



## INDIAN SCHOOL AL WADI AL KABIR

<b>Class: XII</b>	<b>Department: SCIENCE 2020 – 2021</b> <b>SUBJECT : BIOLOGY</b>	<b>Date of submission:</b> <b>30.06.2020</b>
<b>Worksheet No: 05</b> <b>WITH ANSWERS</b>	<b>UNIT: GENETICS &amp; EVOLUTION</b> <b>Chapter: PRINCIPLES OF INHERITANCE AND VARIATIONS</b>	<b>Note:</b> <b>A4 FILE FORMAT</b>
<b>NAME OF THE STUDENT</b>	<b>CLASS &amp; SEC:</b>	<b>ROLL NO.</b>

### MULTIPLE CHOICE QUESTIONS

- Klinefelter's syndrome has the genetic make up
  - 44 autosomes + XXY
  - 44 autosomes + XO
  - 45 autosomes + XX
  - 45 autosomes + XY

**Ans. (a)**
- To analyse the genotype of an organism, it is made to
  - Self cross
  - Cross with recessive parent
  - Cross with dominant parent
  - Cross with another species

**Ans. (b)**
- Read the statements and find the correct one.  
'Sickle cell anemia'-----
  - is a sex linked disorder
  - is due to a single base mutation of B globin gene
  - is inherited whose one of the parent is carrier and other normal
  - changes shape of RBC from Round to concave.

**Ans. (b)**
- All genes located on the same chromosome:
  - Form different groups depending upon their relative distance
  - Form one linkage group
  - Will not form any linkage groups
  - Form interactive groups that affect the phenotype

**Ans. (b)**

5. Distance between the genes and percentage of recombination shows:
- (a) a direct relationship
  - (b) an inverse relationship
  - (c) a parallel relationship
  - (d) no relationship
- Ans. (a)**
6. 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
- Ans. (d)**
7. A cross between two tall plants resulted in offsprings having few dwarf plants. What would be the genotypes of both the parents?
- (a) TT and Tt
  - (b) Tt and Tt
  - (c) TT and TT
  - (d) Tt and tt
- Ans. (b)**
8. In a dihybrid cross, 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 a case of multiple allelism
  - (d) The alleles of two genes are segregating independently.
- Ans. (d)**
9. Which of the following will not result in variations among siblings?
- (a) Independent assortment of genes
  - (b) Crossing over
  - (c) Linkage
  - (d) Mutation
- Ans. (c)**
10. Mendel's Law of independent assortment holds good for genes situated on the:
- (a) Non-homologous chromosomes
  - (b) Homologous chromosomes
  - (c) Extra nuclear genetic element
  - (d) Same chromosome
- Ans. (a)**

## TWO MARK QUESTIONS

1. Explain the following terms:

- (a) Alleles (b) Pedigree analysis

**(Hints: (a) alternative forms of a gene, (b) study of a genetic disorder by analyzing the family history)**

- Mendel published his work on inheritance in 1865 but it remained unrecognized till 1900. Give the reasons for this.  
**(Hints: lack of communication, use of mathematics, concept of factor)**
- Human skin colour exhibits a special pattern of inheritance. Comment on it and how it varies from other Mendelian characters?  
**(Hints: Polygenic inheritance, more than one genes but in Mendelian inheritance only one gene controls one character)**
- Why is pedigree analysis done in the study of human genetics? State the conclusion that can be drawn from it.  
**(Hints: experiments cannot be conducted in humans, it explains the pattern of inheritance of genes through the family tree)**
- Linkage and crossing over of genes are alternatives of each other. Justify with the help of an example  
**(Hints: Definition of linkage and crossing over, explanation with the help of Morgan's experiment)**

