



Multiple Choice Questions on Genetics

- (1). The principle of independent assortment was first formulated by:
 - (a). Watson
 - (b). Mendel
 - (c). Crick
 - (d). Morgan

- (2). Which of the following is an example of codominance?
 - (a). ABO blood groups
 - (b). Pea plant flower color
 - (c). Sickle cell anemia
 - (d). Huntington's disease

- (3). The Hardy-Weinberg equilibrium requires all of the following EXCEPT:
 - (a). Large population size
 - (b). No mutation
 - (c). Migration
 - (d). Random mating

- (4). The genetic code is said to be degenerate because:
 - (a). A single codon can code for multiple amino acids
 - (b). Multiple codons can code for the same amino acid
 - (c). Codons are composed of nucleotides
 - (d). Each codon codes for only one amino acid

- (5). Which of the following is NOT a mechanism of genetic recombination in bacteria?
 - (a). Conjugation
 - (b). Transformation
 - (c). Transduction
 - (d). Mutation

- (6). The enzyme responsible for unwinding the DNA helix during replication is:

- (a). DNA polymerase
 - (b). Helicase
 - (c). Ligase
 - (d). Primase
- (7). Which of the following represents a transition mutation?
- (a). A to T
 - (b). G to C
 - (c). A to G
 - (d). C to T
- (8). The phenomenon where one gene affects multiple phenotypic traits is called:
- (a). Pleiotropy
 - (b). Epistasis
 - (c). Polygeny
 - (d). Incomplete dominance
- (9). In a dihybrid cross, the phenotypic ratio in the F2 generation typically follows:
- (a). 9:3:3:1
 - (b). 3:1
 - (c). 1:2:1
 - (d). 2:1
- (10). The concept of "one gene, one enzyme" was proposed by:
- (a). Watson and Crick
 - (b). Beadle and Tatum
 - (c). Avery and Griffith
 - (d). Hershey and Chase
- (11). Which of the following is NOT true about mitochondrial DNA?
- (a). It is maternally inherited
 - (b). It is circular
 - (c). It undergoes recombination
 - (d). It has a high mutation rate
- (12). Genetic drift is most likely to occur in:
- (a). Large populations
 - (b). Small populations
 - (c). Populations with high gene flow
 - (d). Populations under natural selection
- (13). In genetic mapping, the unit of measurement for distance between genes is:

- (a). Kilobases
- (b). Centimorgans
- (c). Base pairs
- (d). Megabases

(14). Which of the following processes leads to the formation of a Barr body?

- (a). Dosage compensation
- (b). Genetic imprinting
- (c). Mutation
- (d). Chromosome duplication

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(15). Which of the following is an example of a frameshift mutation?

- (a). Insertion of a single nucleotide
- (b). Transition mutation
- (c). Transversion mutation
- (d). Synonymous substitution

(16). Which of the following statements is true about linked genes?

- (a). They assort independently
- (b). They are always on different chromosomes
- (c). They tend to be inherited together
- (d). They undergo crossing over frequently

(17). Which of the following enzymes is involved in the synthesis of the RNA primer during DNA replication?

- (a). Helicase
 - (b). DNA polymerase
 - (c). Primase
 - (d). Ligase
- (18). Which type of RNA is responsible for bringing amino acids to the ribosome?
- (a). mRNA
 - (b). rRNA
 - (c). tRNA
 - (d). snRNA
- (19). The chromosomal theory of inheritance was proposed by:
- (a). Sutton and Boveri
 - (b). Mendel
 - (c). Watson and Crick
 - (d). Morgan
- (20). Which of the following statements about genetic recombination is correct?
- (a). It only occurs during mitosis
 - (b). It increases genetic diversity
 - (c). It decreases genetic diversity
 - (d). It occurs only in prokaryotes
- (21). Which of the following is a characteristic of the lac operon in *E. coli*?
- (a). It is always active
 - (b). It is inducible
 - (c). It is repressible
 - (d). It is constitutive
- (22). The term "genotype" refers to:
- (a). The physical appearance of an organism
 - (b). The set of alleles an organism has
 - (c). The evolutionary history of an organism
 - (d). The proteins expressed by an organism
- (23). Which of the following is an example of a nonsense mutation?
- (a). A mutation that changes a codon to one that encodes a different amino acid
 - (b). A mutation that results in a premature stop codon
 - (c). A mutation that adds a nucleotide into the sequence
 - (d). A mutation that occurs in the intronic region
- (24). Epigenetic modifications include all of the following EXCEPT:

