

**Directions:** In no way can one review guide encapsulate the entire semester or the depth and breadth of your learning. This review is intended for you to use to support your study sessions. Can you demonstrate proficiency with these concepts? How well can you connect the big ideas with each other? What kind of whiteboard representations come to mind as you review these concepts? Could you write a short essay describing what you know about the overarching big idea and subsequent details connected with that big idea?

### **THE CELL CYCLE**

Sketch and label the cell cycle

G1

S

G2

M (mitosis or meiosis)

What is meant by interphase?

What is apoptosis and why would it occur?

When does protein synthesis occur?

When does DNA replication occur?

Graph the amount of DNA in each phase of the cell cycle.

When would DNA polymerase be at its highest concentration? RNA polymerase?

When does the nucleus divide?

What happens to the rate of mitosis in cancer?

What is nondisjunction? How does it impact gametes like the egg cell?

Describe the checkpoint “questions” asked as the cell progresses through the cell cycle.

### **CELL DIVISION**

Compare and contrast mitosis with meiosis.

Sketch and label PMAT of mitosis.

Describe how Metaphase of mitosis differs from Metaphase One of Meiosis.

Which one is most like cloning?

Which one occurs in human gonads like testes and ovaries?

What are the purposes for each process?

What happens if something goes wrong during mitosis or meiosis?

Are homologous chromosomes paired during both processes or just one, why?

What is meant by the diploid and haploid number of chromosomes?

Is DNA duplicated before each process? Why?

What is crossing over and when does it most often occur---mitosis or meiosis? Why?

### **Reading karyotypes**

Identifying gender

Identifying results of nondisjunction—monosomy, trisomy

### **Inheritance, Punnett square, Predictive Pedigrees, Crosses**

Gregor Mendel

Probability of cross outcomes

Alleles vs genes

Homozygous dominant or recessive

Multiple alleles in the A,B,O blood system  
heterozygous  
Genotype ratio  
Phenotype ratio  
Monohybrid cross  
X-linked cross  
Dihybrid cross  
pedigrees

### **Problem solving genetic crosses**

Autosomal dominant  
Autosomal recessive  
Incomplete dominance  
Codominance  
X-linked recessive  
The ABO blood group system of inheritance!

### **The structure and function of DNA**

The twisted ladder analogy  
nucleotide  
Purines, pyrimidines  
Two hydrogen bonds between AT  
Three hydrogen bonds between CG  
Where are the phosphates and sugars in DNA structure?  
CUT  
AG  
Antiparallel  
Phosphate  
Deoxyribose  
Base pairing rules  
DNA polymerase  
Mutation  
What could happen if one letter ATCG in the DNA molecule is changed, duplicated, or deleted?  
Compare and contrast DNA with RNA in terms of structure, function and location.

### **The three forms of RNA and their functions in the process of protein synthesis**

mRNA  
tRNA  
rRNA  
Differentiate between codons and anticodons.  
Which enzyme builds mRNA?

### **Arrange in the correct order according to decreasing size of structures**

DNA, nucleus, chromosome, nucleotide, nitrogenous base

### **Protein synthesis**

What are the steps in protein synthesis?  
Sketch and label this process.

### *Transcription, nucleus*

DNA (the gene of interest)

mRNA

RNA polymerase

Introns (interrupt)

Exons (expressed)

G cap and polyA tail

codons

### *Translation, cytoplasm*

rRNA (2 subunits)

mRNA (codons)

tRNA (anticodon) (amino acid)

sequence of amino acids

protein

the mRNA codon decoder box showing corresponding amino acids

a frame shift mutation

    a deletion (one nucleotide)

a point mutation (one nucleotide)

    a substitution (one nucleotide for another nucleotide)

Given a sequence of amino acids, determine the codons in DNA, mRNA or even tRNA. Use the decoder box!

### **Causes for genetic diseases/disorders**

PKU

CF

Sickle Cell Anemia

Polydactylism

### **Biotechnology**

Inserting genes from one organism into another to make a gene product: ie the human insulin gene (DNA) can be inserted into a bacteria's DNA . The bacteria then can produce the protein hormone insulin to be given as medicine to people who suffer from diabetes.

Cloning

### **MICROEVOLUTION 5 MECHANISMS OF CHANGE**

Gene flow

Genetic drift

Non-random mating

Natural selection

Mutation

Biological Fitness

Finch populations and beak size/drought on the Galapagos Islands

Antibiotics

Pesticides

Sickle Cell Anemia and Malaria

Artificial selection

The peppered moth population and Hardy-Weinberg problems  
 $p + q = 1$  and  $p^2 + 2pq + q^2 = 1$

### **HUMAN BODY SYSTEMS**

This is the most recent unit!

THINK BIG...

Nervous system

Reproductive system

Respiratory system

Urinary system

Circulatory system

The pathway of blood through the heart and diffusion of gases at the body's cells.  
The role of the red blood cell and hemoglobin in the circulatory system.

Be able to identify all body structures explored during the dissection experience.

### **STUDENTS ARE EXPECTED TO:**

Think analytically reading passages and graphs

Examine critically diagrams and models of biological processes

Predict with accuracy frequencies and probabilities