirely.	It may occupy 10% to 20% of the cell cycle.

(iii)

AMITOSIS	MITOSIS
1. It is the simple common process of cell division having no sub-stages.	It is a type of cell division where two daughter cells are produced having same number of chromosomes to the parent cell.
2. Occur in prokaryotic cells like bacteria.	Occur in higher organisms — both plants and animals.
3. Nucleus divides several times without each division being accompanied by division of cytoplasm.	Each nuclear division is followed by cytoplasmic division.

(iv)

CHROMOSOME	CHROMATID
1.Chromosomes are the highly condensed chromatin fibres.	A chromosome consists of two symmetrical structures called chromatids.
2. A chromosome is an individual entity.	Chromatids are attached to each other by centrosome.

(v)

CENTROSOME	CENTROMERE
1. Centrosome is a cell organelle which is present near the nucleus.	Centromere is a clear zone in the centromere.
2. Centrosome consists of one or two centrioles 3. It initiates and regulates cell division.	Centromere does not possess any centriole. It divides the chromosome into two parts called chromosome arm.

(vi)

ASTER	SPINDLE FIBRE
1. Aster is a star-like figure present at the opposite poles of a dividing cell.	Spindle fibres extend between the two asters.
2. Astral rays arise from the centriole and radiate out.	These are formed mostly by microtubules.

24. The number of chromosomes in a certain type of cell division is halved.

This kind of cell division occurs in

(i) only testis **(ii)** only ovary

(iii) both ovary and testis **(iv)** all body cells

Ans.(iii) both ovary and testis.

25. Imagine one cell (A) has undergone are mitotic division and another cell (B) has completed its meiotic division. How many cells would the two produce?

Cell A : _____

Cell B : _____

Ans. Cell A : Two daughter cells.

Cell B : Four daughter cells.

26. A bacterial cell divides once every minute. It takes an hour to fill up a cup. How much time will it take fill half a cup?

Ans. The bacterial cell doubles in one minute. Because of that, bacterial cells can fill a cup from half of a cup in one minute. As it takes 1 hour (60 mins) to fill a cup, therefore to fill up half of a cup, it requires (60 – 1) minute, i.e., 59 minutes.

27. What is the importance of meiosis in creating variation?

Ans. Meiosis has the greatest significance for the biological world because by crossing over, meiosis provides an opportunity for the exchange of genes and thus cause genetical variations among the species.

28. Why is meiosis referred to as reduction division?

Ans. Meiosis has two phases — Meiosis - I and Meiosis - II

In the first meiotic division, i.e. Meiosis-I, the reduction in chromosome numbers take place, thus, two haploid cells are result of this division.

As chromosome number is reduced in this stage, it is also called reduction division.

29. (a) What is interphase?

(b) Mention three significant changes that occur in a cell during interphase.

Ans.(a) The period following the completion of cell division, when the nucleus is not dividing, is called interphase.

(b) Interphase stage is considered as the preparatory stage for cell division. Main changes occuring in this stage include —

- Synthesis of DNA
- Synthesis of RNA and protein
- Cell growth

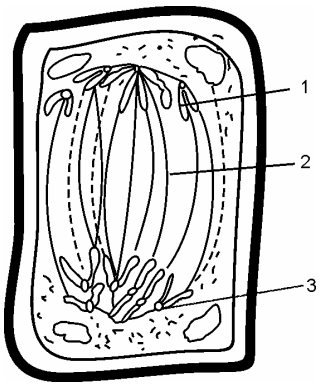
30. The diagram below represents a certain stage of a cell.

(a) Is it an animal cell or a plant cell? Give one reason in support of your answer.

(b) Label the parts numbered 1-3.

(c) Which stage (phase) of mitosis is represented in this diagram?

(d) Name the stage that comes prior to this stage.



Ans.(a) It is a plant cell because of the presence of cell wall, spindle fibre and no centrosome/aster.

(b) 1 – chromosome, 2 – microtubule / spindle fibre, 3 – centromere.

