

## Worksheet

### Biology XII

- 1) Write the percentage of the pea plants that would be heterozygous tall in the F<sub>2</sub> generation, when tall heterozygous F<sub>1</sub> pea plants are selfed.
- 2) In a test cross progeny of pea plants, all were bearing violet flowers. Give the genotypes of the parent pea plants.
- 3) Name the respective pattern of inheritance where F<sub>1</sub> phenotype does not resemble either of the two parents and is in between the two. resembles only one of the two parents.
- 4) In a dihybrid cross, would the proportion of parental gene combination be much higher than non-parental types, as experimentally shown by Morgan and his group? When the two genes show linkage Write the possible genotypes Mendel got when he crossed F<sub>1</sub> tall pea plant with a dwarf pea plant.
- 5) Why in a test cross, did Mendel cross a tall pea plant with a dwarf pea plant only?
- 6) Name the event during cell division cycle that results in the gain or loss of chromosomes.
- 7) Name an autosomal dominant and one autosomal recessive Mendelian disorder in humans.
- 8) Write the genotype of an individual who is carrier of sickle-cell anaemia gene, but apparently unaffected and an individual affected with the disease.
- 9) Human being suffering from Down's syndrome shows trisomy of 21st chromosome. Mention the cause of this chromosomal abnormality.
- 10) What is heterogamety? Give an example of an organism showing it.
- 11) Gene I that controls the ABO blood grouping in human beings has three alleles I<sup>A</sup>, I<sup>B</sup> and i. How many different genotypes are likely to be present in the human population? Also, how many phenotypes are possibly present?
- 12) Mention the type of allele that expresses itself only in homozygous state in an organism.
- 13) A mother with blood group 'O' has a foetus with blood group 'A', father is also 'A'. If the genes of the both the parents are inherited then the foetus should be a mixture of both the parents i.e. half 'O' and half 'A'. Since the foetus is 'A', how can you explain the situation?
- 14) What is the advantage of presence of sickle allele in the heterozygous condition?

**SHORT ANSWER TYPE QUESTIONS (2marks )**

15) A cross is made between different homozygous pea plants for contrasting flower positions.

Find out the position of flowers in F<sub>1</sub> generation on the basis of genotypes.  
Work out the cross up to F<sub>2</sub> generation.

Compute the relative fraction of various genotypes in the F<sub>2</sub> generation?

16) In a typical monohybrid cross the F<sub>2</sub>- population ratio is written as 3 : 1 for phenotype but expressed as 1 : 2 : 1 for genotype. Explain with the help of an example.

17) When a tall pea-plant was selfed, it produced one-fourth of its progeny as dwarf. Explain with the help of a cross.

18) A cross between a red flower-bearing plant and a white flower-bearing of *Antirrhinum* produced all plants having pink flowers. Work out a cross to explain how this is possible.

19) In Snapdragon a cross between true-breeding red flowered (RR) plants and true-breeding white flowered (rr) plants showed a progeny of plants with all pink flowers.

The appearance of pink flowers is not known as blending. Why?  
What is this phenomenon known as?

20) Work out a cross to find the genotype of a tall plant. Name the type of cross.

21) How does a test-cross help in identifying the genotype of the organism? Explain.

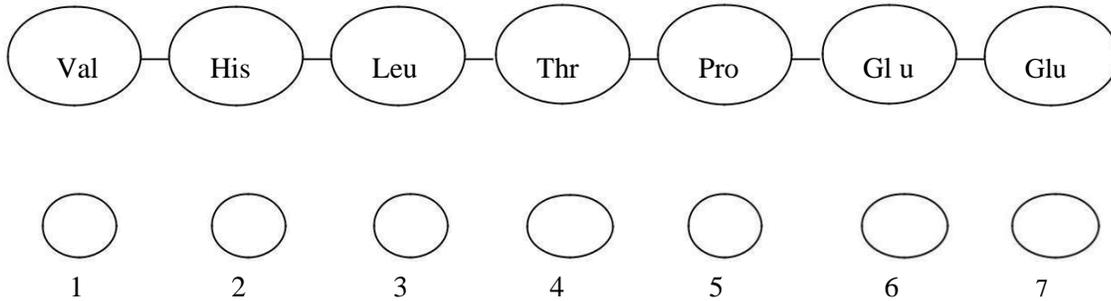
22) With the help of a Punnett square, find the percentage of heterozygous tall plants in a F<sub>2</sub> population involving a true-breeding tall and a true breeding dwarf pea plant.

23) Tallness of pea plant is a dominant trait while dwarfness is the alternate recessive trait. When a pureline tall is crossed with a pureline dwarf, what fraction of tall plants in F<sub>2</sub> shall be heterozygous? Give reasons

24) Differentiate between multiple allelism and pleiotropy, with the help of an example each.

**SHORT ANSWER TYPE QUESTIONS (3marks)**

**25) A relevant portion of B-chain of haemo-globin of a normal human is given below:**



**The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and to GUG as a result of mutation 'B'. Hemoglobin structure did not change as a result of mutation 'A' whereas hemoglobin structure changed due to mutation 'B' leading to sickle-shaped RBCs. Explain giving reasons how could mutation 'B' change the haemoglobin structure and not mutation 'A'.**

**26) Write the scientific name of the fruit-fly. Why did Morgan prefer to work with fruit-flies for his experiments? State any three reasons.**

**27) Why is pedigree analysis done in the study of human genetics? State the conclusions that can be drawn from it.**