



### **BIOLOGY**

## **BOOKS - NCERT BIOLOGY (ENGLISH)**

# PRINCIPLE OF INHERITANCE AND VARIATIONS

Multiple Choice Questions Mcqs

1. All genes located on the same chromosome

A. from different groups depending upon

their relative distance

B. from one linkage group

C. will not from any linkage group

D. from interactive groups that dffect the

phenotype

Answer: B

2. Conditions of a karyotype

 $2n\pm 1 \; \mathrm{and} \; 2n\pm 2$  are called

A. aneuploidy

B. polyploidy

C. allopolyploidy

D. monosomy

Answer: A

3. Distance between the genes and percentage

of recombination shows

A. a direct relationship

B. an inverse relationship

C. a parallel relationship

D. no relationship

Answer: A

**4.** If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is

A. autosomal dominant

B. autosomal recessive

C. sex-linked dominant

D. sex-linked recessive

#### Answer: D

**5.** In sickle cell anaemia glutamic acid is replaced by valine Which one of the following triplets codes for valine ?

A.GGG

B. A A G

C. G A A

D. G U G

Answer: D



**6.** Person having genotype  $I^A I^B$  would show

the blood group as AB. Thus is because of

A. pleitropy

B. codominance

C. segregation

D. incomplete dominance

#### Answer: B

7. ZZ/ZW type of sex determination is seen in

A. platypus

B. snails

C. cockroach

D. peacock

Answer: D

8. A cross between two tall plants resulted in offspring having few dwarf plants. What would be the genotypes of both the plants ?

A. TT and Tt

B. Tt and Tt

C. TT and TT

D. Tt and tt

Answer: B

**9.** In a dihybrid crossm if you get 9:3:3:1 ratio it denotes that

A. the alleles of two genes are interacting

with each other

B. it is a multigenic inheritance

C. it is case of multiple allelism

D. the alleles of two genes are segregating

independently







**10.** Which of the following will not result in variations among siblings ?

A. Independent assortment of genes

B. Crossing over

C. Linkage

D. Mutation

Answer: C

**11.** Mendel's law of independent assortment holds good for genes situated on the

A. non-homolgous chmologous

B. homologous chromosomes

C. extra nnclear genetic element

D. same chromosome

Answer: A

**12.** Occasionally, a single gene may express more than one effect. The phenomenon is called

A. multiple allelism

B. mosaicism

C. pleiotropy

D. polygeny

Answer: C

**13.** In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome-bearing organisms are

A. males and frmales, respectively

B. femelses and males, respectively

C. all males

D. all frmales

Answer: A



**14.** The inheritance pattern of a gene over generations amoung human is studied by the pedigree analysis. Character studied in the pedigree analysis is equivalent to

A. quantitaviev trait

- B. Mendelian trait
- C. polygenic trait
- D. maternal trait

#### Answer: B



**15.** It is said thet Mendel proposed that the factor controlling any character is discrete and independen. His proposition was based on the

A. result of  $F_3$ -generation of a cross

B. observations that the offspring of a

cross made between the plants having

two contrasting characters shows only

character without any blending

C. self-pollination of  $F_1$  offsprings

D. cross-pollination of  $F_1$ -generation with

recessive parent

Answer: B

16. Two genes 'A' and 'B' are linked. In a dihybrid cross involving these two genes, the  $F_1$  heterozyogte is crossed with homozygous recessive parental type (aa bb). What would be the ratio of offspring in the next generation?

A.1:1:1:1

B. 9: 3: 3: 1

C. 3:1

D. 1:1

Answer: A



17. In the  $F_2$  generation a Mendelian dihybrid cross the number of phenotypes and genotypes are

A. phenotypes-4 genotypes-16

B. phenotypes-9, genotypes-4

C. phenotypes-4, genotypes-8

D. phenotypes-4, genotypes-9

Answer: D

**18.** Mother and father of a person with 'O' blood group have 'A' and 'B' blood group respectively. What would be the genotype of both mother and father ?

A. Mother is homozygous for 'A' blood
group and father is heterozgous for 'B'
B. Mother is heterozygous for 'A' blood
group and father is homozygous for 'B'

heterozygous for 'A' and 'B' blood group

respectively

D. Both mother and father are homozygous

for 'A' and 'B' blood group respectively

Answer: C

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Very Short Answer Type Questions

**1.** What is the cross between the progeny of  $F_1$  and the homozygous recessive parent called? How is it useful?

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**2.** Do you think Mendel's Laws of inheritance would have been different in the characters that he choose were located on the same chromosome.



