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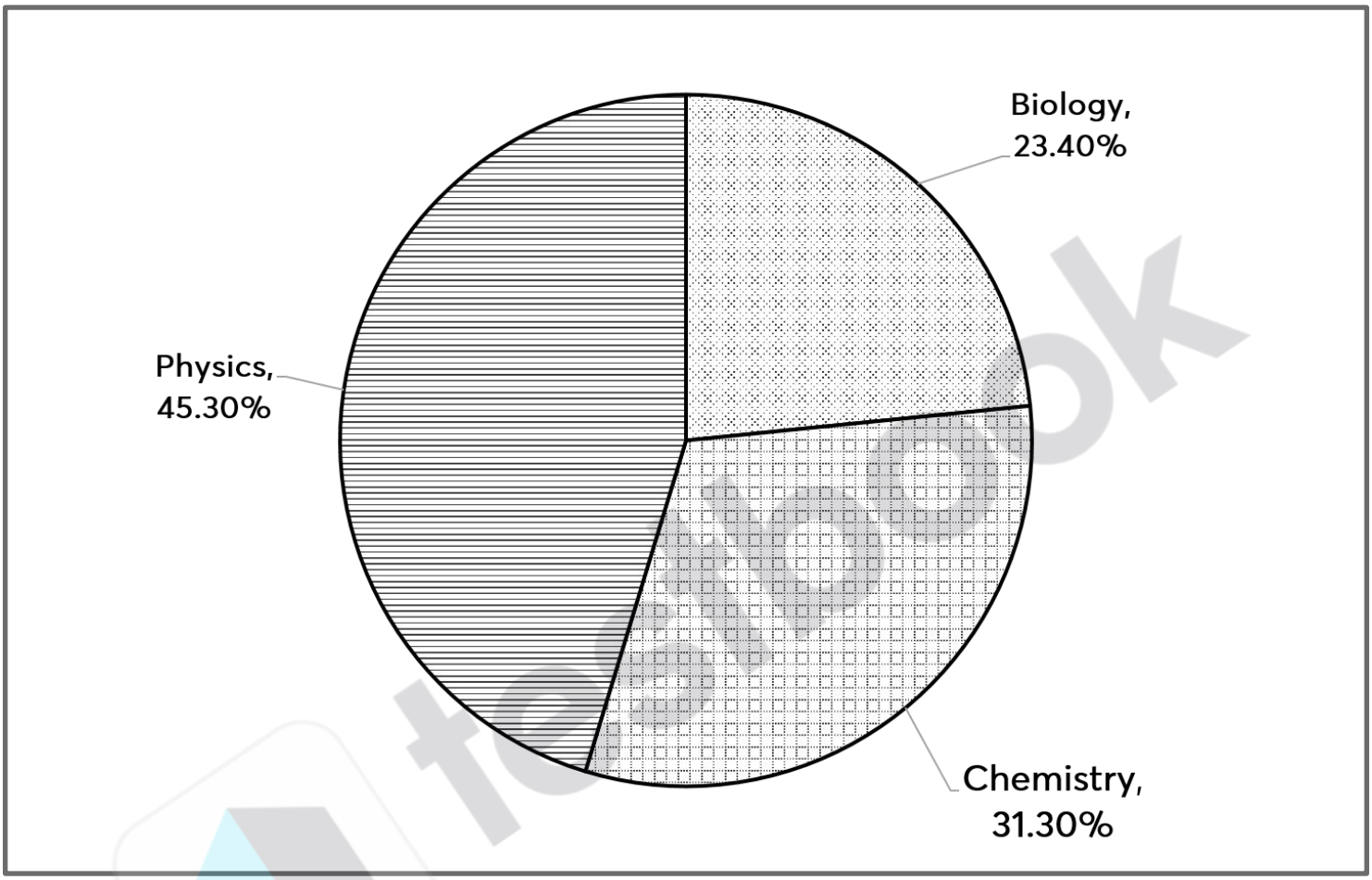
Table of Content

CHAPTER WISE WEIGHTAGE ANALYSIS



CHAPTER: 1

CELL, GENETICS & EVOLUTION

1. The smallest unit of the life capable of independent existence is: [RRB NTPC 2021]
A) Protoplasm B) Cytoplasm
C) Cell D) Vacuoles

2. CSIR scientists have conducted a genetic study for the first time in India. Where has the study been conducted? [RRB NTPC 2021]
A) Hyderabad B) Lakshwadeep
C) Kochi D) Andaman

3. In the respiration process, complex organic compounds such as glucose are broken down to provide energy in the form of _____ [RRB NTPC 2021]
A) PTA B) NAC
C) CAL D) ATP

4. The branch of science that studies cells is called _____.
A) Cytology B) Entomology
C) Homoplastic D) Hormonology

5. The other term for genetic engineering is: [RRB NTPC 2016]
A) DNA fingerprinting B) DNA editing
C) Recombinant DNA technology D) Gene therapy

