

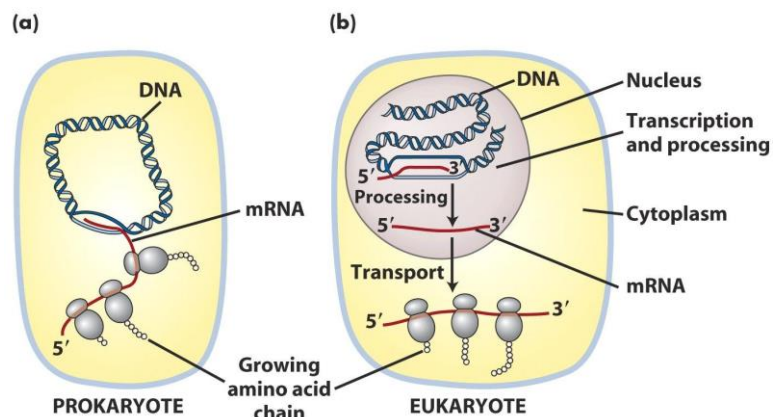
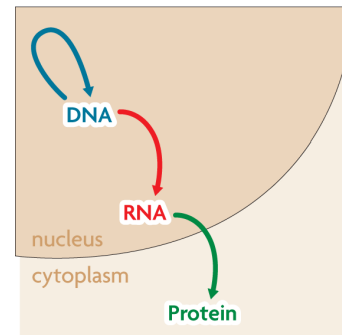
# Study Guide: Unit 5 Test

## HONORS BIOLOGY: PROTEIN SYNTHESIS

**Directions:** The list below identifies topics, terms, and concepts that will be addressed on your Unit 5 Test. This list should help you focus your review. This is not a homework assignment you will turn into me.

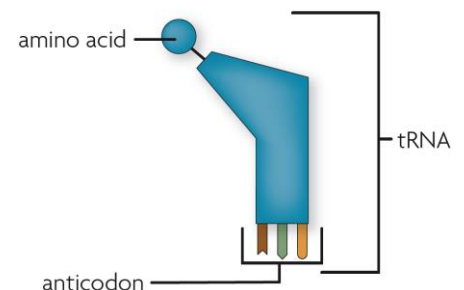
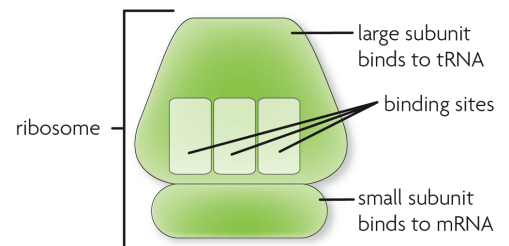
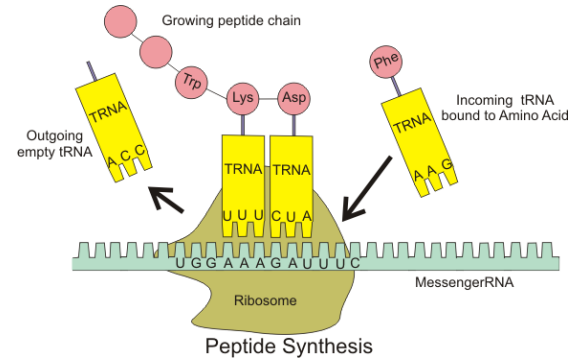
### Transcription

- Central dogma of molecular biology (Francis Crick)
  - Replication (DNA → DNA)
  - Transcription (DNA → RNA)
  - Translation (RNA → Proteins)
- Prokaryotic cells
  - Replication, transcription, translation in cytoplasm
- Eukaryotic cells
  - Replication and transcription in nucleus
  - Translation in cytoplasm
- Differences between DNA and RNA
  - RNA single stranded (DNA double)
  - RNA sugar ribose (DNA sugar deoxyribose)
  - RNA uracil in place of thymine in DNA
- Transcription produces 3 kinds of RNA
  - Messenger RNA (mRNA)
  - Transfer RNA (tRNA)
  - Ribosomal RNA (rRNA)
- Process of transcription
  - Function of enzymes involved
  - Unwinding of DNA
  - Complimentary bases in RNA (A=U, C=G)



### Translation (Protein Synthesis)

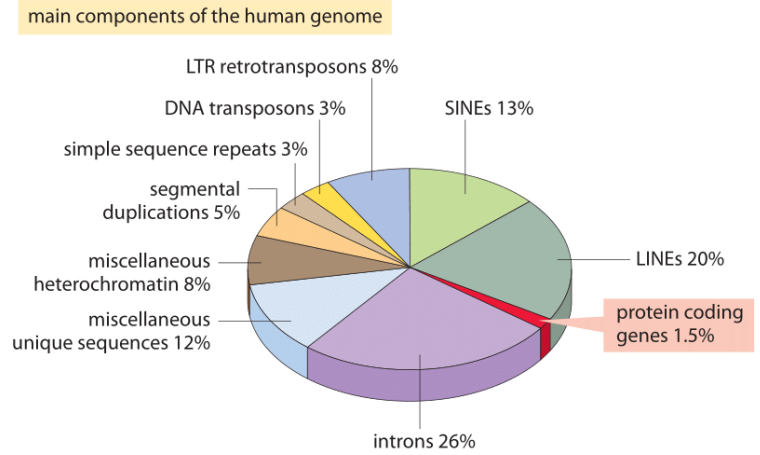
- RNA making Proteins (polypeptides)
- Amino acid monomer, Protein Polymer
- Codon (3-letter code on RNA)
  - 64 combinations
  - Only 20 amino acids
    - Many AA coded by more than one codon
  - Special codons
    - Start codon
    - Stop codon
  - Universal code
    - Suggests common ancestor
- Two important “tools” needed to translate a codon into an amino acid
  - Ribosome (site of protein synthesis)
    - Made of rRNA
  - tRNA
    - Carries free-floating amino acids from cytoplasm to ribosome
    - attaches to specific amino acid
    - Has “3-letter” anticodon
- Occurs in cytoplasm
  - mRNA binds to ribosome
  - Reads one codon at a time



