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CLASS 10 • BIOLOGY

CHAPTER 15: INHERITANCE

Solved MCQs with detailed
explanations

85

Solved MCQs

8

Topic Sections



Answers Ticked



01 Introduction to Genetics & DNA Structure**10 MCQs**

1 What is the branch of biology that specifically deals with the study of inheritance?

A Evolution

B Genetics ✓

C Ecology

D Paleontology

★ **Explanation**

Correct Answer: B

Genetics is the precise branch of biology that focuses on how traits are transmitted from parents to offspring. While evolution deals with changes in populations over time, genetics is the foundational mechanism that drives those changes.

2 Which of the following is considered an inheritable trait in humans?

A Intelligence

B Eye colour

C Height

D All of the above ✓

★ **Explanation**

Correct Answer: D

The text explicitly states that height, eye colour, and intelligence are all inheritable traits. While environmental factors also play a role, the genetic blueprint for these characteristics is passed down from parents to offspring.

3

How many total chromosomes are present in a normal human body cell?

A 23

B 46



C 48

D 44

★ Explanation

Correct Answer: B

Human body cells contain 23 pairs of homologous chromosomes. Since each pair consists of 2 chromosomes, the total number is $23 \times 2 = 46$ chromosomes.

4

The two chromosomes of a pair that are similar in structure and carry genes for the same traits are called:

A Gametes

B Nucleosomes

C Homologous chromosomes



D Chromatids

★ Explanation

Correct Answer: C

Homologous chromosomes are pairs where one chromosome comes from the mother and the other from the father. They carry the same genes at the same locations (loci), though they may have different alleles.

5

What is the structural unit of chromatin that looks like "beads on a string"?

A Nucleosome



B Histone

C Double helix

D Gene

★ **Explanation**

Correct Answer: A

Chromatin is made of DNA wrapped around proteins called histones, forming bead-like structures known as nucleosomes. The DNA connecting these nucleosomes forms the "string" in the "beads on a string" analogy.

6

Which proteins are primarily responsible for packaging DNA into chromatin?

A Nucleotides

B Histones



C Ribosomes

D Enzymes

★ **Explanation**

Correct Answer: B

The text specifically notes that chromatin is a complex material made of DNA and proteins, mainly histone proteins. DNA wraps around these positively charged histones to condense into a compact structure.

7

Who proposed the double-helix model of DNA in 1953?

A Gregor Mendel and Charles Darwin

B James Watson and Francis Crick ✓

C C. de Buffon and J. de Lamarck

D R.C. Punnett and T.H. Morgan

★ **Explanation**

Correct Answer: B

James Watson and Francis Crick are credited with proposing the revolutionary double-helix structure of DNA in 1953, which explained how genetic information is stored and replicated.

8

In the Watson-Crick model, the nitrogenous bases are located:

A On the outside of the double helix

B On the inside of the double helix ✓

C Forming the phosphate-sugar backbone

D Attached to the histones

★ **Explanation**

Correct Answer: B

The model describes the structure as a twisted ladder where the phosphate-sugar backbone forms the outer handrails (outside), while the nitrogenous bases pair in the interior (inside) to form the rungs of the ladder.

9 Which nitrogenous base pairs with Guanine in DNA?

A Adenine

B Thymine

C Cytosine



D Uracil

★ **Explanation**

Correct Answer: C

Based on the specific base pairing rules in DNA, Guanine (a purine) always forms hydrogen bonds with Cytosine (a pyrimidine).

10 How many hydrogen bonds are formed between Adenine and Thymine?

A 1

B 2



C 3

D 4

★ **Explanation**

Correct Answer: B

Adenine and Thymine are held together by two hydrogen bonds, whereas Cytosine and Guanine are held together by three. This difference contributes to the stability of the DNA molecule.

02

DNA Replication & Protein Synthesis (Central Dogma)

10 MCQs

11

What is the process of making an identical copy of DNA before cell division called?

A Transcription

B Translation

C Replication



D Mutation

★ **Explanation**

Correct Answer: C

DNA replication occurs before a cell divides to ensure that each new daughter cell receives a complete and identical set of genetic instructions.

12

During DNA replication, the double helix unwinds, and the separated strands act as:

A Templates



B Enzymes

C Nucleotides

D Ribosomes

★ **Explanation**

Correct Answer: A

The separated parental strands act as templates. Free-floating nucleotides pair with the exposed bases on each template strand, resulting in two new DNA molecules, each containing one old and one new strand (semi-conservative replication).