- (a). DNA methylation
- (b). Histone modification
- (c). RNA interference
- (d). Point mutation

(25). In humans, the SRY gene is located on the:

- (a). X chromosome
- (b). Y chromosome
- (c). Autosomes
- (d). Mitochondrial DNA

Answer Key

(1). **(b) Mendel**

Gregor Mendel first formulated the principle of independent assortment through his work on pea plants.

(2). **(a) ABO blood groups**

The ABO blood group system is an example of codominance where both A and B alleles are expressed.

(3). **(c) Migration**

Hardy-Weinberg equilibrium assumes no migration, as migration introduces new alleles into the population.

(4). **(b) Multiple codons can code for the same amino acid**

The genetic code is degenerate because more than one codon can specify the same amino acid.

(5). **(d) Mutation**

Mutation is not a mechanism of genetic recombination but rather a source of genetic variation.

(6). **(b) Helicase**

Helicase is the enzyme that unwinds the DNA helix during replication.

(7). **(c) A to G**

A transition mutation refers to a purine-purine or pyrimidine-pyrimidine substitution, like A to G.

(8). **(a) Pleiotropy**

Pleiotropy occurs when one gene influences multiple phenotypic traits.

(9). **(a) 9:3:3:1**

A dihybrid cross typically results in a 9:3:3:1 phenotypic ratio in the F₂ generation.

(10). **(b) Beadle and Tatum**

Beadle and Tatum proposed the "one gene, one enzyme" hypothesis through their experiments on Neurospora.

(11). **(c) It undergoes recombination**

Mitochondrial DNA does not undergo recombination; it is inherited as a unit.

(12). **(b) Small populations**

Genetic drift is most significant in small populations where random changes in allele frequencies can occur more easily.

(13). **(b) Centimorgans**

Centimorgans are the units used in genetic mapping to measure the distance between genes.

(14). **(a) Dosage compensation**

The formation of a Barr body is a result of dosage compensation, where one X chromosome in females becomes inactivated.

(15). **(a) Insertion of a single nucleotide**

A frameshift mutation occurs due to the insertion or deletion of nucleotides that alters the reading frame.

(16). **(c) They tend to be inherited together**

Linked genes are located close together on the same chromosome and are usually inherited together.

(17). **(c) Primase**

Primase synthesizes the RNA primer required for DNA polymerase to begin replication.

(18). **(c) tRNA**

tRNA is responsible for bringing amino acids to the ribosome during protein synthesis.

(19). **(a) Sutton and Boveri**

The chromosomal theory of inheritance was proposed by Sutton and Boveri, linking Mendel's laws to chromosomes.

(20). **(b) It increases genetic diversity**

Genetic recombination increases genetic diversity by creating new combinations of alleles.

(21). **(b) It is inducible**

The lac operon in E. coli is an inducible system that is activated in the presence of lactose.

(22). **(b) The set of alleles an organism has**

The genotype refers to the specific alleles present in an organism's genetic makeup.

(23). **(b) A mutation that results in a premature stop codon**

A nonsense mutation is one that changes a codon into a stop codon, leading to a truncated protein.

(24). **(d) Point mutation**

Point mutations are changes in a single nucleotide and are not considered epigenetic modifications.

(25). **(b) Y chromosome**

The SRY gene, which determines male sex development, is located on the Y chromosome in humans.

