Biology 30: Diploma Exam Review Package

Name: _____ Date: _____

Study Tips

In preparation for your Biology 30 diploma exam (worth 30% of your final mark) you may want to consider doing the following things:

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

- Organize your notes & materials
- Access all materials for the course from either my website and/or from Google Classroom
- 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 or http://exambank.com (username: paper, password: demo)
- 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!

The Nervous System

_____ I can describe in general terms the structure and function of a neuron and myelin sheath.

_____ I can explain how an action potential is formed by electrochemical gradients and how it is transmitted along a neuron.

_____ I can explain how a nerve impulse can cross a synapse using neurotransmitters such as norepinephrine, acetylcholine, and enzymes such as cholinesterase.

_____I can differentiate between the somatic and autonomic nervous systems.

_____ I can describe the function of the 4 lobes of the cerebrum, the pons, the cerebellum, the medulla oblongata, the hypothalamus, and the spinal cord.

_____ I can list several functions of both the parasympathetic and sympathetic nervous systems.

_____ I can explain how a reflex works, including the sensory receptor, sensory neuron, interneuron, motor neuron, and effector.

Sensory Reception

_____ I can describe the structure and function of the human eye, including the cornea, lens, sclera, choroids, retina, rods, and cones, fovea centralis, pupil, iris, and optic nerve.

_____ I can describe the structure and function of the auditory parts of the ear including the pinna, auditory canal, tympanic membrane, ossicles, cochlea, organ of Corti, and auditory nerve.

_____ I can describe the structure and function of the balance related parts of the ear including the semicircular canals, utricle, saccule.

_____ I can describe the function of the Eustachian tube.

Endocrine System

_____ I understand that the role of the endocrine system is to maintain a constant internal environment in the body (homeostasis)

_____ I can identify the location of the principal human endocrine glands including the hypothalamus/pituitary complex, thyroid, parathyroid, adrenal glands, and islet cells of the pancreas.

_____ I can describe the function of the following hormones:

- ___ Thyroid Stimulating Hormone (TSH) & Thyroxine
- ___ Calcitonin & Parathyroid Hormone (PTH)
- ___ Adrenocorticotropic Hormone (ACTH) & Cortisol
- ___ Glucagon & Insulin
- ___ Human Growth Hormone (hGH)
- ___ Antidiuretic Hormone (ADH)
- ___ Epinephrine / Adrenaline
- ___ Aldosterone
- ___ Follicle Stimulating Hormone (FSH)
- ___ Leutinizing Hormone (LH)
- ___ Prolactin & Oxytocin

_____ I can describe how each of the hormones above could be or are controlled through negative feedback.

_____ I can describe the role that thyroxine plays in metabolism.

_____ I can describe the role that glucagon and cortisol play in blood sugar regulation.

_____ I can describe the role hGH has in growth.

_____ I can describe the role ADH has in water regulation and the role aldosterone has in sodium ion and water regulation.

_____ I can explain how both ADH and Aldosterone can alter the body's blood pressure.

_____ I can explain the relationship between the nervous system and the endocrine system and how they can sometimes act together (ie. the hypothalamus/pituitary complex; the adrenal gland is stimulated by both the endocrine system and sympathetic nervous system)

_____ I can describe the physiological consequences of hormone imbalances including:

- ___ Diabetes mellitus
- ___ Diabetes insipidus
- ___ Gigantism / Acromegaly
- ___ Dwarfism
- ___ Goitre
- ___ Cretinism
- ___ Graves' Disease

Reproduction

_____ I can identify the structures in the human female reproductive system and describe their function:

- ___ Ovaries
- ___ Fallopian Tubes
- ___ Uterus
- ___ Endometrium
- ___ Cervix
- ___ Vagina

_____ I can identify the structure in the male reproductive system and describe their functions:

- ___ Testes
- ___ Seminiferous tubules
- ___ Interstitial Cells
- ___ Sertoli Cells
- ___ Epididymides
- ___ Ductus/vas deferens
- ___ Cowper's Glands
- ___ Seminal Vesicles
- ___ Prostate Gland
- ___ Ejaculatory Duct
- ___ Urethra
- ___ Penis

_____ I can differentiate between sperm and eggs in terms of their supporting structures such as seminiferous tubules, interstitial cells, sertoli cells, follicle, and corpus luteum.

_____ I can describe how the Y chromosome causes testosterone to be produced leading to male organ formation, whereas it's absence results in female organ development.

_____ I can explain how STI's like Chlamydia, gonorrhea, human papilloma virus, etc can interfere with fertility and reproduction.

_____ I can describe the role of GnRH, FSH, eH, estrogen, progesterone and testosterone in the regulation of primary and secondary sex characteristics in females and in males.

_____ I can identify the principal reproductive hormones involved in the female menstrual cycle and explain how FSH, LH, estrogen, and progesterone work together to maintain the menstrual cycle.