13 The process of synthesizing mRNA from a DNA template is called:

A Replication

B Transcription ✓

C Translation

D Transformation

★ **Explanation**

Correct Answer: B

Transcription is the first step of gene expression, where the specific sequence of DNA nucleotides is copied into a complementary strand of messenger RNA (mRNA).

14 Where does the process of translation occur within the cell?

A In the nucleus

B On the ribosomes ✓

C Inside the mitochondria

D On the cell membrane

★ **Explanation**

Correct Answer: B

The text states that the mRNA carries the genetic sequence to the ribosome. The ribosome reads this sequence and joins specific amino acids to form a protein; this process is known as translation.

15 What is the Central Dogma of molecular biology?

A DNA → Protein → RNA

B RNA → DNA → Protein

C Protein → RNA → DNA

D DNA → RNA → Protein



★ **Explanation**

Correct Answer: D

The central dogma illustrates the flow of genetic information: DNA is transcribed into RNA, which is then translated into a functional protein that determines the organism's traits.

16 The specific location or position of a gene on a chromosome is known as its:

A Allele

B Locus



C Genotype

D Phenotype

★ **Explanation**

Correct Answer: B

The physical location of a gene on a chromosome is called a locus (plural: loci). Homologous chromosomes have the same genes at the same loci.

17 What determines the sequence of amino acids during protein synthesis?

A The sequence of nucleotides in DNA



B The sequence of sugars in the backbone

C The number of hydrogen bonds

D The size of the nucleosome

★ **Explanation**

Correct Answer: A

The text emphasizes that the sequence of DNA nucleotides dictates the sequence of amino acids. This is done through the intermediate mRNA during transcription and translation.

18 A specific segment of DNA that contains the instructions for making a particular protein is called a:

A Nucleotide

B Chromosome

C Gene



D Codon

★ **Explanation**

Correct Answer: C

A gene is defined as the part of a DNA sequence (sequence of nucleotides) that contains the instructions for the synthesis of a particular protein.

19 How many nitrogenous bases code for a single amino acid during translation?

A 1

B 2

C 3



D 4

★ **Explanation**

Correct Answer: C

The ribosome reads the mRNA sequence in sets of three nucleotides (called codons). Each codon specifies a particular amino acid. (This is implied by the reading frame mechanism described in the text).

20 Which molecule carries the genetic code from the nucleus to the ribosome?

A tRNA

B rRNA

C mRNA



D DNA

★ **Explanation**

Correct Answer: C

Messenger RNA (mRNA) acts as the carrier. It is transcribed in the nucleus and travels to the ribosome, where its sequence is translated into a protein.

03

Genes, Alleles, Genotype, and Phenotype

10 MCQs

21 Alternate forms of a gene are called:

A Loci

B Alleles



C Chromatids

D Nucleosomes

★ Explanation

Correct Answer: B

The text defines alleles as the alternate forms of a gene. For example, the gene for height might have a tall allele and a short allele.

22 If an individual has the genotype 'Aa', they are said to be:

A Homozygous dominant

B Homozygous recessive

C Heterozygous



D Hemizygous

★ Explanation

Correct Answer: C

The genotype 'Aa' contains two different alleles for a specific trait. The text defines this condition as heterozygous.

23 The specific combination of genes in an individual is known as their:

A Phenotype

B Genotype ✓

C Karyotype

D Allele

★ **Explanation**

Correct Answer: B

Genotype refers to the actual genetic makeup (e.g., AA, Aa, or aa) of an organism, while phenotype refers to the physical expression of those genes.

24 In the case of albinism, normal pigmentation is dominant. What is the genotype of an albino individual?

A AA

B Aa

C aa ✓

D AO

★ **Explanation**

Correct Answer: C

Albinism is a recessive trait. It is only expressed when both alleles are recessive. Therefore, an individual must have the 'aa' genotype to lack normal body pigments.

25 An allele that masks or prevents the expression of another allele is called:

A Recessive

B Dominant ✓

C Codominant

D Mutated

★ **Explanation**

Correct Answer: B

The dominant allele (represented by a capital letter) is the one that expresses its trait even when paired with a different (recessive) allele. It "dominates" the relationship.

26 What is the physical expression of a genotype called?

A Phenotype ✓

B Homozygous

C Heterozygous

D Locus

★ **Explanation**

Correct Answer: A

Phenotype is the observable physical or biochemical characteristic of an organism (e.g., being albino or having normal pigmentation), determined by the genotype and environmental influences.