6. _____ are a kind of waste disposal system of the cell. They help to keep the cell clean by digesting any foreign materials as well as worn-out cell organelles. [RRB NTPC 2021]
A) Mitochondria B) Plastids
C) Lysosomes D) Golgi

7. Alignment of chromosomes in the center of the cell at the equatorial plate constitutes which stage of mitosis? [RRB NTPC 2021]
A) Telophase B) Anaphase
C) Prophase D) Metaphase

8. Which of the following organelle of the eukaryotic cells are also called suicidal bags? [RRB NTPC 2022]
A) Golgi body B) Mitochondria
C) Lysosomes D) Chloroplast

9. How many pairs of autosomes does a normal human have? [RRB NTPC 2022]
A) 22 B) 44
C) 23 D) 1

10. Which of the following is called the 'powerhouse of the cell'?
A) Red blood cells B) Mitochondria
C) White blood cells D) Plasma membrane

11. The transformation of silkworms and frog larvae into adults through drastic changes is called _____. [RRB NTPC 2022]
A) mutation B) metamorphosis
C) diversification D) transfiguration

12. In Mendel's experiment, when F1 generation plants were self-pollinated, what was the genotypic ratio? [RRB Group D 2022]
A) 1 : 2 : 3 B) 1 : 2 : 1
C) 2 : 2 : 1 D) 3 : 2 : 1

13. Which of the following cellular components is absent in most of the prokaryotes? [RRB Group D 2022]
A) Nuclear membrane B) Ribosome
C) Cell wall D) Cytoplasm

14. Name the process that causes living cells to expand in size and shape when placed in a hypotonic solution. [RRB Group D 2022]
A) Diffusion B) Osmosis
C) Transpiration D) Photosynthesis

15. How many pairs of sex chromosomes are present in humans? [RRB Group D 2022]
A) 2 pairs B) 1 pair
C) 3 pairs D) 4 pairs

16. Name the process through which gaseous exchange takes place across the cell membrane.
A) Diffusion B) Osmosis
C) Endocytosis D) Absorption

17. Which molecule is known as the 'Energy Currency' of the cell [RRB Group D 2022]
A) Pyruvic acid B) Glucose
C) ADP D) ATP

18. A basic event in protein synthesis is the creation of a/an _____. [RRB Group D 2018]
A) DNA copy B) RNA copy
C) mRNA copy D) DNA and RNA copy

19. _____ mutation is NOT hereditary. [RRB Group D 2018]
A) Deletion B) Insertion
C) Somatic D) Duplication

20. Cells of _____ and _____ tissues are living cells. [RRB Group D 2018]
A) Parenchyma and sclerenchyma B) Sclerenchyma and tracheids
C) Collenchyma and sclerenchyma D) Parenchyma and collenchyma

21. _____ character predominates and is clearly seen in F_1 Generation. [RRB Group D 2018]
A) Inherited B) Allele
C) Dominated D) Recessive

22. _____ promote(s) cell division. [RRB Group D 2018]
A) Abscisic acid B) Cytokinins
C) Gibberellins D) Auxin

23. _____Theory of Evolution tells us how life evolved from simple to more complex forms. [RRB Group D 2018]
A) Darwin's B) Wallace
C) Mendel's D) Lamarck's

24. Sclerenchyma is composed of _____. [RRB Group D 2018]
A) WBC B) complex cell
C) non-living cell D) RBC

25. _____ is the sequence of gradual changes that take place in the primitive organisms over millions of years, resulting in the formation of new species. [RRB Group D 2018]
A) Evolution B) Fossils
C) Analogous organs D) Homologous organs

26. The organs that have different basic structure (or different basic design) but have similar appearance and perform similar functions are called: [RRB Group D 2018]

A) fossils
B) homologous organs
C) analogous organs
D) biogenetic law

27. Human genetics can be traced back to:[RRB Group D 2018]
A) African origin
B) American origin
C) South Asian origin
D) East Asian origin

28. The fungal cell wall is made up of hard complex sugars called _____. [RRB Group D 2018]
A) Chitin
B) Lignin
C) Pectin
D) Cellulose

29. In a Mendelian test, tall pea plants with violet flowers and short flowers with white flowers were used for breeding. All the flowers of their progeny were violet in color but about half of the plants were small in stature. This shows that the genetic composition of tall plants can be represented as_____. [RRB Group D 2018]
A) TtWW
B) TTww
C) TtWw
D) TTWW

30. On what basis did Mendel give the law of purity of gametes? [RRB Group D 2018]
A) Bank Cross
B) Dihybrid Cross
C) Test Cross
D) Monohybrid Cross

31. The phenotypic ratio in the F2 generation is _____. [RRB Group D 2018]
A) 1 : 2 : 3
B) 9 : 3 : 3 : 1
C) 1 : 3 : 3 : 9
D) 1 : 2 : 5

