

Molecular Basis of Inheritance — Assignment 1

Class 12 Biology · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.
(3) Universal values: $g = 10 \text{ m/s}^2$ unless stated. Give answers with correct SI units.

DNA Structure — The Watson-Crick Model

MCQ Questions (choose the correct option)

- DNA is a
 - double helix
 - single strand
 - triple helix
 - protein
- The two strands of DNA are
 - antiparallel
 - parallel
 - identical
 - discontinuous
- In DNA, adenine pairs with
 - thymine
 - guanine
 - cytosine
 - uracil
- The distance between two consecutive base pairs is
 - 0.34 nm
 - 3.4 nm
 - 34 nm
 - 0.034 nm

1 Mark Questions

- What is the shape of DNA?
- Which base pairs with guanine?
- What is the pitch of the DNA helix?

2 Mark Questions

- State Chargaff's rule.
- What is meant by antiparallel strands?

3 Mark Questions

- Describe the Watson-Crick model of DNA.
- Explain base pairing in DNA.

DNA as the Genetic Material

MCQ Questions (choose the correct option)

1. The transforming principle was identified by
 - (A) Avery, MacLeod and McCarty
 - (B) Mendel
 - (C) Darwin
 - (D) Watson
2. Griffith worked with
 - (A) *Streptococcus pneumoniae*
 - (B) *E. coli*
 - (C) peas
 - (D) bacteriophages
3. The experiment that proved DNA is the genetic material used
 - (A) bacteriophages
 - (B) peas
 - (C) maize
 - (D) yeast
4. DNA is a better genetic material because it is
 - (A) more stable
 - (B) less stable
 - (C) single-stranded
 - (D) catalytic

1 Mark Questions

1. Who discovered the transforming principle?
2. Which molecule is the genetic material in most organisms?

2 Mark Questions

1. Describe Griffith's transformation experiment.
2. Why is DNA more stable than RNA?

3 Mark Questions

1. Describe the experimental proof that DNA is the genetic material.
2. Compare DNA and RNA as genetic material.

Semi-Conservative Replication

MCQ Questions (choose the correct option)

1. DNA replication is
 - (A) semi-conservative
 - (B) conservative
 - (C) dispersive
 - (D) non-conservative
2. Semi-conservative replication was proved by
 - (A) Meselson and Stahl
 - (B) Watson and Crick

- (C) Avery
 - (D) Griffith
3. The enzyme that unwinds DNA is
- (A) helicase
 - (B) ligase
 - (C) polymerase
 - (D) primase
4. Meselson and Stahl used the isotope
- (A) ^{15}N
 - (B) ^{32}P
 - (C) ^{35}S
 - (D) ^{14}C

1 Mark Questions

1. What is semi-conservative replication?
2. Which enzyme joins DNA fragments?
3. Which isotope did Meselson and Stahl use?

2 Mark Questions

1. What is the role of DNA polymerase?
2. Describe the Meselson-Stahl experiment.

3 Mark Questions

1. Describe the process of DNA replication.
2. Explain semi-conservative replication with experimental proof.

Transcription and mRNA Processing

MCQ Questions (choose the correct option)

1. The enzyme that synthesises RNA is
 - (A) RNA polymerase
 - (B) DNA polymerase
 - (C) ligase
 - (D) helicase
2. The strand that is copied is the
 - (A) template strand
 - (B) coding strand
 - (C) lagging strand
 - (D) leading strand
3. In prokaryotes, transcription occurs in the
 - (A) cytoplasm
 - (B) nucleus
 - (C) mitochondria
 - (D) ribosome
4. The promoter is recognised by the

- (A) sigma factor
- (B) rho factor
- (C) primase
- (D) ligase

1 Mark Questions

1. What is transcription?
2. Name the enzyme of transcription.
3. What is a promoter?

2 Mark Questions

1. Differentiate between the template strand and the coding strand.
2. What is mRNA processing?

3 Mark Questions

1. Describe transcription in prokaryotes.
2. Explain the processing of hnRNA into mRNA.

The Genetic Code

MCQ Questions (choose the correct option)

1. The start codon is
 - (A) AUG
 - (B) UAA
 - (C) UAG
 - (D) UGA
2. The genetic code is
 - (A) triplet
 - (B) doublet
 - (C) singlet
 - (D) quadruplet
3. The number of stop codons is
 - (A) three
 - (B) two
 - (C) one
 - (D) four
4. The genetic code is degenerate because
 - (A) more than one codon codes for an amino acid
 - (B) one codon codes for many amino acids
 - (C) codons overlap
 - (D) it has no start codon

1 Mark Questions

1. What is a codon?
2. Name the start codon.

3. Name the stop codons.

2 Mark Questions

1. What is meant by the degeneracy of the genetic code?
2. Why is the genetic code called non-overlapping?

3 Mark Questions

1. Describe the salient features of the genetic code.
2. Explain the start and stop codons.

Translation and the Lac Operon

MCQ Questions (choose the correct option)

1. Translation occurs on the
 - (A) ribosome
 - (B) nucleus
 - (C) mitochondria
 - (D) Golgi body
2. The lac operon is induced by
 - (A) lactose
 - (B) glucose
 - (C) galactose
 - (D) sucrose
3. The repressor of the lac operon is coded by the
 - (A) i gene
 - (B) z gene
 - (C) y gene
 - (D) a gene
4. The enzyme coded by the z gene is
 - (A) beta-galactosidase
 - (B) permease
 - (C) transacetylase
 - (D) repressor

1 Mark Questions

1. What is translation?
2. What is the lac operon?
3. Name the inducer of the lac operon.

2 Mark Questions

1. What is the role of tRNA in translation?
2. Explain the induction of the lac operon.

3 Mark Questions

1. Describe the process of translation.
2. Explain the lac operon and its regulation.

Human Genome Project and DNA Fingerprinting

MCQ Questions (choose the correct option)

1. The Human Genome Project was completed in
 - (A) 2003
 - (B) 1990
 - (C) 2000
 - (D) 2010
2. DNA fingerprinting was developed by
 - (A) Alec Jeffreys
 - (B) Watson
 - (C) Crick
 - (D) Morgan
3. DNA fingerprinting uses
 - (A) repetitive DNA
 - (B) coding DNA
 - (C) RNA
 - (D) proteins
4. The human genome contains about
 - (A) 3.1 billion base pairs
 - (B) 30,000 base pairs
 - (C) 3.1 million base pairs
 - (D) 300 base pairs

1 Mark Questions

1. What is DNA fingerprinting?
2. When was the Human Genome Project completed?
3. What is satellite DNA?

2 Mark Questions

1. Mention two goals of the Human Genome Project.
2. What are the applications of DNA fingerprinting?

3 Mark Questions

1. Describe the Human Genome Project and its salient features.
2. Explain the principle and applications of DNA fingerprinting.