27 Which of the following represents a homozygous genotype?

A Aa

B AB

C aa



D Bb

★ **Explanation**

Correct Answer: C

Homozygous means having two identical alleles for a particular gene. 'aa' represents a homozygous recessive genotype.

28 If a dominant allele only suppresses the expression of a recessive allele but does not affect its nature, what happens to the recessive allele in a heterozygous individual?

A It is destroyed

B It mutates

C It remains unchanged and can be passed on



D It becomes dominant

★ **Explanation**

Correct Answer: C

The text clearly states: "A dominant allele only suppresses the expression of recessive allele. It does not affect its nature." This means the recessive allele remains intact and can be passed to offspring.

29 During gamete formation, alleles of a gene pair separate. How many alleles does a single gamete receive?

A 0

B 1



C 2

D 4

★ **Explanation**

Correct Answer: B

According to Mendel's Law of Segregation, the two alleles of a gene pair separate during meiosis. Therefore, each gamete receives only one allele from the pair.

30 When two gametes unite during fertilization, the resulting zygote receives:

A One allele from each parent



B Two alleles from the mother

C Two alleles from the father

D Four alleles total

★ **Explanation**

Correct Answer: A

The text mentions that when gametes of both parents unite, the resulting offspring receives one allele from each parent, restoring the paired condition of genes.

04 Mendel's Laws of Inheritance**15 MCQs**

31 Gregor Mendel worked with which plant to discover the fundamental principles of genetics?

A Rose

B Pea plant (*Pisum sativum*)



C Four O'Clock plant

D Wild Mustard

★ **Explanation**

Correct Answer: B

Mendel selected the pea plant because it had a short life cycle, contrasting traits, and allowed both self-fertilization and cross-fertilization.

32 A cross in which only one trait is studied at a time is called a:

A Dihybrid cross

B Monohybrid cross



C Test cross

D Back cross

★ **Explanation**

Correct Answer: B

A monohybrid cross involves the study of the inheritance of a single contrasting trait (e.g., seed shape: round vs. wrinkled).

33 When Mendel crossed true-breeding round-seeded plants with wrinkled-seeded plants, what was the phenotype of the F1 generation?

A All wrinkled

B All round



C 50% round, 50% wrinkled

D 75% round, 25% wrinkled

★ **Explanation**

Correct Answer: B

The F1 generation expressed only the dominant trait. Since round seeds were dominant over wrinkled seeds, all F1 offspring produced round seeds.

34 In Mendel's monohybrid cross, what was the phenotypic ratio of the F2 generation?

A 1:1

B 9:3:3:1

C 3:1



D 1:2:1

★ **Explanation**

Correct Answer: C

When the F1 generation (Rr) was self-fertilized, the F2 generation produced a phenotypic ratio of 3 dominant (round) to 1 recessive (wrinkled).

35 What is the genotypic ratio of the F2 generation in a monohybrid cross?

A 3:1

B 1:2:1



C 9:3:3:1

D 2:1:1

★ **Explanation**

Correct Answer: B

The genotypic ratio of the F2 generation is 1 homozygous dominant (RR) : 2 heterozygous (Rr) : 1 homozygous recessive (rr). The phenotypic ratio is 3:1.

36 Mendel's Law of Segregation states that:

A Traits are inherited independently of one another

B Alleles of a gene pair separate during gamete formation ✓

C Dominant alleles always mask recessive alleles

D Genes are located on chromosomes

★ **Explanation**

Correct Answer: B

The Law of Segregation explains that the two alleles for each trait separate (segregate) during meiosis, so each gamete carries only one allele for each gene.

37 A dihybrid cross involves studying how many contrasting traits at a time?

A One

B Two ✓

C Three

D Four

★ **Explanation**

Correct Answer: B

Mendel's dihybrid cross studied two traits simultaneously, such as seed shape (round vs. wrinkled) and seed color (yellow vs. green).

38 What was the phenotypic ratio of the F₂ generation in Mendel's dihybrid cross (RRYY x rryy)?

A 3:1

B 1:2:1

C 9:3:3:1



D 1:1:1:1

★ **Explanation**

Correct Answer: C

The classic Mendelian dihybrid cross yields four phenotypes in the F₂ generation: 9 round yellow, 3 round green, 3 wrinkled yellow, and 1 wrinkled green.