(c) The stage represented here is anaphase of mitosis.

(d) The stage that comes prior to this is metaphase and the stage that comes next to it is telophase.

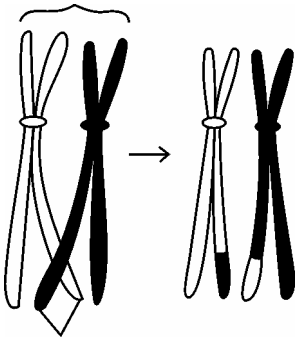
31. "First meiotic division is the reduction division." What does the word "reduction" refer to in this statement?

Ans. In meiosis, the number of chromosomes in the sex cells is halved. Each finally resulting cell has only half the number of chromosomes (haploid or *n*) of the original cell (diploid or 2*n*). That means, the term 'reduction' refers to the reduction of chromosome number only.

32. Gametes must be produced by meiosis for sexual reproduction". Why is it so?

Ans. As meiosis is a reduction division, the gametes produced through meiosis is haploid. This is essential because when the male and female gametes fuse during fertilisation, the normal double (diploid) number of chromosomes (in pairs) is reacquired (by the combination of haploid chromosomes from both the gametes).

33. The diagram below represents a certain phenomenon which occurs during meiosis. Explain the phenomenon by using the terms _____ homologous chromosome, chromatids, crossing over.



Ans. In first meiotic division, during pairing, some chromatids of homologous chromosomes break and rejoin at points of intersection, called chiasmata (singular chiasma). This causes crossing-over with exchange of chromatid material between chromosomes from the parents. This leads to a new combination of genes in the sex cells.

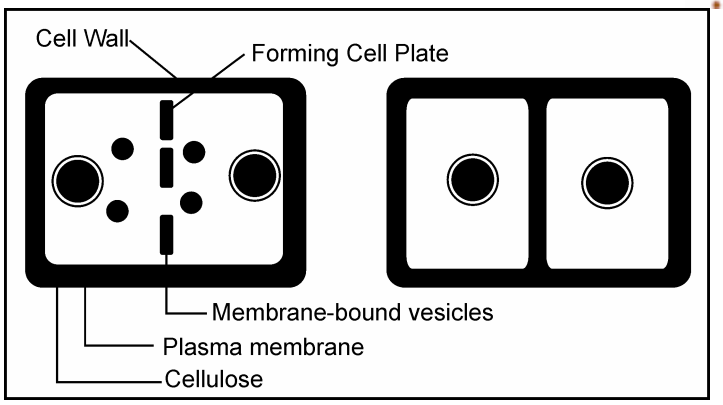
34. (a) What is cytokinesis?

(b) With the help of neat sketches, show how cytokinesis differs in a plant cell and an animal cell.

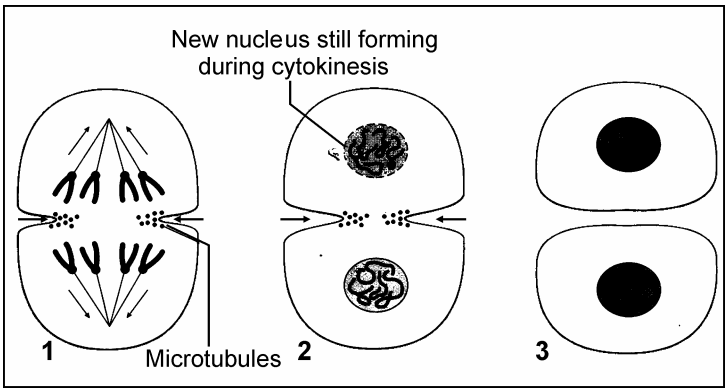
Ans.(a) Cytokinesis is the division of cytoplasm.

(b) During cytokinesis, the cytoplasm divides by a process, called cleavage. In plant cells a cell plate formation begins at the centre of the cytoplasm with graded deposition of cellulosic material. The cell plate begins in the centre and proceeds towards the cell wall. This type of cytokinesis is known as centrifugal.

