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Sub. Biology

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1. Mention the advantages of selecting pea plant for experiment by Mendel.

Solution:

Gregor Mendel demonstrated characters of inheritance acquired by offspring from parents. He selected pea plants for this experiment for the following reasons:

- Peas exhibit several visible contrasting features such as dwarf/tall plants, wrinkled/round seeds, yellow/green pod, white/purple flowers and so on.
- As they possess bisexual flowers, they can easily undergo self-pollination. This is why pea plants are able to produce offspring with the same traits over generations
- Cross pollination can easily be achieved through emasculation wherein the stamen of the flower is plucked without any disturbance to the pistil
- These plants have a short life span wherein they produce plenty of seeds in one generation alone

2. Differentiate between the following – (a) Dominance and Recessive (b) Homozygous and Heterozygous (c) Monohybrid and Dihybrid.

Solution:

The differences are as follows:

(a) Dominance and recessive

Dominance	Recessive
In the presence or absence of a recessive trait, dominant factor or allele expresses itself	A recessive trait expresses itself only in the absence of a dominant trait
Example: In a pea plant, round seed, violet flower are dominant characters	Example – In a pea plant, white flower, dwarf plant etc are recessive characters

(b) Homozygous and heterozygous

Homozygous	Heterozygous
For a particular trait, homozygous contains two similar alleles	For a particular trait, heterozygous contains two different alleles
Only one type of gamete is produced	It produces more than one type of gamete – two different types of gametes to be precise
For homozygous, the genotype contains either recessive or dominant never both the alleles. Example- TT or tt	For heterozygous, the genotype possesses both recessive and dominant alleles. Example – Tt

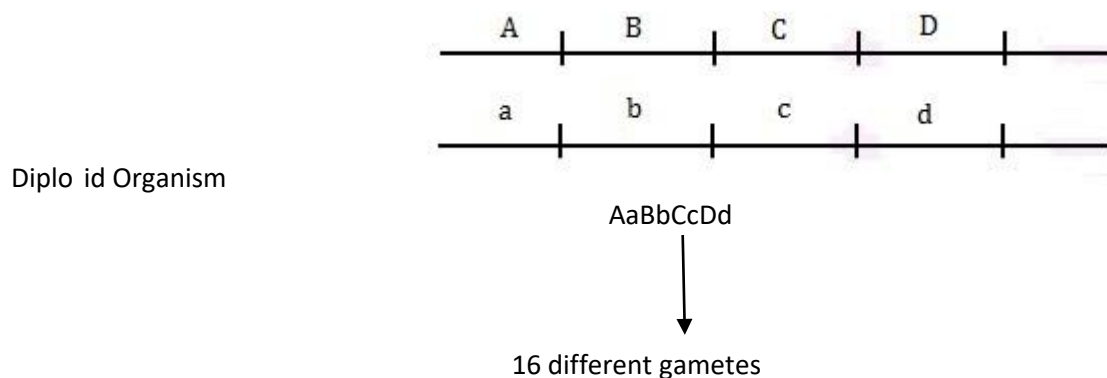
(c) Monohybrid and dihybrid

Monohybrid	Dihybrid
It is a cross between parents differing in only one pair of contrasting characters	It is a cross between parents differing in two pairs of contrasting characters
Example – a cross between a dwarf and a tall pea plant	Example – a cross between yellow wrinkled seed and a green rounded seed

3. A diploid organism is heterozygous for 4 loci, how many types of gametes can be produced?

A locus is a fixed point on a chromosome that is occupied by one or more genes. For an allelic pair, heterozygous entities contain different alleles. Thus, a diploid entity which is heterozygous at four loci has four different contrasting characters at four different loci.

Example – if an entity is heterozygous at four loci with four different characters, such as Mm, Nn, Oo, Pp, then while meiotic division they split to form 8 different gametes.



If genes are not linked to each other, then the diploid entities will produce 16 different gametes. But, if genes are linked, gametes will decrease their number as the genes may be linked which in turn will be inherited together during the meiotic cell division.