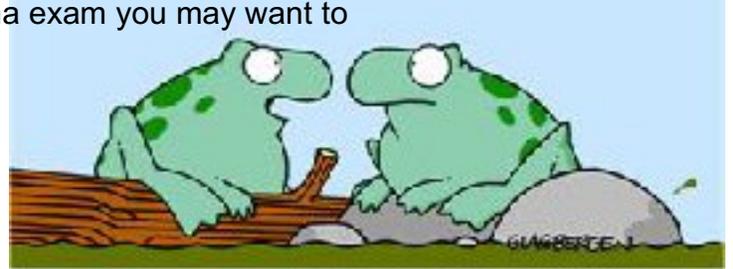


BIOLOGY 30 STUDY GUIDE

Study Tips:

In preparation for your Biology 30 diploma exam you may want to consider doing the following things:

- Organize your notes & materials
- Access all materials for the course from my website



"Looks aren't everything. It's what's inside you that really matters. A biology teacher told me that."

- Prioritize study areas (spend more time on your weakest and/or first learned areas as they will be rusty)
- Utilize study guides
- Use online resources like my website and/or (selected videos from "Crash Course" & "Bozeman")
- Quiz yourself online at <http://questaplus.alberta.ca>
- Study with friends – explain concepts and ask each other questions
- Have your parents quiz you from your notes or textbook
- Create index flip cards and quiz yourself
- Ask lots of questions to Mr. Wisniewski –

This booklet is not due and is not for marks. If you can honestly answer these questions and you understand the concepts that these questions cover, you should do very well on the diploma exam. FYI... The review booklet is based on the chapter order in your textbook, not the order that we covered material during the class. Good luck!

Biology 30 Study Guide – Major Concepts

Unit 1 – Nervous System

- Structure of a Neuron
 - cell body, dendrites, membrane, neurilemma, axon, axon terminal, synapse etc
- Conduction of nerve impulses
 - Ion exchange (how are sodium and potassium regulated?)
 - polarization, depolarization, repolarization – can you identify each stage on a diagram of a neuron or on a graph of an action potential?
 - All or none response – what does that mean? Is it possible to for a neuron to be depolarized without resulting in an action potential?
- Myelination (Difference between grey matter and white matter, what is the purpose of myelin?)
- Neurotransmitters – (synapses, receptors, enzymes that break down neurotransmitters)
 - Acetylcholine & cholinesterase (how do they work?)
- Central Nervous System vs Peripheral Nervous System
- Brain Structure and Function (know which part does what)
 - Cerebrum, Brain Stem (Hypothalamus, Pons, Medulla Oblongata, Cerebellum)
 - 4 Lobes (Frontal, Parietal, Temporal, Occipital)
- Somatic vs Autonomic
- Somatic Nervous System
 - Reflex Arc (Receptors, Sensory neurons, inter-neurons, motor neurons, effectors)
- Autonomic Nervous System
 - Functions of and differences between the Sympathetic and Parasympathetic Nervous System (list 10 responses each)
- The Eye
 - human eye, including the cornea, lens, sclera, choroids, retina, rods, and cones, fovea centralis, pupil, iris, and optic nerve.
 - Function of the three different layers: Sclera, choroid, retina
 - Review vision defects (myopia vs hyperopia)

- The Ear
 - Know all the parts of the ear (outer, middle, inner)
 - Associated functions with sound & balance
 - Hearing: auditory canal, tympanic membrane, ossicles, cochlea (including oval window, organ of corti, basilar membrane, round window) auditory nerve
 - Balance / Movement: Dynamic vs Static, Vestibule(utricle, saccule), Semi-Circular Canals
 - describe the function of the Eustachian tube.

Unit 2 – Endocrine System

- Understand the meaning of homeostasis and the function of hormones in our body as they relate to homeostasis
- Specific Hormones and Glands – You should know the **source, target and function** of all the following hormones. You should also understand how they are regulated.
- All hormones...know effects if they are hypersecreted vs hyposecreted
- Know what a feedback loop is (how to read or draw one indicating negative or positive feedback)
 - Pituitary Gland: (know how anterior and posterior relate to the hypothalamus)
 - Anterior: TSH, ACTH, GH, FSH, LH, PRL
 - Posterior: ADH, Oxytocin
 - Adrenal Gland
 - Cortex: Aldosterone, Cortisol
 - Medulla: Epinephrine, Norepinephrine
 - Pancreas:
 - Glucagon vs Insulin
 - Understand cause of diabetes etc
 - Know types of Diabetes and when/why occur
 - Thyroid Gland: Thyroxine, Calcitonin
 - Parathyroid Gland: Parathyroid Hormone
 - Testes: Testosterone
 - Ovaries: Estrogen, Progesterone
- Which hormones affect glucose levels? Identify at least three that increase and three that decrease blood sugar levels.
- Which hormones affect metabolism...list several
- ADH vs. Aldosterone...and how affect blood pressure