39 According to the Law of Independent Assortment, the segregation of alleles for one trait is:

A Dependent on the segregation of alleles for another trait

B Independent of the segregation of alleles for another trait



C Always linked to the sex of the offspring

D Determined by the environment

★ **Explanation**

Correct Answer: B

The Law of Independent Assortment states that alleles of different genes assort independently during gamete formation. The segregation of 'R' and 'r' happens independently of 'Y' and 'y'.

40 A diagram used to predict the outcome of a genetic cross by determining all possible genotypes is called a:

A Pedigree chart

B Punnett square ✓

C Karyotype

D Flowchart

★ **Explanation**

Correct Answer: B

Named after R.C. Punnett, this checkerboard diagram is used to cross gametes from both parents and determine all possible genotypes of the offspring.

41 In a Punnett square for a monohybrid cross ($Rr \times Rr$), what fraction of the offspring is expected to be heterozygous?

A $1/4$

B $1/2$ ✓

C $3/4$

D $1/3$

★ **Explanation**

Correct Answer: B

The cross $Rr \times Rr$ yields RR , Rr , Rr , rr . Two out of the four squares (or 50%) represent the heterozygous genotype (Rr).

42 Mendel concluded that traits are controlled by discrete, separable factors. What are these factors now known as?

A Nucleotides

B Genes ✓

C Proteins

D Chromosomes

★ **Explanation**

Correct Answer: B

Mendel called them "special factors" or "elements." Today, we know these discrete units of inheritance as genes.

43 Why did Mendel's work go largely unnoticed until the 20th century?

A He published in a local newspaper

B His mathematical approach and statistical analysis were ahead of his time ✓

C He did not perform enough experiments

D He worked with animals, not plants

★ **Explanation**

Correct Answer: B

Mendel was unique because he applied statistical analysis (ratios) to biology. His contemporaries did not appreciate this quantitative approach, and his work was rediscovered later.

44 Which of the following is NOT a reason Mendel chose pea plants for his experiments?

- A** They had a short life cycle
- B** They had contrasting traits
- C** They could self-fertilize and cross-fertilize
- D** They had a very complex genome with many traits ✓

★ **Explanation**

Correct Answer: D

Mendel chose peas because they had simple, distinct traits that were easy to track. A complex genome with many traits would have made identifying inheritance patterns difficult.

45 The parental generation is denoted as:

- A** F1
- B** F2
- C** P1 ✓
- D** G1

★ **Explanation**

Correct Answer: C

The original parents used in a cross are referred to as the Parental generation, or P1. Their offspring are the F1 (first filial) generation.

05

Co-dominance and Incomplete Dominance

10 MCQs

46 Which of the following is an example of co-dominance?

A Pink flowers in Four O'Clock plants

B AB blood group in humans



C Albinism in humans

D Round seeds in pea plants

★ Explanation

Correct Answer: B

Co-dominance occurs when both alleles express themselves completely and independently in the heterozygote. In blood group AB, both Antigen A and Antigen B are produced.

47 In incomplete dominance, the heterozygous phenotype is:

A A blend of the two homozygous phenotypes



B Exactly the same as the dominant phenotype

C Exactly the same as the recessive phenotype

D A completely new trait not seen in either parent

★ Explanation

Correct Answer: A

In incomplete dominance, neither allele is completely dominant. The heterozygote shows a blending or intermediate phenotype (e.g., red x white = pink).

48 What is the phenotypic ratio of the F₂ generation in incomplete dominance?

A 3:1

B 9:3:3:1

C 1:2:1



D 2:1

★ **Explanation**

Correct Answer: C

Because the heterozygote has a distinct phenotype (pink), the F₂ generation from a cross of two pink flowers (Rr x Rr) yields 1 red (RR) : 2 pink (Rr) : 1 white (rr).

49 The ABO blood group system in humans is controlled by how many alleles?

A 2

B 3



C 4

D 1

★ **Explanation**

Correct Answer: B

The gene "I" has three alleles: I^A, I^B, and i. This is an example of multiple alleles, though any individual only carries two of them.

50 Which blood group genotype demonstrates co-dominance?

A $I^A I^A$

B $I^A i$

C $I^B I^B$

D $I^A I^B$



★ **Explanation**

Correct Answer: D

In the genotype $I^A I^B$, both alleles produce their respective antigens (A and B) simultaneously, without one masking the other. This is the definition of co-dominance.