32. Which of the following is a unicellular green algae? [RRB Group D 2018]
A) Chara
B) Ulothrix
C) Spirogyra
D) Chlamydomonas

33. Mendel's laws apply only when: [RRB Group D 2018]
A) Parents are pure breeding
B) Parent is codominant
C) Characters are recessive
D) Characters are linked

34. In which kingdom would you place all organisms, which are multicellular eucentric with a cell wall? [RRB Group D 2018]
A) protista
B) plantea
C) monera
D) animalia

35. Gene mutation is caused by which of the following? [RRB Group D 2018]
A) Reproduction
B) Change in protein sequence
C) Change in the sequence of nitrogenous bases
D) Secretion of enzymes of hormones

36. The basic source of biological diversity is _____- [RRB Group D 2018]
A) mutation
B) cosmic evolution
C) inheritance
D) fermentative action

37. _____ is a part of DNA, which provides information for a protein. [RRB Group D 2018]
A) Chromosome
B) Nucleus
C) Trait
D) Gene

38. Alleles are: [RRB Group D 2018]
A) Alternative forms of enzymes
B) Gene variant
C) Alternate form of chromosome
D) Form of imperfect predominance

39. The sex of the children is determined by the hereditary chromosome inherited from [RRB Group D 2018]
A) Father
B) Nature
C) Mother and Father
D) Mother

40. In a cell that is NOT dividing, DNA is present as part of the _____. [RRB Group D 2022]
A) chromosome
B) nucleoplasm
C) gene
D) chromatin material

41. Which one of these is found in human Females only?
A) XX chromosome
B) X-chromosome
C) XYY chromosome
D) Y-chromosome

42. What is the full form of RNA?
A) Ribo nucleic acid
B) Ribo nuclear acid
C) Retinal nucleic acid
D) Robert nuclear acid

43. Differentiation in organisms leads to _____. [RRB Group D 2018]
A) Origin and Development of Diversity
B) Choose the most desirable properties
C) Survival of organism
D) Complex form of origin

44. Which of the following molecules govern the inheritance of a trait by the offspring? [RRB Group D 2022]
A) Only maternal DNA
B) Paternal and maternal DNA
C) Proteins
D) Only paternal DNA

45. Every germ cell will take one chromosome from each pair and these may be of either maternal or paternal origin. When two germ cells combine, they will restore the normal number of chromosomes in the progeny, ensuring the stability of the DNA of the species.
Such a mechanism of inheritance is explained in _____. [RRB Group D 2022]
A) mutation in species
B) variation in chromosomal number
C) speciation of organisms
D) the results of the Mendel's experiments

46. The breakdown of glucose to pyruvate takes place in the _____ during energy production. [RRB ALP 2018]
A) mitochondria
B) cytoplasm
C) nucleus
D) endoplasmic reticulum

47. Chlorophyll pigment is present in which of the following components of a cell? [RRB Group D 2022]
A) Ribosomes
B) Mitochondria
C) Lysosomes
D) Chloroplasts

48. Which of the following statement(s) is/are incorrect?
A. The full name of DNA is deoxyribo-nucleic acid.
B. It is the chemical element present in the chromosome which carries the genetic property.
C. DNA is a polynucleotide, nucleo-tide is the basic structural unit of DNA, which is made up of two components. [RRB Group D 2018]
A) C and B
B) A and C
C) Only C
D) Only A

49. A girl child has which of the following combinations of chromosomes in her cells? [RRB ALP 2018]
A) 44 autosomes + XX
B) 22 autosomes + XX
C) 44 autosomes + XY
D) 22 autosomes + XY

50. Which of the following statements is NOT true of Meiosis? [RRB ALP 2018]
A) As a consequence of Meiosis, the number of chromosomes is doubled in the resulting cells.
B) Meiosis takes place in gonads for production of gametes.
C) Meiosis takes place in two phases.
D) During Meiosis, the genes of the parent cells are mixed in the resulting cells.

51. What is the main difference observed between a slide of human cheek cells and a slide of onion peel when viewed under a compound microscope? [RRB Group D 2022]

A) Presence of cell wall in human cheek cells
B) Presence of plastids in cheek cells
C) Presence of mitochondria in onion peel cells
D) Presence of cell wall in onion peel cells

52. Which of the following statements is true? [RRB ALP 2018]

A) The term 'Genetics' was coined by J. D. Watson in 1906.
B) In human beings, there are 46 chromosomes. Of these, 42 (21 pairs) are autosomes and 4 (2 pairs) are sex chromosomes.
C) Mendel was the first scientist to visualise a gene as an inheritance in 1886.
D) A DNA molecule is made up of two long polynucleotide strands forming a double helical structure (double helix) just like a spiral staircase.

53. Which of the following statements is FALSE? [RRB Group D 2022]

A) Each gene controls one character.
B) The two alleles are brought together at the time of gamete formation
C) Every germ cell will take one chromosome from each pair.
D) Genes are located on chromosomes.