Unit 3 – Reproduction & Development

- Structure of the Male Reproductive System
 - Know what each of the following does: Urethra, Vas Deferens, Seminal Vesicles, Epididymis, Testes, Ejaculatory Duct, Prostate, Cowpers Gland, Urethra, Seminiferous Tubules etc)
- Sertoli vs Interstitial...location and function
- Hormonal regulation of male reproductive system (What function does FSH have in males? LH?)
- Relate each of the following steps of spermatogenesis to mitosis & meiosis: (spermatogonium, 1° spermatocyte, 2° spermatocyte)
- Sperm composition, Spermatozoa structure and function (head, neck, tail) as well as where the components of semen come from (fructose, prostaglandins)
- Structure of the Female Reproductive System
 - Fallopian Tubes / Oviducts, Uterus, Cervix, Vagina, Anus, Ovary)
- Hormonal control of the female reproductive system
 - Menstrual Cycle (Follicular phase, Ovulation, Luteal Phase)
 - What role do estrogen, progesterone, FSH, and LH play in the menstrual cycle? How do higher levels of certain hormones affect the levels of others?
- Role of Corpus Luteum
- The process of fertilization (where does it take place?) in-vitro fertilization
- Embryonic Development (Zygote, Morula, Blastula, Gastrula Implantation, neurulation) --KNOW stages and what is going on in them
- identify the major tissues and organs that arise from the ectoderm (nervous system, skin), the mesoderm (skeleton, muscles, reproductive system), and the endoderm (digestive and respiratory systems, endocrine glands)
- Extra-embryonic membrane formation of placenta, amnion, chorion, allantois
- Role of prostaglandins
- What is HCG, where does it come from? when is it produced, what does it do, how long is it produced for?
- Fetal Development (Stages, Placenta, medical technologies)
- explain how both fraternal and identical offspring are formed in a single birthing event.
- Birth (hormones involved etc)
- Two ways of sampling DNA for testing...

- explain how STI's like Chlamydia, gonorrhea, human papilloma virus, etc can interfere with fertility and reproduction.
- describe the influence environmental factors such as maternal lifestyle, alcohol, drugs, and infections can have on embryonic and fetal development – i.e. teratogens

Unit 4 – Molecular Genetics

- contributions that were made by James Watson and Francis Crick and Rosalind Franklin
- DNA Structure, Nucleotides, Chromosomes, Gene, Locus, Allele
- Structure and Discovery of DNA
- DNA Replication – Semi-conservative Replication–ENZYMES used
- Protein Synthesis
 - Transcription: From DNA to mRNA
 - Translation: From mRNA code to Protein / Polypeptide with tRNA and rRNA
- use the mRNA codon table to identify the amino acid sequence for which it codes
- nitrogen bases in DNA can give evidence for the relationships among organisms of different species
- very small amounts of DNA are found in chloroplasts and mitochondria and can be used to help trace inheritance.
- Mutations
 - Point mutations, frame shift mutations etc
- DNA Technology
 - Restriction Enzymes, Ligases
 - Gel Electrophoresis
 - Recombinant DNA
 - DNA Fingerprinting
 - Plasmid Transformation

Unit 5 – Classical Genetics

- Mitosis and Meiosis (Cell Division)
 - Interphase
 - Prophase, Anaphase, Metaphase, Telophase
 - Chromatids, Tetrads, Homologous Chromosomes, Centrioles, Spindle Fibres etc)
 - Crossing Over- the significance to organisms inheritance...
 - Non-Disjunction (Trisomy, monosomy)
- differentiate and compare the processes of mitosis and meiosis in terms of their purpose, as well as the major steps involved in each
- describe the difference between metaphase of mitosis and metaphase of meiosis I & II.
- the meaning of haploidy, diploidy, and polyploidy

- can identify and describe some of the diversity of reproductive strategies by comparing the alternation of generations in organisms such as Daphnia, sea anemones, moss, pine trees etc.
- Karyotypes
- Mendel's Laws of Heredity
- describe the evidence Mendel obtained for dominance, segregation, and the independent assortment of genes on different chromosomes.
- Crosses, Punnet Squares
 - Terminology: Genotype, Phenotype, Homozygous Recessive, Homozygous Dominant, Heterozygous
 - Monohybrid Crosses
 - Test Crosses...what is it and how used...
 - Multiple Alleles Crosses...examples
 - Incomplete and Co-Dominance...what are and how use with punnet square
 - Dihybrid Crosses -
 - Sex-Linked – X-linked traits in punnet squares
- traits can be controlled by one pair of genes (Rh factor), or they may be controlled by many genes (ex. skin colour, height)
- Gene Mapping
 - Crossing over & how distance between genes affects their ability to be passed on together
- Pedigrees

Unit 6 – Population Biology

- Hardy-Weinberg Equation & Conditions
- Population Growth Rates (natality, mortality, immigration, emigration)
- understand the meaning of, and can describe factors that cause the gene pool to change:
 - Natural Selection
 - Genetic Drift
 - Bottleneck effect
 - Founder effect
 - Gene Flow
 - Nonrandom mating
 - Migration
 - Mutations

- use the Hardy-Weinberg equation to determine allele and genotype frequencies using $p + q = 1$ and $p^2 + 2pq + q^2 = 1$
- Population densities
- calculate a population's growth rate (gr), per capita growth rate (cgr) and population density (Dp).
- describe how interactions between predators and prey and between producers and consumers can alter populations.
- Open and Closed populations
- R-selected and K-selected populations
- explain the differences between a logistic growth pattern (S curve) and an exponential growth pattern (J curve)
- Carrying Capacity
- describe a population's size & growth using the following terms: carrying capacity, biotic potential, environmental resistance
- Interspecific and Intraspecific Competition
- Relationships: Predation, Mutualism, Commensalism
- explain how organisms defend themselves from competition using mimicry, protective coloration, toxins, and modified behaviours.
- explain how / why mixtures of populations may change over time through the stages of succession (ie) from a pioneer community, through to a seral community to finally to climax community