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which are crosses between organisms that differ with regard to two traits. He discovered that the combination of traits in the offspring of the crosses did not always match the combination of traits in the parental organism. From his data, he formulated the principle of independent Assortment.

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paper : Human Genetic

Q no : 1 :-

Fill in the blanks:

- ① (a) Denaturation (b) Annealing (c) Extension.
- ② Resting phase:
- ③ Autosomes.
- ④ law of Segregation
- ⑤ Natural Selection

Q no 2 :-

Ans: ① interphase :-

interphase is the portion of the cell cycle that is not accompanied by observable changes under the microscope and include the G₁S and G₂ phases. During interphase, the cell grows (G₁), replicates its DNA (S), and prepares for mitosis (G₂). A cell in interphase should not be confused with a cell in quiescent state, which represents most of the cell's lifetime. the term quiescent (i.e state of dormancy,

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is misleading since a quiescent cell is very busy synthesizing proteins, copying DNA into DNA, engulfing extracellular material, processing signals, to name just a few activities. Interphase is a phase of cell cycle in which a typical cell spends most of its life. During interphase the cell copies its DNA in preparation of mitosis.

(4) G₁, G₂ and G₀ phase:

G₁: The first phase of interphase is G₁ phase from the end of the previous mitosis phase until the beginning of DNA replication is called G₁ (G₁ indicating gap). It is also called the growth phase.

G₂: After S phase or replication cell then enters the G₂ phase, which lasts until the cell enters mitosis, again, significant biosynthesis occurs during this phase, mainly involving the production of microtubules, which are required during the process of mitosis.

G₀: Cell that have temporarily stopped dividing are said to have entered a state of quiescence, called G₀ phase.



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G₀ phase is viewed as neither dividing nor preparing to divide, or a distinct quiescent stage that occurs outside of the cell cycle.

(3) DNA Synthesis phase:

• cell makes a copy of its entire set of chromosome (DNA).

• Q: why is this necessary?

• Q: what would the chromosome look like now?

S phase (synthesis phase) is the phase of the cell cycle in which DNA is replicated, occurring between G₁ phase and G₂ phase. Since accurate duplication of the genome is critical to successful cell division, the processes that occur during S-phase are tightly regulated and widely conserved.

(2) Check point of cell division:

cell cycle are control mechanism in the eukaryotic cell cycle which ensure its proper progression. Each point along the cell cycle, during which the condition of the cell are assessed with progression through the various phases of the cell cycle occurring only when favorable condition are met.

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Q NO 3: Mutation and types of mutation.

Ans: Mutation: (i) Introduction:-

- Sudden heritable change in genetic material or character of an organism is known as mutation.
- Individual showing these change are known as ~~mutant~~ variant.
- Factor or agents causing mutation are known as mutagens.

(ii) History:-

English farmer Seth Wright recorded cause of mutation first time in 1791 in male lamb with unusual short legs. The term mutation is coined by Hugo de Vries in 1900 by his observation in *Oenothera*.

(iii) Characteristics of mutation:-

- Generally mutant alleles are recessive to their normal alleles.
- Most mutation have harmful effects but some mutation are beneficial.
- Spontaneous mutation occurs at very low rate.
- Some genes shows high rate of mutation such genes are called as mutable gene.
- Highly mutable sites within a gene are known as hot spots.

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Mutation can occur in any tissue cell (somatic).

Causes of Mutation:

① Spontaneous Mutation:- Spontaneous mutation occurs naturally without any cause. The rate of spontaneous mutation is very slow of eg-methylation followed by deamination of cytosine. Rate of spontaneous mutation is higher in eukaryotes than prokaryotes.

② Induced Mutation:

Mutation produced due to treatment with either a chemical or physical agent are called induced mutation.

Types of Mutation:

① Missense Mutation:- This type of mutation is a change in one DNA base pair. Instead of substituting one amino acid for another, however the altered DNA sequence prematurely signals the cell to stop building a protein. This type of mutation result in a shortened protein that may function improperly or not at all.

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② Silent Mutation: Some mutation that change DNA bases do not have any effect on the sequence of amino acids in the protein. These mutation are called silent mutations and they do not affect the structure and function of the protein because there is no effect on the amino acid sequence.

③ Nonsense Mutation: A nonsense mutation is also a change in one DNA base pair. Instead of substituting one amino acid for another, however, the altered DNA sequence prematurely signals the cell to stop building a protein. This type of mutation results in a shortened protein that may function improperly or not at all.

Q no 5. Mitosis.

Ans.: Mitosis =

" Cell division can be divided into stages.

- Interphase
- Prophase
- Metaphase
- Anaphase
- Telophase
- Cytokinesis

ii) Interphase:

The cell prepares for division.

- Animal and plant cell.
- DNA replicated (copied)
- makes new organelles
- Cell increase in size (growth)

ii) Prophase:

The cell prepares for nuclear division

- Animal and plant cell
- Chromosome appear.
- Centrioles separate and spindle form.
- Nuclear envelope disappears.
- Longest phase in mitosis.

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(i) Metaphase:

The cell prepares chromosome for division.

- Animal and plant cell chromosome line up at the middle of the cell.
- Spindle fibres attached to chromosome at the centromere.
- Shortest phase of mitosis.

(ii) Anaphase:

The chromosome divide.

- Animal and plant cell spindle fibres pull chromosome apart.
- $\frac{1}{2}$ of each chromosome (called chromatid) moves to poles of cell.

(iii) Telophase:

The cytoplasm divide.

- | | |
|---|--|
| Animal cell | Plant cells. |
| - DNA uncoils appears at chromosome again | DNA uncoils and appears as Chromatin again |
| - 2 nuclei form | - 2 nuclei form |
| - cell membrane pinches into form the 2 new daughter cells. | - new cell wall form between two nuclei form the 2 new daughter cells. |

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Q No 4 :: Model Genetics ::

Ans :: Model Genetic ::

Genetic model are valuable tools for reproducing and understanding the pathogenic mechanism linked to mutation and for identifying new potential therapeutic target

Mendel law of Segregation :: states that a diploid organism passes a randomly selected allele for a trait to its offspring, such that the offspring receives one allele from each parent. Learning objectives. Apply the Law of segregation to determine the chances of a particular genotype arising from a genetic cross.

Mendel law of Independent Assortment :: The principle of independent assortment describes how different genes independently separate from one another when reproductive cells develop. independent assortment of genes and their corresponding traits was first observed by Gregor Mendel in pea plant. Mendel was performing dihybrid crosses.

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