54. Some features of a prokaryotic cell are mentioned below. Select the INCORRECT option. [RRB Group D 2022]

A) Very small in size
B) Membrane-bound cell organelles present
C) Single chromosome
D) Nuclear region known as nucleoid

55. Why are mitochondria considered as a 'weird' organelle? [RRB Group D 2022]

A) Because they contain ribosomes and DNA
B) Because they are the power-house of the cell
C) Because they are the store of cellular contents
D) Because they can digest microorganisms

56. How many autosomes will be present in a sexually reproducing organism with the chromosome number 2n = 18? [RRB Group D 2022]

A) 18
B) 16
C) 15
D) 17

57. The process of division of a cell into two identical daughter cells is called? [RRB Group D 2018]

A) Multiple fragmentation
B) Bifurcation
C) Revival
D) Spore formation

58. In which of the following processes, the cell is involved in the generation of an exact copy of another living part or a complete organism? [RRB Group D 2018]

A) Cloning
B) In vitro fertilization (IVF)
C) Fructification
D) Regeneration

59. Ancient hominids who are placed in the category of homo sapiens were -

A. Ergaster line
B. Cro - Magnon
C. Neanderthal
D. Proconsuls

[RRB NTPC 2016]

A) D
B) B
C) C
D) A

60. _____ affects the atoms in living cells and thereby damages their genetic material (DNA). [RRB ALP 2019]

A) Chlorinated water
B) Chloroform
C) Benzene vapours
D) Ionising radiation

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ans	C	B	D	A	C	C	D	C	A	B	B	B	A	B
Q.	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Ans	B	A	D	C	C	D	C	B	A	C	A	C	A	A
Q.	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Ans	A	D	B	D	A	B	C	A	D	B	A	D	A	A
Q.	43	44	45	46	47	48	49	50	51	52	53	54	55	56
Ans	D	B	D	B	D	C	A	A	D	D	B	B	A	B
Q.	57	58	59	60										
Ans	B	A	B	D										

SOLUTIONS

1. A cell is the smallest unit capable of independent existence which can reproduce itself. All living organisms, except for viruses, are composed of one or more cells. Single-cell organisms; such as, bacteria, protozoa, and other micro-organisms are termed unicellular, while plants and animals that contain many cells are termed multicellular.

2. CSIR scientists have conducted a genetic study for the first time in Lakshwadeep, India. A team of researchers led by K Thangaraj at the Council of Scientific and Industrial Research (CSIR)-Centre for Cellular and Molecular Biology, Hyderabad have performed a genetic study on the Lakshadweep islanders. The genetic study on the Lakshadweep islanders took place for the first time and the results were published in scientific reports on 6 May 2019.

3. ATP stands for Adenosine Triphosphate. ATP is the energy-carrying molecule used in cells. In the respiration process, complex organic compounds such as glucose are broken down to provide energy in the form of ATP. Mitochondria produces ATP molecules, which is why it is known as the cell powerhouse. In mitochondria, energy is stored in the form of ATP. ATP acts as the energy currency of the cell.

4. Branch of science that studies cells is called Cytology. All living organisms are made up of cells. The cell was discovered in 1665. The first cells from an organism were observed by Robert Hooke.

5. Genetic engineering, a practice used to modify an organism's DNA, is synonymously known as Recombinant DNA technology. This process involves manipulating an organism's genes by introducing, removing, or altering genetic material. It differs from DNA fingerprinting, which identifies genetic sequences; DNA editing, focusing on specific gene

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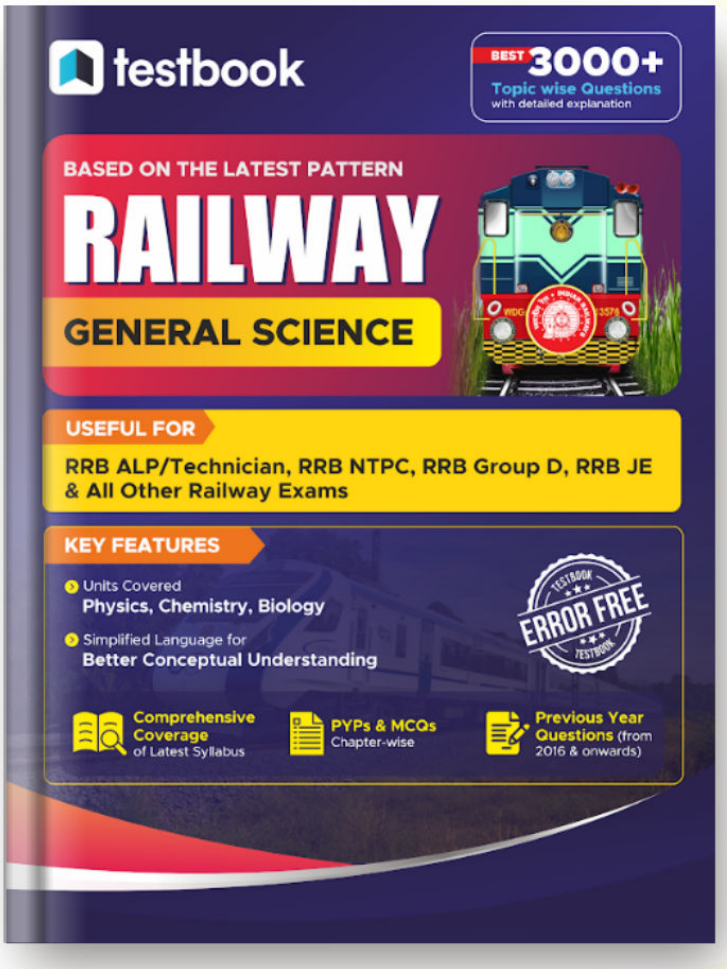