51 A person with blood group O has which genotype?

A $I^A i$

B $I^B i$

C ii



D $I^A I^B$

★ **Explanation**

Correct Answer: C

Blood group O is a recessive trait. It is only expressed when an individual inherits the 'i' allele from both parents (ii). The 'i' allele does not produce any antigens.

52 In Four O'Clock plants, if a red-flowered plant (RR) is crossed with a white-flowered plant (rr), what is the phenotype of the F1 generation?

A Red

B White

C Pink



D Red and white stripes

★ **Explanation**

Correct Answer: C

This is a classic example of incomplete dominance. The heterozygote (Rr) produces pink flowers, which is a blend of the red and white pigments.

53 How does incomplete dominance differ from co-dominance?

A

Incomplete dominance produces a blended phenotype, while co-dominance expresses both traits simultaneously



B

Incomplete dominance occurs only in animals

C

Co-dominance produces a blended phenotype

D

They are exactly the same thing

★ **Explanation**

Correct Answer: A

In incomplete dominance, the traits blend (pink from red and white). In co-dominance, both traits are fully expressed side-by-side (AB blood type).

54 If a pink Four O'Clock plant is self-fertilized, what percentage of offspring will be white?

A 0%

B 25% ✓

C 50%

D 75%

★ **Explanation**

Correct Answer: B

The cross is $Rr \times Rr$. The genotypic ratio is 1 RR : 2 Rr : 1 rr . The white phenotype corresponds to the ' rr ' genotype, which is 1 out of 4, or 25%.

55 The relationship between alleles I^A and i is:

A Co-dominant

B Incomplete dominant

C I^A is dominant over i ✓

D i is dominant over I^A

★ **Explanation**

Correct Answer: C

The text states that I^A produces antigen A, while ' i ' produces no antigen. I^A is dominant over ' i ', as the presence of I^A results in blood group A even if ' i ' is present.

06 Variations and Evolution

12 MCQs

56 What are the main sources of variations in sexually reproducing populations?

- A** Crossing over and mutations
- B** Random fertilization and gene flow
- C** Both A and B
- D** Cloning

★ **Explanation**

Correct Answer: C

Variations arise from genetic recombination during crossing over in meiosis, mutations, the random combination of gametes during fertilization, and gene flow between populations.

57 Which type of variation shows distinct, non-overlapping phenotypes?

- A** Continuous variation
- B** Discontinuous variation
- C** Environmental variation
- D** Acquired variation

★ **Explanation**

Correct Answer: B

Discontinuous variations have distinct categories with no intermediate forms. Human blood groups are a prime example, as a person is either A, B, AB, or O.

58 Human height is an example of:

A Discontinuous variation

B Continuous variation ✓

C Co-dominance

D Mutation

★ **Explanation**

Correct Answer: B

Continuous variations show a complete range of measurements from one extreme to another (e.g., very short to very tall) with many intermediate heights, influenced by multiple genes and the environment.

59 Who proposed the theory of "inheritance of acquired characteristics"?

A Charles Darwin

B Gregor Mendel

C J. de Lamarck ✓

D C. de Buffon

★ **Explanation**

Correct Answer: C

Lamarck proposed that organisms could pass on traits acquired during their lifetime to their offspring. This idea was later rejected because the mechanisms were vague and unsupported by evidence.

60

Charles Darwin proposed the mechanism of organic evolution known as:

A Natural selection



B Artificial selection

C Mutation theory

D Law of Segregation

★ **Explanation**

Correct Answer: A

Darwin proposed the Theory of Natural Selection after his voyage on the HMS Beagle, explaining how favorable variations accumulate in a population over generations.

61

What is "fitness" in the context of natural selection?

A The physical strength of an organism

B An organism's ability to survive and reproduce



C The lifespan of an organism

D The speed of an organism

★ **Explanation**

Correct Answer: B

Evolutionary fitness is defined by an organism's ability to survive, reproduce, and pass its favorable variations to the next generation.

62 In the example of the peppered moth in England, why did the dark-colored moths become more common during the Industrial Revolution?

- A** They were stronger than light moths
- B** They migrated to England
- C** Pollution killed the light-colored lichens, making dark tree trunks camouflage the dark moths ✓
- D** They were artificially selected by humans

★ **Explanation**

Correct Answer: C

Soot from factories killed the light-colored lichens on tree trunks, turning them dark. Light-colored moths became easily visible to predators, while dark moths were camouflaged and survived to reproduce.