In animal cells, the cell membrane starts constricting from the sides and proceeds inward, till the mother cell is divided into two daughter cells. This type of division is known as centripetal.



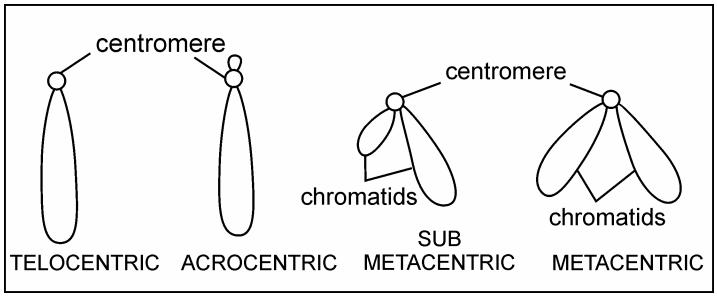
Cytokinesis in plant cell



Cytokinesis in animal cell

35. Classify the types of chromosomes according to their shape.

Ans. Depending upon the position of centromere, a chromosome may have the following shapes —



Types and shapes of chromosome

Telocentric : Rod-shaped having centromere at the proximal end.

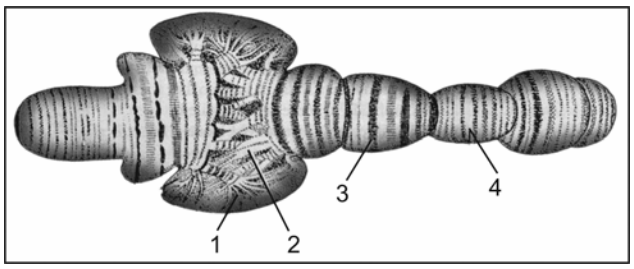
Acrocentric : Rod-shaped having centromere at one end but slightly below the normal position.

Submetacentric : T-shaped or L-shaped having centromere almost at the middle position.

Metacentric : 'V' shaped having the centromere at the centre and forming two equal arms.

36. Following is the picture of a giant chromosome. See the picture and answer the following.

(a) Name the chromosome
(b) Mark the parts 1 to 4
(c) Where can you find it?
(d) Who discovered this chromosome?



Ans.(a) This is a polytene chromosome.

(b) 1 → Chromosome puff

2 → Chromonemata

3 → Dark band

4 → Inter band

(c) This chromosome is found in a dipteran insect *Chironomus.*

(d) Polytene chromosome was discovered by an Italian scientist Balbiani.

37. With the help of a diagram describe the structure of a chromosome.

Ans. The chromosome has the following structures :

Chromatid : A chromosome consists of two symmetrical structures called chromatids. The chromatids are attached to each other by centromere.

Chromonema : A chromonema represents a chromatid in the early stages of condensation. The chromonemata form the gene-bearing portion of chromosome.

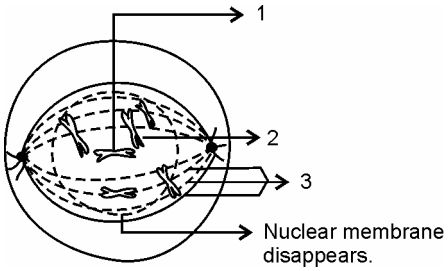
Chromomeres : The chromomeres are bead-like accumulations of chromatin material. Chromatin matter are regions of tightly folded DNA.

Centromere and kinetochore : The centromere lies within a thinner segment of chromosome, the primary constriction. Centromeres are found to contain specific DNA sequences with special protein bound to them, forming a disc-shaped structure *kinetochore.*

38. Write about the nitrogenous bases found in RNA and DNA.

Ans. Nitrogenous bases can be purines : adenine (A) and guanine (G), and three types of pyrimidines : thymine (T), cytosine (C) and uracil (U). The characteristic that differentiates DNA from RNA is that DNA contains all of the nitrogenous bases except **uracil,** and RNA contains all of the nitrogenous bases except t**hymine.** Bases are bonded to sugar molecules.