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modifications; and gene therapy, aimed at treating diseases by altering genes. Recombinant DNA technology encompasses a broader range of genetic manipulation techniques.

6. Lysosomes are a kind of waste disposal system of the cell. They help to keep the cell clean by digesting any foreign materials as well as worn-out cell organelles.

7. Mitosis is a kind of cell division in which one cell (the mother) divides to generate two genetically identical new cells (the daughters). Mitosis is the stage of the cell cycle's division process in which the DNA of the cell's nucleus is split into two equal sets of chromosomes. In Metaphase the chromosomes are perfectly lined up end-to-end along the cell's equator. The mitotic spindle threads extend from the centrioles, which are now at opposing poles of the cell.

8. Lysosomes are membrane-bound vesicular structures formed by the process of packaging in the Golgi apparatus. These are also called "Suicidal bags" because of their phagocytic activity. Lysosome keeps the cell clean by digesting any foreign material as well as worn-out cell organelles.

9. There are 46 chromosomes in all, divided into 23 pairs in humans.These 22 which are the same for both males and females are referred to as the autosomes.There are differences between the sexes in the 23rd pair of chromosomes, or allosomes, which is the sex chromosome.When compared to females, who have two copies of the chromosome (44A + XX), males only have one and one chromosome (44A+ XY).

10. The proteins synthesized by the proteins in mitochondria are utilized to generate adenosine triphosphate (ATP) from the food. This ATP acts as the energy currency of the cell, because of which the whole cell and body get energy. Thus, mitochondria are called the powerhouse of the cells. This happens by breaking down food substances such as carbohydrates and fats in the presence of oxygen. The ribosomes are non-membrane-bound organelles that help in the synthesis of proteins.

11. The transformation of the larva into an adult through drastic changes is called metamorphosis. It is a biological process that involves sudden and abrupt changes in the body structure of the animal by cell growth and differentiation. It is generally observed in amphibians and insects. Complete metamorphosis is seen in butterflies. Complete metamorphosis consists of a very active, ravenously eating larval stage and an inactive pupa stage while the incomplete metamorphosis has a nymph, which very closely resembles the adult.

12. In Mendel's experiment, the F1 generation results from the cross-pollination of two-parent (P) plants and contains all purple flowers. The F2 generation results from the Self-pollination of F1 plants and contains 75% purple flowers and 25% white flowers (PHENOTYPE). The GENOTYPE was 25% pure purple flower, 50% hybrid purple flower, and 25% pure white flower. PHENOTYPIC RATIO - 3:1 GENOTYPIC RATIO - 1:2:1

13. The nuclear envelope or nuclear membrane is a two-layered membrane that wraps around and covers each nucleus. It separates the cytoplasm from the nucleoplasm, which is the fluid in the nucleus. Both plant and animal cells contain the nuclear membrane. Numerous functions are carried out by cells, including the creation of proteins, the transformation of molecules into energy, and the elimination of waste products.

14. Osmosis is the process by which solvent molecules move through a semi-permeable membrane from a solution of low concentration to one of high concentration. It is a passive process that takes place without using any energy. In a hypotonic solution, a cell will gradually inflate and grow until it bursts. It can occur in any solvent, including gases and supercritical liquids.

15. A total of 46 chromosomes make up a human, including one pair of XX or XY chromosomes and 22 pairs of numbered chromosomes called autosomes. Sex chromosomes, the 23rd pair, are different in males and females. In contrast to males, who have one X and one Y chromosome, females have two copies of the X chromosome. By size, the 22 autosomes are numbered.

16. An essential mechanism by which gases are exchanged in a cell is diffusion. The difference in concentration pressure is what primarily controls this process. As a result, the gases shift from a place of high concentration to one of low concentration. The main time that diffusion occurs in plant cells is during photosynthesis when carbon dioxide diffuses into plant cells through the stomata on the leaf.