- Anticodon complimentary to codon
- Amino acids bond to each other

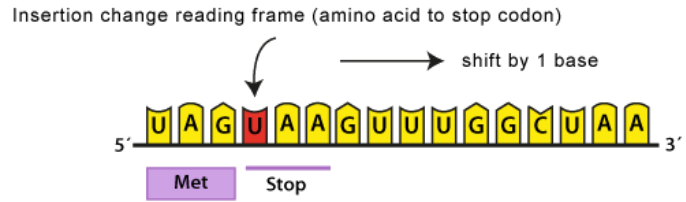
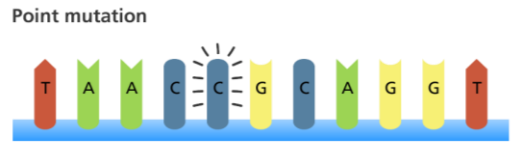
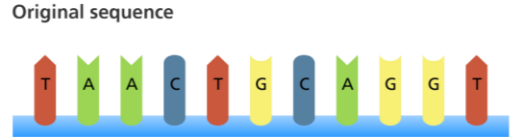
## Gene Expression

- cells can control when gene is “turned on or off”
- Different in prokaryotic and eukaryotic cells
- Cell specialization
  - only certain genes are expressed in each type of cell

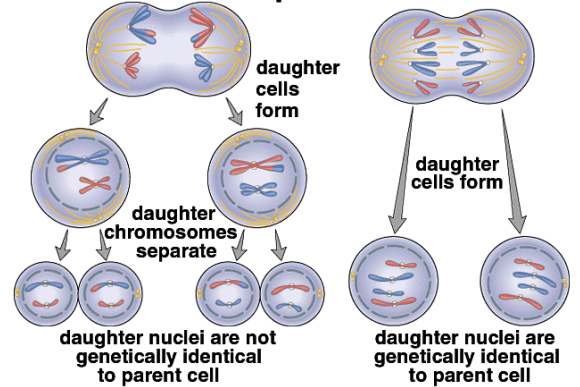


## Mutations

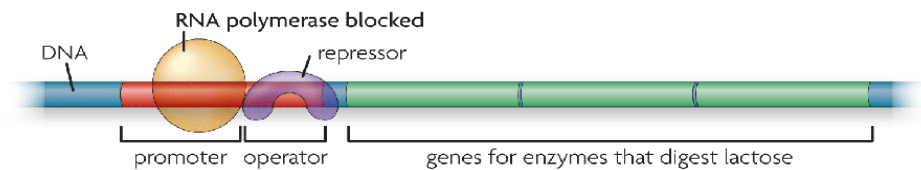
- any change in an organism’s DNA
- in single gene usually happen during replication
- group of genes or chromosome happen during meiosis
- Types of mutations
  - Point mutation
    - Duplication
    - Translocation
  - Chromosomal
- Mutation may or may not affect phenotype
  - Chromosomal usually big affect
  - Gene mutations may change phenotype
    - Premature stop condon
    - Change 3-D shape of protein
    - Change in gene regulation
    - Mutation may be in “silent” region of DNA
    - May not affect protein folding
- Mutation in body cells cannot be passed on
- Mutations in sex cells either harmful or beneficial
- Natural selection removes mutant alleles
- Mutations caused by several factors
  - Replication errors
  - Mutagens



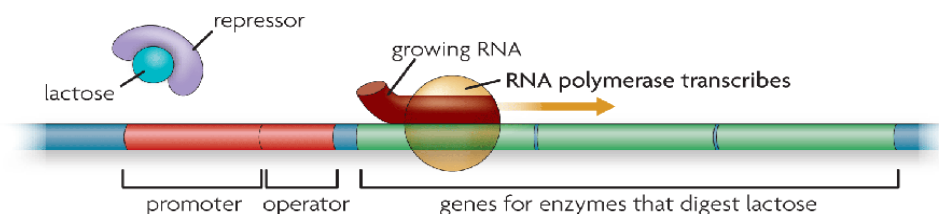
## Meiosis compared to mitosis



Without lactose (switched off)



With lactose (switched on)



**Radiation**

- UV Radiation: Both natural sunlight and tanning beds
- X-Rays: Medical, dental, airport security screening

**Chemicals**

- Cigarette Smoke: Contains dozens of mutagenic chemicals
- Nitrate & Nitrate Preservatives: In hot dogs and other processed meats
- Barbecuing: Creates mutagenic chemicals in foods
- Benzoyl Peroxide: Common ingredient in acne products

**Infectious Agents**

- Human Papillomavirus (HPV): Sexually transmitted virus
- Helicobacter pylori: Bacteria spread through contaminated food