

SBI4U MOLECULAR GENETICS Unit Checklist

Name: _____



Mastery Checks may be attempted more than once and are not considered complete until $\geq 70\%$ is achieved.

Notes and activities will be checked for completion & corrections.

Topic	Objective(s)	Key Concepts	Approx. # classes	Notes	Mastery Check Inc. # of attempts
1	Ethics in Genetics: <i>Explain social, ethical, and legal implications of genetics & biotechnology</i>	- Stem cells - GMOs - DNA fingerprinting - Gene patenting - Cloning	3		X
2	DNA Structure & History: <i>Describe historical scientific contributions that have advanced molecular genetics Explain the basic structure and components of DNA</i>	- base pairing, A,C,G,T, hydrogen bonds, - Chargaff's rule - purines & pyrimidines - sugar-phosphate backbone, phosphodiester bonds, - Anti-parallel, 3', 5' ends	2		□□□□
3	DNA Replication: <i>Explain how DNA replication occurs in cells and why it is important Describe the different repair mechanisms that can correct mistakes in DNA sequencing</i>	- Leading Strand, Lagging strand, Okazaki Fragments, Replication fork/bubble - Enzymes: DNA Helicase, DNA Polymerases, Gyrase, - 3', 5', RNA Primers, SSBP's,	2		□□□□
4	Transcription: <i>Explain the process of transcription and its importance to living organisms Compare the structures and functions of RNA and DNA, and explain their roles in the process of protein synthesis</i>	-Central Dogma: DNA → RNA → Protein - DNA → mRNA, 5' to 3' -Genomes: Genes & Non-Coding DNA, Introns, Exons - Nucleus, Promoters (TATA box), Template strand, RNA Polymerase, 5' cap, Poly-A tail, mRNA, Terminators, Processing	2		□□□□
5	Translation: <i>Explain the steps of translation as involved in the process of protein synthesis</i>	- Cytoplasm - tRNA, rRNA, - Ribosome A-P-E sites, codons, start codon, amino acids, stop codon - Amino Acid interactions & shape - Wobble hypothesis	2		□□□□
6	Mutations: <i>Explain how mutations can occur by changing the genetic material in cells and the effects of these changes</i>	-Causes: Physical/Chemical, Spontaneous errors, Germ/Somatic -Types: Point (Substitution & Insert/Delete), Inversion, Duplication, Translocation, Transposon -Effects: Silent, Missense/nonsense, Wobble Effect, Role of Introns, Non-Coding Sections -Significance: Loss of function, Enhanced Function, Advantage	2		□□□□
7	Control Mechanisms: <i>Explain how genetic expression is controlled in prokaryotes and eukaryotes by regulatory proteins</i>	- Lac Operon & Trp Operon - Regulators	2		□□□□
8	Biotechnology <i>Describe examples of genetic modification, and explain how it is applied in industry and agriculture</i>	- PCR - RFLP - CRISPR	2		X

Assessments

All assessments & labs must be completed in class and are due at the end of the in-class work period(s) unless otherwise indicated.

Assignments	DUE DATE	Quizzes & Tests	DATE
Ethics Debate Summary	Friday Nov. 23 rd	Topics 2-5 Quiz	Tuesday Dec. 4 th
Central Dogma Project		Unit Test	Tuesday Dec. 11 th
Mutation Mini-Project			

Molecular Genetics Terms to Know

- | | | | |
|----------------------|------------------------|-------------------------|---------------------------|
| - 3' | - Exonuclease A site | - Okazaki Fragments | - RNA Primer |
| - 5' | - Expression | - Operator | - Semiconservative |
| - Adenine | - Frame shift | - Operon | - Silent mutation |
| - Aminoacyl-tRNA | - Franklin | - Origin of Replication | - Single-Stranded Binding |
| - Anticodon | - Gene Patenting | - P site | Proteins |
| - Antiparallel | - Gene Regulation | - Parental Strand | - Small Subunit |
| - BRCA Gene | - Genes | - Peptide Bond | - Spontaneous |
| - Central Dogma | - Genetically Modified | - Phosphate Group | - Stem Cell |
| - Chargaff's Rule | Organisms | - Phosphodiester Bond | - Substitution |
| - Codon | - Glycosyl Bond | - Pluripotent | - TATA Box |
| - Complimentary | - Guanine | - Point Mutation | - Termination |
| Base-Pairing | - Housekeeping genes | - Polypeptide | - Termination Sequence |
| - Cytosine | - Induced mutation | - Posttranscriptional | - Therapeutic Cloning |
| - Daughter Strand | - Induction | - Posttranslational | - Thymine |
| - Deletion | - Initiation | - Primase | - Totipotent |
| - Deoxyribose Sugar | - Insertion | - Promoter | - Transcription |
| - DNA Fingerprinting | - Inversion | - Promoter Region | - Transcription Factor |
| - DNA Gyrase | - lac Operon | - Purine | - Transcription factors |
| - DNA Helicase | - Lagging Strand | - Pyrimidine | - Transcription Unit |
| - DNA Ligase | - Large Subunit | - Reading Frame | - Transcriptional |
| - DNA Polymerase I | - Leading Strand | - Release Factor | - Translation |
| - DNA Polymerase III | - Missense mutation | - Replication | - Translational |
| - DNA Template | - mRNA | - Replication Bubble | - Translocation |
| - Double Helix | - Mutagenic agent | - Replication Fork | - Transposable |
| - Double Helix | - Mutation | - Repression | - tRNA |
| - Downstream | - Nitrogenous Base | - Reproductive Cloning | - trp Operon |
| - Elongation | - Nonsense mutation | - Ribosome | - Upstream |
| - | - Nucleotide | - RNA Polymerase II | - Watson & Crick |

Mastery Checks:

- Mastery Checks may be attempted more than once and are not considered complete until **≥ 70%** is achieved.
- **≥ 70% or a minimum of two attempts on all mastery checks is required **before** a unit test**
- Must be written during class or after school during supervised extra help times.
- Must be attempted as you progress through the topics – **DO NOT** let them accumulate until the end of the unit. You may run out of

Edsby Gradebook Symbols



- ✓ Not yet **≥ 70%** but 2 attempts completed
- ! Overdue / Late
- ✗ Not Done
- ⦿ Incomplete (one attempt < 70%)