17. Cells use and store energy in the form of ATP. It is commonly referred to as the energy currency since it readily releases energy in the bond that joins the second and third phosphate groups. Three serially connected phosphate groups, a ribose sugar, and a nitrogenous base (adenine) make up the nucleoside triphosphate (ATP) structure.

18. The mRNA provides the template for the Genetic Code. A gene is used to build a protein using the following two step process i.e. Transcription and Translation. Transcription: It is the process by which DNA is copied to mRNA, which carries the information needed for protein synthesis. Translation: It is the process that takes the information passed from DNA as messenger RNA and turns it into a series of amino acids.

19. Somatic Mutation is defined as the alteration in DNA that occurs after conception. It can occur in any of the cell body except the germ cells and therefore is not hereditary.

20. The cells of Parenchyma tissue are living and have thin cell walls. It mainly acts as a packing tissue. Collenchyma cells are also living cells. Its main function is to provide flexibility to the plants.

21. Mendel's law of dominance states that when parents with pure contrasting traits are crossed together, only one form of trait appears in the next generation. The hybrid off springs will exhibit only the dominant trait in the phenotype.

22. Cytokinin is a plant hormone. It promotes cell division in plants. Gibberellins is a plant hormone. It promotes stem elongation in plants. Auxin is a plant hormone. It promotes cell elongation in plants.

23. Darwin's theory of evolution tells us how life evolved from simple to more complex form. Evolution is a process of change happening over generations. Darwin published his theory of evolution with evidence in his book 'On the Origin of Species' in 1859. The book introduced the scientific theory of evolution over the course of generations through the process of Natural Selection.

24. Sclerenchyma is a simple permanent plant tissue. It provides mechanical stiffness and strength to the plants. It is composed of dead cells i.e non-living cells.

25. Evolution in its contemporary meaning in biology typically refers to the changes in the proportions of biological types in a population over time. Evolution is the change in the characteristics of a species over several generations and relies on the process of natural selection. Evolution relies on there being genetic variation? in a population which affects the physical characteristics (phenotype) of an organism.

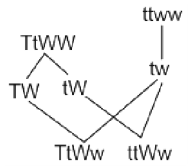
26. Analogous organs have similar functions but different origins. These are developed in widely different organisms phylogenetically due to similar habitats and modes of life, e.g., wings of insects, birds and bats, eyes of octopus and mammals.

27. Human genetics can be traced back to African origin. Paleontological and genetic evidence indicates that modern humans originated in Africa within the past 300 thousand years and spread across the globe within the last 100 thousand years. Therefore, modern humans have continuously inhabited the African continent longer than any other region.

28. The cell wall is a characteristic structure of fungi and is composed mainly of glucans, chitin, and glycoproteins. As the components of the fungal cell wall are not present in humans, this structure is an excellent target for antifungal therapy.

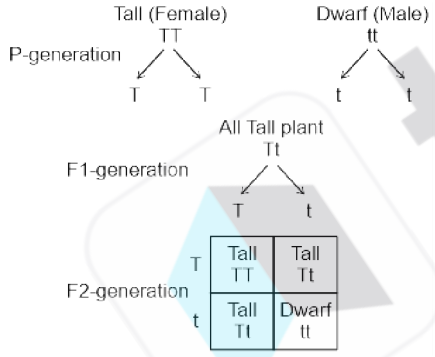
29.

If a cross is carried out between a tall parent with violet flowers (TtWW) and a short parent with white flowers (ttww), the progeny obtained is TtWw (8) : ttWw (8).



30.

To understand the idea of the purity of gametes, a monohybrid cross is taken. A monohybrid cross between pea plant-bearing axial flowers (AA) and plant-bearing terminal flowers (aa). In hybrid F1, two types of male and female gametes are formed in equal quantity.



31. The phenotypic ratio in the F2 generation is 9 : 3 : 3 : 1. In the F2 generation of Mendels dihybrid cross, the phenotypic ratio is 9:3:3:1 but here 9 and 1 represent the parental types i.e., they show the parental phenotype but 3 and 3 represent the recombinants i.e., showing one character of one parent and the other character of another parent. So, the phenotypic ratio of recombinants is 3:3 i.e., 1:1.

32. Chlamydomonas reinhardtii, a unicellular, photosynthetic green alga in the Chlamydomonadaceae, has never had a multicellular ancestor yet is closely related to the volvocine algae, which express multicellularity in colonies of up to 50,000 cells.

33. Gregor Mendel, through his experiments on pea plants, discovered the fundamental laws of inheritance. He deduced three laws from his experiments and these laws are applicable when parents are pure breeding. The three laws of inheritance proposed by Mendel include:Law of Dominance, Law of Segregation, Law of Independent Assortment

34. Plantae is a taxonomic group that includes land plants and green algae. Kingdom Plantae includes multicellular, (mostly) autotrophic eukaryotes that (usually) conduct photosynthesis.