39. Given below is a diagram representing a stage during mitotic cell division in an animal cell. Examine it carefully and answer the questions which follow.



(i) Identify the stage. Give one reason in support of your answer.

(ii) Name the cell organelle that forms the 'aster'.

(iii) Name the parts labelled 1, 2, and 3.

(iv) Name the stage that follows the one shown here. How is that stage identified?

(v) Mention two points of differences between mitosis and meiosis with regard to:

(a) The number of daughter cells produced.

(b) The chromosome number in the daughter cells.

Ans.(i) The stage is prophase because

(a) chromosomes have been duplicated to form two chromatids.

(b) the centrosome splits into two.

(c) spindle fibres appear between the two daughter centrioles.

(d) the nucleolus disappear and the nuclear membrane starts disappearing.

(ii) The cell organelle that forms the aster is centrosome.

(iii) 1 → centromere, 2 → chromosome 3 → spindle fibre.

(iv) The stage following late prophase is metaphase. The features of this stage are —

(a) the chromosomes arrange on the equatorial plane.

(b) each chromosome gets attached to a spindle fibre by its centromere.

(v)

Mitosis	Meiosis
(a) The number of daughter cells produced is two in number.	The number of daughter cells produced is four in number.
(b) The chromosome number in the daughter cells is same as the parents.	The chromosome number in the daughter cells is half of the parent cell.

40. Look at the diagrams and identify the stage of cell division it is depicting.

Ans.(i) Metaphase, **(ii)** Anaphase,

(iii) Prophase **(iv)** Telophase

41. Shown below are four stages (A, B, C, D) (not in sequence) of a certain kind of cell division.

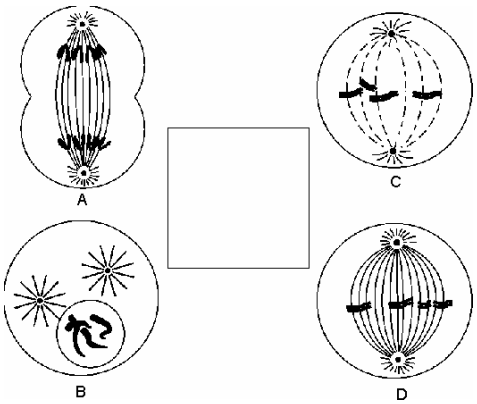
(i) Is it a plant cell or an animal cell? Give two reasons. .....

(ii) Is it undergoing mitosis or meiosis? .....

(iii) What should be the correct sequence of these four stages among themselves? .....

(iv) Name the stage that should precede the earliest of these stages .....

(v) Draw the stage named above inside the blank space provided.



Ans.(i) It is an animal cell because

(a) no cell wall is seen.

(b) cell is round in shape.

(c) centrosome with clearly differentiated centrioles is seen.

(ii) The cell is undergoing mitosis.

(iii) The correct sequence of the four stages should be-

B → Prophase

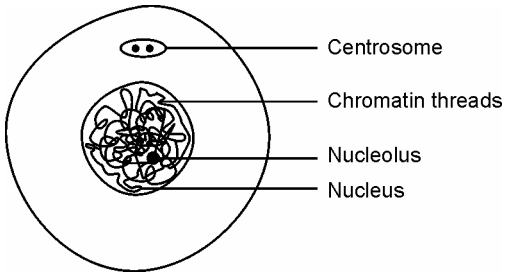
D → Metaphase

C → Anaphase

A → Telophase

(iv) The stage that should precede the earliest of these stages is interphase.

(v)



Interphase (Resting stage)

42. What is the significance of mitosis?

Ans. Mitosis has the following significance —

(i) Mitosis plays an important role in vegetative growth, wound healing, repair and regeneration.

(ii) Proper size of an organism is maintained by mitosis.

(iii) Helps in asexual reproduction.

(iv) The gametes divide mitotically.