63 The concept that all living things were created in their current form a few thousand years ago is known as:

- A** Organic evolution
- B** Theory of Special Creation ✓
- C** Natural selection
- D** Lamarckism

★ **Explanation**

Correct Answer: B

The Theory of Special Creation is the anti-evolution idea that species are immutable and were created exactly as they are now. Scientific work in the 18th century began to challenge this view.

64 How many possible chromosomal combinations can occur in humans during fertilization?

A 23

B 46

C 70 trillion



D 100 million

★ **Explanation**

Correct Answer: C

The text states that the possible number of chromosomal combinations at fertilization in humans is 70,368,744,177,664 (over 70 trillion), which is a massive source of genetic variation.

65 Which scientist was the first to propose a mechanism of evolution, though it was later rejected?

A Charles Darwin

B J. de Lamarck



C Gregor Mendel

D C. de Buffon

★ **Explanation**

Correct Answer: B

Lamarck was the first to propose a mechanism (inheritance of acquired traits), but it was rejected due to a lack of evidence. Darwin later proposed a successful mechanism (natural selection).

66 In natural selection, what happens to unfavorable variations over time?

- A** They become more common
- B** They are selected against and become rarer ✓
- C** They mutate into favorable variations
- D** They are passed on to all offspring

★ **Explanation**

Correct Answer: B

Organisms with unfavorable variations are less likely to survive and reproduce. Therefore, these variations are "selected against" and gradually decrease in the population.

67 What is the result of natural selection over many generations?

- A** The population becomes genetically identical
- B** The allele that provides greater fitness becomes more common in the population ✓
- C** The population stops evolving
- D** Unfavorable variations completely disappear in one generation

★ **Explanation**

Correct Answer: B

Natural selection drives evolution by increasing the frequency of advantageous alleles in the population over successive generations, allowing the population to adapt to its environment.

07

Artificial Selection & Applied Genetics

8 MCQs

68

The intentional breeding of organisms with desirable traits is called:

A Natural selection

B Artificial selection ✓

C Genetic drift

D Mutation

★ Explanation

Correct Answer: B

Artificial selection, also known as selective breeding, is driven by human intervention to produce offspring with specific desired characteristics.

69

Who first expressed the term "artificial selection" in the 11th century?

A Charles Darwin

B Abu Rayhan Biruni ✓

C Gregor Mendel

D J. de Lamarck

★ Explanation

Correct Answer: B

The Persian scientist Abu Rayhan Biruni first expressed the term. Darwin later used the concept to draw parallels with natural selection.

70 In artificial selection, the bred animals are known as:

A Varieties

B Cultivars

C Breeds



D Mutants

★ **Explanation**

Correct Answer: C

The text specifies that in artificial selection, bred animals are known as breeds (e.g., different breeds of sheep, hens), while bred plants are known as varieties or cultivars.

71 Which of the following plants was developed through artificial selection from the wild mustard plant?

A Broccoli

B Cabbage

C Kale

D All of the above



★ **Explanation**

Correct Answer: D

The diagram in the chapter shows that broccoli, cabbage, kale, kohlrabi, and cauliflower were all selectively bred from the wild mustard plant by humans favoring different parts of the plant.

72 What is the key difference between natural selection and artificial selection?

- A** Natural selection occurs in plants, artificial in animals
- B** Humans favor specific variations in artificial selection, while the environment selects in natural selection ✓
- C** Artificial selection takes millions of years
- D** Natural selection produces new species, artificial does not

★ **Explanation**

Correct Answer: B

The text highlights that in artificial selection, humans intentionally choose which traits to propagate. In natural selection, the environment acts as the selective pressure, determining which traits are favorable for survival.

73 The process of selective breeding has revolutionized:

- A** Agricultural production
- B** Livestock production
- C** Both A and B ✓
- D** Only wild animal populations

★ **Explanation**

Correct Answer: C

Selective breeding has dramatically increased the production of wool, meat, milk, eggs, and crop yields, revolutionizing agriculture and livestock production globally.

74 In the Genetic Algorithm Evolution Flow chart, what operators are involved?

A Mutation, Crossover, Reproduction

B Evaluation, Fitness value

C Both A and B



D Transcription, Translation

★ **Explanation**

Correct Answer: C

The chart illustrates a computational model of evolution involving GA operators (Mutation, Crossover, Reproduction) and an Evolution Environment (Evaluation, Fitness value), mimicking biological evolution.