35. Gene mutation is caused by the change in the sequence of nitrogenous bases. Gene Mutation is a change in one or more genes. It is caused by the change in one or more nucleotides of DNA.

36. Mutation is a change in a DNA sequence. It can be a result of DNA copying mistakes made during cell division, exposure to chemicals called mutagens, exposure to ionizing radiation, or infection by viruses. It is the basic source of biological diversity.

37. Genes are functional units of heredity as they are made of DNA. The chromosome is made of DNA containing many genes. Every gene comprises a particular set of instructions for a particular function or protein-coding. Speaking in usual terms, genes are responsible for heredity. There are about 30000 genes in each cell of the human body. DNA present in the gene comprises only 2 percent of the genome.

38. A variant form of a gene is known as an allele. Some genes exist in several distinct versions, all of which are found at the same genetic locus on a chromosome.

39. Men determine the sex of a baby depending on whether their sperm is carrying an X or Y chromosome. An X chromosome combines with the mother's X chromosome to make a baby girl (XX) and a Y chromosome will combine with the mother's to make a boy (XY).

40. Chromatin Material is a complex of DNA, histones, and non-histone proteins that make up the genetic material in the nucleus of a non-dividing cell. It is organized into two types of chromatin: Euchromatin is less condensed and contains actively transcribed genes. Heterochromatin is highly condensed and contains inactive genes.

41. Males have a single X and a single Y chromosome. Females can have only XX. Females will have defects related to the only X chromosome.

42. Ribonucleic acid is a polymer of nucleotides that is made up of a ribose sugar, a phosphate, and bases such as adenine (A), guanine (G), cytosine (C), and uracil (U). It has various biological roles in coding, decoding, regulation, and expression of genes.

43. Differentiation in organisms leads to a more complex origin, involving the transformation of cells into a more specialized type during the development of multicellular organisms. This process is driven by factors like adult stem cells and antigen exposure, resulting in fully differentiated daughter cells. Terminal differentiation, where precursor cells cease division, and dedifferentiation, the integration of cellular processes, are also pivotal aspects of this biological phenomenon.

44. Genes carry the information that determines your traits (say: trates), which are features or characteristics that are passed on to you — or inherited — from your parents. Each cell in the human body contains about 25,000 to 35,000 genes. DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA.

45. The mechanism of inheritance where germ cells take one chromosome from each pair and combine to restore the

normal number of chromosomes in the progeny is explained in the results of Mendel's experiments. Genes are present as units in chromosomes and a germ cell chooses one chromosome from each parent to make a single gene. Mutation, variation in chromosomal number, and speciation can also occur due to environmental factors or genetic changes.

46. Cytoplasm is a rich fluid containing water, enzymes, salts, and proteins, filling cells and enclosed by the cell membrane. It's found in both eukaryotic (organisms with a nucleus) and prokaryotic (organisms without a nucleus) cells. Glycolysis, the breakdown of glucose ($C_6H_{12}O_6$) to pyruvate releasing ATP, occurs in the cytoplasm. Additionally, cytoplasm holds cell organelles and is crucial for cellular processes, distinguishing it as a vital cellular component.

47. Chlorophyll is a green pigment that is responsible for photosynthesis in plants. Chloroplasts are organelles found in plant cells that contain chlorophyll and are responsible for photosynthesis.

48. Genetic material, either DNA or RNA, contains all information specific to an organism. DNA, found in the nucleus, forms chromosomes and has a double-stranded structure made of deoxyribonucleotides. A nucleotide consists of pentose sugar, nitrogen bases, and a phosphate group. The statement that DNA is a polynucleotide made of two components is false because a nucleotide has three components.

49. A girl child has combination of 44 autosomes + XX chromosomes. XX denotes the sex chromosomes of the girl child. Typically, human females have two X chromosomes while males possess an XY pairing. Human females are homogametic i.e., they produce same type of gametes with one X chromosome.

50. During Meiosis, the chromosome count in the daughter cell is halved, making it a Reduction division. JB Farmer and Moore introduced the term Meiosis in 1905, occurring exclusively in reproductive cells. A diploid cell divides into four haploid cells through two phases: Meiosis-I, where chromosomes are halved, and Meiosis-II, where there's no reduction in chromosome number.

51. The main difference between human cheek cells and onion peel cells under a microscope is the presence of a cell wall in onion peel cells, as they are plant cells. Cheek cells, being animal cells, lack a cell wall and plastids, which are present in plant cells. Both cell types share common organelles like cell membranes, endoplasmic reticulum, and nuclei. Cheek cells appear irregular in shape, while onion peel cells are generally rectangular.

52.

- A DNA molecule is made up of two long polynucleotide strands forming a double helical structure (double helix) just like a spiral staircase.

53. Two alleles are brought together during gamete formation: This is incorrect as per the law of segregation, which states that a pair of alleles separate during meiosis resulting in each gamete containing only one copy of an allele. This ensures genetic diversity and maintains the stability of the species' DNA.