### THREE MARK QUESTIONS

- ABO blood group in humans is an example for dominance, co-dominance and multiple alleles. Justify.  
**(Hints: dominance – between alleles  $I^A$  and  $i$  & between alleles  $I^B$  and  $i$ , Co-dominance – between alleles  $I^A$  and  $I^B$ , Multiple alleles – presence of more than two alleles)**
- Differentiate between:
  - Deletion and Insertion
  - XXY disorder and XO disorder
  - Aneuploidy and Polyploidy**(Hints: (a) – removal of one or two base pairs and insertion is addition of one or two base pairs; (b) – Klinefelter's and Turner's syndrome; (c)- change in one or two chromosomes – aneuploidy, change in one or more haploid set - polyploidy)**
- Write brief note on the sex determination in honey bees.  
**(Hints: explanation of haplo-diploidy, representation of cross, males – haploids and by parthenogenesis & females – diploids and by fusion)**
- Haemophilia is an example for a Mendelian disorder which is due to sex linked recessive gene. Give brief description of any other two Mendelian disorders.  
**(Hints: sickle cell anaemia/ colourblindness/Phenylketonuria – any two, explanation – type of disease, genotypes, reason, symptoms)**
- During his studies on genes in *Drosophila* that were sex-linked, T.H. Morgan found  $F_2$  population phenotypic ratios deviated from the expected 9:3:3:1. Explain the conclusion, he arrived at.

**(Hints: reasons for deviation – linkage and crossing over, explanation of the terms, relationship between both with distance between genes, mention the crosses conducted by Morgan)**

### FIVE MARK QUESTIONS

1. With the help of one example each explain male and female heterogamety.  
**(Hints: Male heterogamety – definition, example – XX – XY or XX – XO type – represent the cross, Female heterogamety – definition, example – ZW – ZZ type – represent the cross)**

2. (a) State the law of independent assortment.

(b) Using Punnett Square demonstrate the law of independent assortment in a dihybrid cross involving two heterozygous parents.

**(Hints: (a) – state the law, (b) – representation of complete dihybrid cross with Punnett square)**

3. In Snapdragon, a cross between true-breeding red flowered plant and white flowered plants showed a progeny of plants with all pink flowers.

(a) The appearance of pink flowers is not known as blending. Why?

(b) What is this phenomenon known as?

(c) Represent the cross

**(Hints: (a) – here the alleles are not interfering each other, the product produced by one dominant allele is not enough for the production of red colour and hence intermediate colour is obtained; (b) – incomplete dominance; (c) – representation of incomplete dominance)**

4. Name the respective pattern of inheritance where  $F_1$  phenotype,

(a) Does not resemble either of the two parents and is in between the two.

(b) Resembles only one of the two parents.

Represent the cross also.

**(Hints: (a) – incomplete dominance, example and representation of cross; (b) – complete dominance, example, representation of monohybrid cross)**

5. Write notes on deviations from Mendelian pattern of inheritance

**(Hints: explanation and representation of any two deviations in detail – multiple alleles, co-dominance, polygenic inheritance, pleiotropy)**

## PREVIOUS BOARD QUESTIONS

1. In a typical monohybrid cross the  $F_2$  population ratio is written as 3:1 for phenotype but expressed as 1:2:1 for genotype. Explain with the help of an example.  
**(Hints: representation of a typical monohybrid cross and mention the phenotypic and genotypic ratio)**
2. Recently a girl baby has been reported to suffer from haemophilia. How is it possible? Explain with the help of a cross.  
**(Hints: haemophilia – sex linked recessive disorder, rarely found in females, two conditions for females being haemophilic – haemophilic father and carrier mother, both parents haemophilic, representation of both conditions with the help of cross )**
3. Pea seeds with BB alleles have round seeds and large starch grains, while seeds with bb alleles have wrinkled seeds with small starch grains. Work out the cross between these two parents. Explain the phenotypic ratio of the progeny with respect to seed shape and the starch grain size of the progeny produced.  
**(Hints: It is an example for pleiotropy, seed shape shows typical dominance and starch grain exhibits incomplete dominance, representation of cross, mention genotypic and phenotypic ratio for both characters)**
4. (a) Work out a cross up to  $F_2$  generation between two pure breeding pea plants, one bearing violet flowers and the other white flowers.  
(b) (i) Name this type of cross.  
(ii) State the different laws of Mendel that can be derived from such a cross.  
**(Hints: (a) – Representation of cross – monohybrid, mention phenotypic and genotypic ratio; (b) (i) monohybrid cross; (ii) state law of dominance and law of segregation)**
5. (a) Do you agree to the perception in our society that the woman is responsible for the gender of the offspring? Substantiate your answer scientifically.  
(b) How did Morgan explain linkage of genes?  
**(Hints: (a) – No, explanation of sex determination mechanism in humans, male heterogamety, justification; (b) linkage – definition, relationship between linkage and distance between genes, result of linkage)**

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***CHECKED BY : HOD- SCIENCE***