(v) The old, decaying and dead cells of body are replaced by mitosis.

43. (i) Draw a neat labelled diagram to show the metaphase stage of mitosis in an animal cell having chromosomes.

(ii) How many daughter cells are formed at the end of mitosis and at the end of meiosis?

(iii) With reference to cell division explain the following terms :

Chromatid, Centromeres, Haploid.

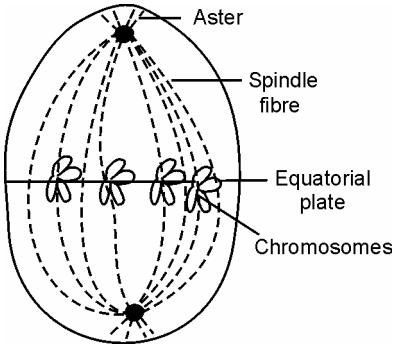
(iv) Name the type of cell division that occurs during:

1. growth of shoot,

2. formation of pollen grains,

3. repair of worn out tissues.

Ans.(i) See figure below



(ii) Mitosis = 2, Meiosis = 4

(iii) Chromatid : The lengthwise half chromosome is called Chromatid.

Centromere : The point at which both the arms of a chromosome are attached.

Haploid : Half of the somatic chromosome number is called haploid.

(iv) 1. Mitotic division.

2. Meiotic division.

3. Mitotic division.

44. Match the process given in column A with the stage in Mitotis in column B.

Column A	Column B
(i) Chromosome becomes arranged in a horizontal plane at the equator.	Anaphase
(ii) Daughter chromosomes move to opposite poles of spindle.	Prophase
(iii) Chromosome become visible as fine long threads.	Telophase
(iv) Chromosomes lose their distinctness and gradually become transformed into chromatin network.	Metaphase

Ans.(i) Metaphase **(ii)** Anaphase **(iii)** Prophase

(iv) Telophase

45. Name the following :

(i) The repeating component of each DNA strand lengthwise.

(ii) The point of attachment of the two chromatids in a chromosome.

(iii) The complex consisting of DNA strand and a core of histones.

(iv) The type of bond which joins the complementory nitrogenous basis.

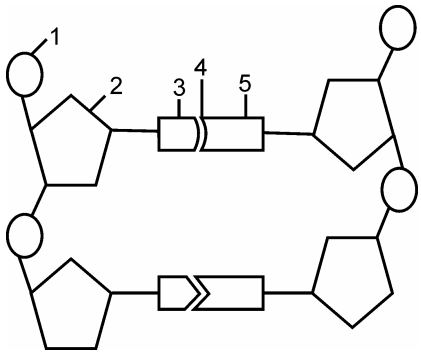
Ans.(i) Nucleotides

(ii) Centromere

(iii) Chromosome

(iv) Hydroen bond

46. Given below is a schematic diagram of a portion of DNA.



(i) How many strands is it showing?

(ii) How many nucleotides have been shown in each strand?

(iii) Label the parts numbered 1, 2, 3, 4 and 5.

Ans.(i) two **(ii)** two

(iii) 1 – Phosphate

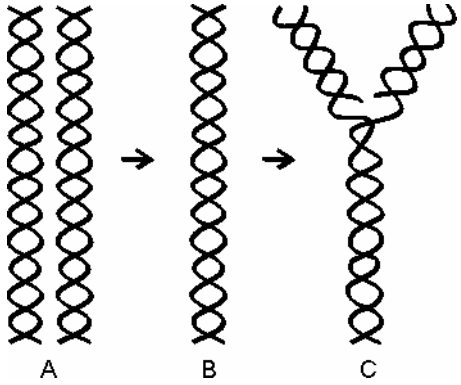
2 – Pentose sugar

3 – Nitrogenous base

4 – Hydrogen bond

5 – Nitrogenous base

47. The three sketches given below (A, B and C) are representing the replication of DNA. What should be their correct sequence starting with the first and ending with the last?



Ans. B C A