54. The main difference between human cheek cells and onion peel cells under a microscope is the presence of a cell wall in onion cells, as they are plant cells. Cheek cells, being animal cells, lack a cell wall and plastids, which are present in plant cells. Both cell types have common organelles like cell membranes, endoplasmic reticulum, and nuclei. Plant cells have a large central vacuole and store starch, while animal cells have smaller vacuoles and store glycogen.

55. The main difference between human cheek cells and onion peel cells under a microscope is the presence of a cell wall in onion peel cells, as they are plant cells. Cheek cells, being animal cells, lack a cell wall and plastids but share common cell organelles like membranes and nuclei with plant cells. Notably, plant cells have a large central vacuole and storage material as starch, whereas animal cells have smaller vacuoles and store glycogen.

56. A sexually reproducing organism with chromosome number 2n=18 will have 16 autosomes. During meiosis, chromosomes divide into exact halves, resulting in 8 autosomes and 1 sex chromosome in each gamete. Thus, the diploid cell will have 16 autosomes and 2 sex chromosomes in total.

57. Bifurcation is the division of a cell into two identical daughter cells. Bifurcation theory explains how minor changes in a parameter can lead to significant changes in system behavior, crucial for organism function and common in biological networks like cell cycle switches. In contrast, fragmentation involves an organism breaking off and regrowing into new organisms, while regeneration allows an organism to regrow lost body parts, such as octopi regrowing arms.

58. Cloning is the process of generating a genetically identical copy of a cell or an organism, involving the generation of an exact copy of another living part or a complete organism. It occurs naturally when a cell replicates itself asexually without genetic alteration or recombination. IVF, on the other hand, is an assistive reproductive technology involving egg and sperm to create an embryo. Fructification and regeneration involve fructifying and restoring damaged or missing parts, respectively.

59. Cro-Magnon, recognized as belonging to Homo sapiens, was discovered in 1868 at a rock shelter site near Les Eyzies, France. This significant fossil represents one of the first to be identified within our species. In contrast, Homo Ergaster is an extinct archaic human species from the Early Pleistocene in Africa, and Neanderthals, another extinct archaic human species or subspecies, inhabited Eurasia until about 40,000 years ago.

60. Ionising radiation damages the genetic material (DNA) in living cells by affecting atoms, posing health risks through tissue and DNA damage. This occurs through direct action, where alpha particles, beta particles, or x-rays break DNA's base pairs, and indirect action. DNA, discovered by James Watson and Francis Crick, is vital for organism development and function, structured as a double helix of polynucleotide chains.

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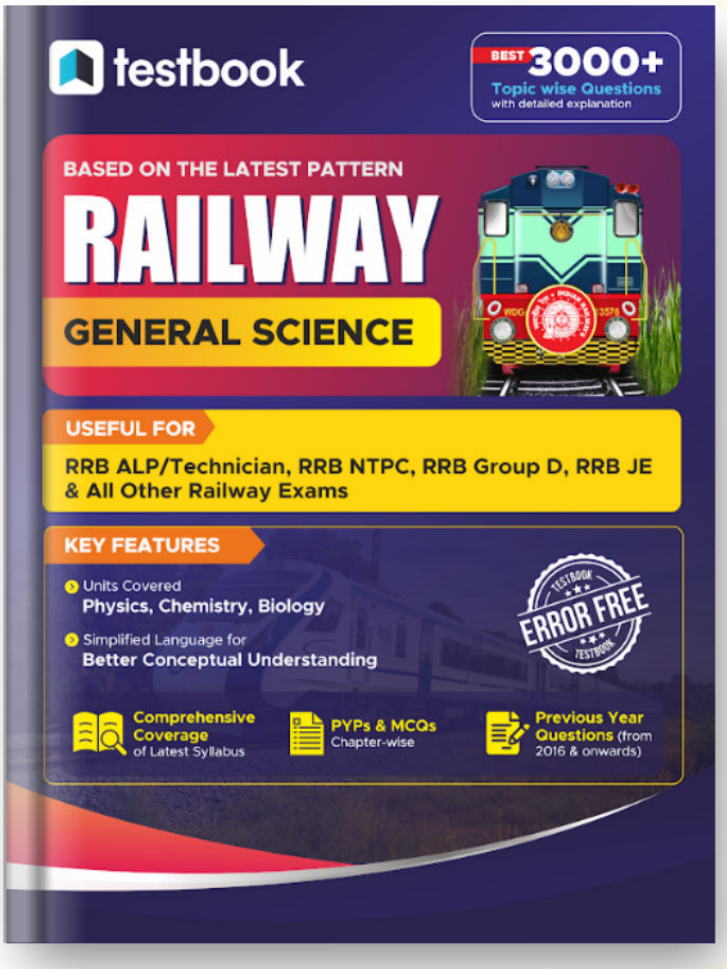

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