SmartKalike

CBSE Class 12 · Biology

Principles of Inheritance and Variation

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

For how long did Mendel conduct hybridisation experiments on garden peas before proposing laws of inheritance?

A. 1856–1863
B. 1846–1853
C. 1865–1872
D. 1875–1882

Answer

(A) 1856–1863 — Mendel conducted hybridisation experiments on garden peas for seven years.

Q2. 1.5 marks · Short answer

State two features of Mendel's experimental approach that supported his conclusions about inheritance.

Answer

1. Mendel applied statistical analysis and mathematical logic to biological problems and used a large sampling size, giving greater credibility to his data.
2. He confirmed his inferences through experiments on successive generations, showing that his results pointed to general rules of inheritance.

Q3. 2 marks · Short answer

State the law of segregation and explain what each gamete receives during gamete formation.

Answer

The law of segregation states that the alleles of a pair separate during gamete formation. Each gamete receives only one allele; alleles do not blend, and both characters can be recovered in the F_2 generation.

Q4. 3 marks · Medium answer

Describe the haplodiploid sex-determination system in honey bees. Include how fertilised and unfertilised eggs develop and the chromosome numbers and ploidy of females and males.

Answer

1. In honey bees, sex determination is based on the number of sets of chromosomes an individual receives.
2. An offspring formed from the union of a sperm and an egg develops as a female (queen or worker), whereas an unfertilised egg develops as a male (drone) by parthenogenesis.

3. Females are diploid, with 32 chromosomes, and males are haploid, with 16 chromosomes.

Q5. 4 marks · Long answer

What is pedigree analysis? Explain how representing a trait in a family tree over generations provides an alternative to controlled crosses for studying inheritance in humans.

Answer

Pedigree analysis traces the inheritance of a particular trait through a family tree over generations.
1. Controlled crosses, which can be performed in pea plants or some other organisms, are not possible in human beings. Therefore, direct experimental crosses cannot be used to study human inheritance.
2. The family history of a particular trait provides an alternative. Records of the trait among family members allow its inheritance to be followed across generations.
3. In pedigree analysis, the inheritance pattern of the trait is represented in a family tree over several generations. The representation makes it possible to examine how the trait passes between family members.
4. Pedigree study can trace a specific trait, abnormality or disease in human genetics. It can also help reveal whether an inherited trait is associated with an altered gene or chromosome.
Thus, pedigree analysis is a useful method for studying inheritance in humans.

Q6. 5 marks · Long answer

Define a true-breeding line. Describe how Mendel selected pea varieties for his crosses, and give examples of contrasting traits he studied.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/biology/principles-of-inheritance-and-variation

Q7. 6 marks · Very long answer

Explain why the law of segregation shows that alleles do not blend. Describe the kinds and proportions of gametes produced by homozygous and heterozygous parents.

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Q8. 1 mark · Multiple choice

In a dihybrid cross involving seed shape and seed colour, which is the expected F_2 phenotypic ratio for round yellow, wrinkled yellow, round green and wrinkled green plants?
(A) 9:3:3:1
(B) 3:1:3:1
(C) 1:2:1:2
(D) 9:3:1:3

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/biology/principles-of-inheritance-and-variation

Q9. 1.5 marks · Short answer

State the law of dominance, explaining what happens when a pair of factors is dissimilar. How do factors occur in relation to a character?

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Q10. 2 marks · Short answer

How can a functioning allele and a modified, non-functional allele account for the phenotype of an individual?

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