75 A group of organisms with desirable characteristics selected for breeding is known as a:

A Species

B Breed



C Population

D Clone

★ **Explanation**

Correct Answer: B

A breed is a specific group of domestic animals or plants having a homogenous appearance, behavior, and other characteristics that distinguish it from other organisms of the same species, developed through artificial selection.

08 Final Review: Miscellaneous & Application**10 MCQs****76 Which of the following statements about mutations is true?**

- A** All mutations are harmful
- B** Mutations are a source of variations 
- C** Mutations only occur during mitosis
- D** Mutations do not affect evolution

★ Explanation**Correct Answer: B**

Mutations are changes in the DNA sequence. While some can be harmful, they are a crucial source of genetic variation. If a mutation provides a survival advantage, it can be passed on and drive evolution.

77 If a true-breeding tall plant (TT) is crossed with a true-breeding short plant (tt), what is the genotype of the F1 generation?

- A** TT
- B** tt
- C** Tt 
- D** T

★ Explanation**Correct Answer: C**

The tall parent gives a 'T' allele, and the short parent gives a 't' allele. All offspring in the F1 generation will receive one of each, resulting in the heterozygous genotype Tt. Since T is dominant, they will all be tall.

78 In a dihybrid cross, what is the probability of an offspring showing both recessive traits?

A $1/16$



B $3/16$

C $9/16$

D $1/4$

★ **Explanation**

Correct Answer: A

In a 9:3:3:1 ratio, the "1" represents the offspring that are homozygous recessive for both traits (e.g., rryy). Since there are 16 possible combinations in a Punnett square, the probability is $1/16$.

79 Why is the concept of the Punnett square important in genetics?

A It physically separates DNA

B It predicts the probability of offspring genotypes and phenotypes



C It mutates genes

D It clones organisms

★ **Explanation**

Correct Answer: B

The Punnett square is a valuable predictive tool. By identifying the gametes of both parents, it allows geneticists to calculate the statistical likelihood of various genotypes and phenotypes appearing in the offspring.

80 What is the ultimate source of all genetic variation?

A Natural selection

B Mutation ✓

C Artificial selection

D Genetic drift

★ **Explanation**

Correct Answer: B

While crossing over and fertilization shuffle existing alleles, mutations are the only mechanism that creates completely new alleles and genetic information in the gene pool, making it the ultimate source of variation.

81 In incomplete dominance, does the dominant allele completely mask the recessive allele?

A Yes

B No ✓

C Only in the F1 generation

D Only in the F2 generation

★ **Explanation**

Correct Answer: B

In incomplete dominance, neither allele is completely dominant. The heterozygote expresses an intermediate phenotype (a blend), indicating that the dominant allele does not fully mask the recessive allele's effect.

82 Which of the following is a continuous variation?

- A Human blood group
- B Human body weight** ✓
- C Flower color in Four O'Clock plants
- D Albinism

★ **Explanation**

Correct Answer: B

Human body weight is a continuous variation because it shows a complete range of measurements from very light to very heavy, with no distinct categories. Blood groups and albinism are discontinuous.

83 The Law of Independent Assortment applies to:

- A Genes on the same chromosome
- B Genes on different chromosomes or far apart on the same chromosome** ✓
- C Only sex-linked genes
- D Only genes that are co-dominant

★ **Explanation**

Correct Answer: B

Mendel's Law of Independent Assortment states that alleles of different genes assort independently during gamete formation. This holds true for genes located on different chromosomes (or far apart on the same chromosome) so they are not physically linked.

84 Which generation in Mendel's experiment displayed the 9:3:3:1 ratio?

A P1

B F1

C F2



D F3

★ **Explanation**

Correct Answer: C

The F2 generation of a dihybrid cross displayed the classic 9:3:3:1 phenotypic ratio, revealing that the two traits were inherited independently of one another.

85 What is the visible characteristic of an organism, such as blue eyes or brown hair, called?

A Genotype

B Phenotype



C Allele

D Locus

★ **Explanation**

Correct Answer: B

The phenotype is the set of observable characteristics or traits of an organism, resulting from the interaction of its genotype with the environment.

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Well Done! Keep Learning.

You have completed all 85 MCQs of Chapter 15:
Inheritance. Revise the explanations, practise again
and master genetics with confidence.

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Genetics

DNA

Mendel's Laws

Variation

Evolution