**3.** Enlist the steps of controlled crosspollination. Would emasculation be needed in a cucurbit plant? Give reasons for your answer.



**4.** A person has to perform crosses for the purpose of studying inheritance of a few traits/characters. What should be the criteria for selecting the organisms?



**5.** the pedigree chart given below shows a particular trait which is absent in parents but present in the next generation irrespective of sexes. Draw your conclusion on the basis of the pedigree.





6. In order to obtain the  $F_1$ -generation Mendel pollinated a pure-breeding tall plant with a pure-breeding dwarf plant. But for getting the  $F_2$ -generatin, he simply self-pollinated the tall  $F_1$  plants. Why?

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7. Genes contain the information that is

required to express a particular trait.' Explain.

8. How are alleles of particular gene differ from each other? Explain its significance.

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**9.** In a monohybrid cross of plants with red and white flowered plants. Mendel got only red flowered plants. On self-pollinating these  $F_1$  plants got both red and white flowered plants in 3:1 ratio. Explain the basis of using RR and rr symbols to represnt the genotype of

plants of parental generation.



**10.** For the experssion of traits genes provide only the potentiality and the enivornment provides the opportunity. Comment on the veracity of the statement.

**11.** A, B, D are three independently assorting genes with their recessive alleles a,b,d respectively. A cross was made between individuals of Aa bb DD genotype with aa bb dd. Find out the type of genotypes of the offspring produced.

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**12.** In our society a woman is often blamed for not bearing male child. Do you think it is



phenotype of pea seed.

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**14.** Even if a character shows multiple allelism, an individual will only have two alleles for that character. Why?





**1.** In a Mendelian monohybrid cross, the  $F_2$ -generation shows identcal genotypic and

phenotypic ratios. What does it tell us about the nature of alleles involved? Justify your answer.

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**2.** Can a child have blood group 'O' if his parents have blood group 'A' and 'B' Explain.

**3.** What is Down's syndrome? Give its symptoms and cause. Why is it that the chances of having a child with Down's syndrome increases if the age of the mother exceeds forty years ?

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4. How was it concluded that genes are

located on chromosomes?

**5.** A plant with red flowers was crossed with another plant with yellow flowers. If F1 showed all flowers orange in colour, explain the inheritance.

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6. What are the characteristic features of a

true-breeding line?

7. In peas, tallness is dominate over dwarfness, and red colour of flowers is dominant over the white colour. When a tall plant bearing red flowers was pollinated with a dwarf plant bearing white flowers, the different phenotypic groups were obtained in the progeny in numbers mentioned against them Tall, Red = 138 Tall, White = 132 Dwarf. Red = 136Dwarf, White = 128

Mention the genotypes of the two parents

and of the four offspring types.



8. Why is the frequency of red-green colourblindness is many times higher in males than that in the females?

**9.** If a father and son are both defective in red-

greenn colour vision, is it likely that the son

inherited the trait from his father? Comment.



# **10.** Discuss why Drosophila has been used extensively for genetical studies?



**11.** How do genes and chromosomes share similarity from the point of view of genetical studies?



**12.** What is recombination? Discuss the applications of recombination from the point

of view of genetic engineering.



13. What is artificial selection? Do you think it

affects the process of natural selection? How



**14.** With the help of an example differntiate between incomplete dominance and co-dominance.



**15.** It is said, that the harmful alleles get eliminated from population over a period of time, yet sickle-cell anaemia is persisting in human population. Why?

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#### Long Answer Type Questions

**1.** In a plant tallenss is dominant over dwarfness and red flower is dominant over

white. Starting with the parents work out a dihybrid cross. What is standard dihybrid ratio? Do you think the values would deviate if the two genes in question are interacting wiht each other?

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**2.** (a) In humans, males are heterogametic and frmales are homogametic, Explain. Are there any examples where males are homogametic and females heterogametic?

(b) Also describe as to, who determines the sex of an unborn child? Mention whether temperature has a role in sex determination.

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**3.** A normal visioned woman, whose father is colour blind, marries a normal visioned man. What would be probability of her sons and daughters to be colour blind. ? Explain with the help of a pedigree chart.



**4.** Discuss in detail the contributions of Morgan and Sturvant in the area of genetics.

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5. Define an euploidy. How is it different form polyploidy? Describe the individuals having following chromosomal abnormalities.
(a) Trisomy of 21st Chromosome

(b) XXY

(c ) XO

