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|  | INDIAN SCHOOL AL WADI AL KABIR |  |
| Class: XII | Department: SCIENCE 2021 - 22 SUBJECT : BIOLOGY | Date of submission: 16.052021 |
| Worksheet No: 04 WITH ANSWERS | UNIT: GENETICS & EVOLUTION Chapter: PRINCIPLES OF INHERITANCE AND VARIATIONS | Note: A4 FILE FORMAT |
| NAME OF THE STUDENT | CLASS & SEC: | ROLL NO. |

ONE MARK QUESTIONS

1. Give the genetic make-up of Klinefelter's syndrome.
2. Crossing with a recessive parent which helps to analyse the genotype of an organism is known as ----
3. What do you mean by linkage groups?
4. If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is -----
5. Name the law which Mendel proposed after two gene inheritance

TWO MARK QUESTIONS

1. Explain the following terms:
(a) Alleles (b) Pedigree analysis
2. Mendel published his work on inheritance in 1865 but it remained unrecognized till 1900. Give the reasons for this.
3. Human skin colour exhibits a special pattern of inheritance. Comment on it and how it varies from other Mendelian characters?
4. Why is pedigree analysis done in the study of human genetics? State the conclusion that can be drawn from it.
5. Linkage and crossing over of genes are alternatives of each other. Justify with the help of an example

THREE MARK QUESTIONS

1. ABO blood group in humans is an example for dominance, co-dominance and multiple alleles. Justify.
2. Differentiate between:
 - (a) Deletion and Insertion
 - (b) XXY disorder and XO disorder
 - (c) Aneuploidy and Polyploidy
3. Write brief note on the sex determination in honey bees.
4. 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.
5. During his studies on genes in *Drosophila* that were sex-linked, T.H. Morgan found F₂ population phenotypic ratios deviated from the expected 9:3:3:1. Explain the conclusion, he arrived at.

FIVE MARK QUESTIONS

1. With the help of one example each explain male and female heterogamety.
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.
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
4. Name the respective pattern of inheritance where F₁ phenotype, Represent the cross also.
 - (a) Does not resemble either of the two parents and is in between the two.
 - (b) Resembles only one of the two parents.
5. Write notes on deviations from Mendelian pattern of inheritance

PREVIOUS BOARD QUESTIONS

1. In a typical monohybrid cross the F₂ population ratio is written as 3:1 for phenotype but expressed as 1:2:1 for genotype. Explain with the help of an example.
2. Recently a girl baby has been reported to suffer from haemophilia. How is it possible? Explain with the help of a 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.

4. (a) Work out a cross up to F₂ 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.
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?

ANSWER KEY (Hints)

ONE MARK QUESTIONS

- 1. 44AA + XXY**
- 2. Test cross**
- 3. Genes located on same chromosome forms the linkage group**
- 4. Sex-linked recessive**
- 5. Law of Independent Assortment**

TWO MARK QUESTIONS

- 1. (Hints: (a) alternative forms of a gene, (b) study of a genetic disorder by analyzing the family history)**
- 2. (Hints: lack of communication, use of mathematics, concept of factor)**
- 3. (Hints: Polygenic inheritance, more than one gene but in Mendelian inheritance only one gene controls one character)**
- 4. (Hints: experiments cannot be conducted in humans, it explains the pattern of inheritance of genes through the family tree)**
- 5. (Hints: Definition of linkage and crossing over, explanation with the help of Morgan's experiment)**

THREE MARK QUESTIONS

- 1. (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)**
- 2. (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)**
- 3. (Hints: explanation of haplo-diploidy, representation of cross, males – haploids and by parthenogenesis & females – diploids and by fusion)**

4. (Hints: sickle cell anemia/ colourblindness/Phenylketonuria – any two, explanation – type of disease, genotypes, reason, symptoms)
5. (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. (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. (Hints: (a) – state the law, (b) – representation of complete dihybrid cross with Punnett square)
3. (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. (Hints: (a) – incomplete dominance, example and representation of cross; (b) – complete dominance, example, representation of monohybrid cross)
5. (Hints: explanation and representation of any two deviations in detail – multiple alleles, co-dominance, polygenic inheritance, pleiotropy)

PREVIOUS BOARD QUESTIONS

1. (Hints: representation of a typical monohybrid cross and mention the phenotypic and genotypic ratio)
2. (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. (Hints: (a) – Representation of cross – monohybrid, mention phenotypic and genotypic ratio; (b) (i) monohybrid cross; (ii) state law of dominance and law of segregation)
4. (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)
5. (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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