_____ I can graph the changes in estrogen, progesterone, FSH, and LH throughout the menstrual cycle.

_____ I can Identify and describe the function of testosterone, LH, and FSH in human males.

_____ I can trace the process from conception to birth including:

- ___ Fertilization, zygote, gastrulation, blastulation & neurulation
- ___ Implantation
- ___ Extra-embryonic membrane formation
  - ___ placenta
  - ___ amnion
  - ___ chorion
  - ___ allantois
- ___ Parturition

_____ I can describe the roles of progesterone, LH, hCG, prostaglandins, and oxytocin in human development (i.e. in the steps above)

_____ I can describe the general mechanisms of lactation in human females after childbirth and the role of oxytocin and prolactin.

_____ I can describe the main physiological events in human prenatal development such as neural tube / nervous system development, heart formation, limb formation, sex differentiation as it relates to each trimester.

_____ I can 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)

_____ I can describe the influence environmental factors such as maternal lifestyle, alcohol, drugs, and infections can have on embryonic and fetal development – i.e. teratogens

_____ I can describe medical technologies such as in vitro fertilization, vasectomy, and infertility drugs.

Cell Division

_____ I can explain the meaning of haploidy, diploidy, and polyploidy

_____ I can explain the steps of the cell cycle including interphase, prophase, metaphase, anaphase, telophase and cytokinesis

_____ I can differentiate and compare the processes of mitosis and meiosis in terms of their purpose, as well as the major steps involved in each.

_____ I can describe the difference between metaphase of mitosis and metaphase of meiosis I & II.

_____ I can describe the process of crossing over and evaluate its significance to organisms inheritance.

_____ I can describe the process of nondisjunction and identify disorders such as Turner & Down Syndrome that occur as a result.

_____ I can explain how both fraternal and identical offspring are formed in a single birthing event.

_____ I 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.

Classical Genetics

_____ I can describe the evidence Mendel obtained for dominance, segregation, and the independent assortment of genes on different chromosomes.

_____ I can calculate & compare ratios and probabilities of genotypes and phenotypes for genetic crosses with the following inheritance patterns:

- _____ Dominant vs recessive
- _____ Incomplete dominance
- _____ Co-dominance
- _____ Linked traits
- _____ Sex-Linked
- _____ Multiple alleles

_____ I can describe the effect that linked genes have on crossing over have on the variability of organisms.

_____ I understand that traits can be controlled by one pair of genes (Rh factor), or they may be controlled by many genes (ex. skin colour, height)

Molecular Genetics

_____ I can describe the contributions that were made by James Watson and Francis Crick to the field of genetics.

_____ I can describe the structure of DNA, including the three components of nucleotides, the two families of nitrogen bases, and how the two strands are bonded together.

_____ I can describe how a DNA molecule is able to replicate itself semi-conservatively using molecules such as helicase & DNA polymerase.

_____ I can describe the differences in DNA synthesis by polymerase in the leading and lagging strands of DNA replication.

_____ I understand how a DNA sequence is transcribed into an mRNA sequence of bases using RNA polymerase.

_____ I understand how rRNA, tRNA, and mRNA interact to synthesize a polypeptide / protein based on the nucleotide sequence of an mRNA molecule.

_____ Given a DNA sequence, I can use the mRNA codon table to identify the amino acid sequence for which it codes.

_____ I can demonstrate how a random change (mutation) in the DNA sequence can result in abnormalities and provide a source of genetic variability (good or bad).

_____ I understand and can demonstrate the range of consequences of genetic mutations (severe, moderate, silent, advantageous).

_____ I can explain how, in general, restriction enzymes cut DNA molecules into smaller fragments based on a specific nucleotide sequence, leaving "sticky ends".

_____ I understand the purpose and function of ligases.

_____ I can explain how restriction enzymes, ligases, and other DNA technology can be used to transform cells by inserting new DNA or genes into their genome.

_____ I can explain how the sequence of nitrogen bases in DNA can give evidence for the relationships among organisms of different species.

_____ I understand that very small amounts of DNA are found in chloroplasts and mitochondria and can be used to help trace inheritance.

Populations and Communities

_____ I can list the 5 conditions that are required for a Hardy-Weinberg equilibrium and can explain how the gene pool changes if each condition is not met.

_____ I 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
- _____ Mutation

_____ I can use the Hardy-Weinberg equation to determine allele and genotype frequencies using $p + q = 1$ and $p^2 + 2pq + q^2 = 1$

_____ I can describe how interactions between predators and prey and between producers and consumers can alter populations.

_____ I can describe commensalism, mutualism, and parasitism.

_____ I understand the difference between interspecific and intraspecific competition and can predict how both will affect populations.

_____ I can explain how organisms defend themselves from competition using mimicry, protective coloration, toxins, and modified behaviours.

_____ I can explain how / why mixtures of populations may change over time from a climax community through different stages of succession.

_____ I know what the terms mortality, natality, immigration, and emigration mean in terms of population siz /growth.

_____ I can describe a population's size & growth using the following terms: carrying capacity, biotic potential, environmental resistance

_____ I can calculate a population's growth rate (gr), per capita growth rate (cgr) and population density (Dp).

_____ I can explain the differences between a logistic growth pattern (S curve) and an exponential growth pattern (J curve)

_____ I can explain the difference between an open and closed populations.

_____ I can list some of the major differences between r-selected and K-selected organisms.