GRADE 12 BIOLOGY
FINAL EXAM

Name: _____
Date: _____

Instructor: Mr. R. Furney

Weight Factor: This final exam is worth 25% of the course mark

Due to COVID this is a take home exam. It must be in my hands by Thursday Noon 5 Nov. It can be earlier. Consult with classmates if necessary.

Marks:
　　Each individual question is two marks unless otherwise indicated

Open responses. Open responses are to be answered in **grammatically correct** sentences/paragraphs.

UNIT A – GENETICS

Multiple Choice – Circle the letter of the **one** best answer

1. Alternate forms of a gene that influence the same trait and are found at the same location in homologous chromosomes are called:

     a. alleles   b. phenotypes
     c. genotypes   d. prototypes

2. If the genotype is **AaBbcc** then **aBc** would represent

     a. The genotype of the offspring   b. the phenotype of the offspring

     c.   a gamete of the parent   d. a possible zygote

3. In humans brown eyes are dominant over blue eyes. A brown-eyed woman who has a blue-eyed child has the genotype

     a. bb   b. Bb   c. BB   d. none of these

4. An **AA** individual:

     a. has a homozygous genotype.
     b. has a heterozygous phenotype.
     c. has a heterozygous genotype.
     d. has a homozygous phenotype.

5. If a human organism inherits two X chromosomes, this individual will be:

     a. Female   b. Male   c. colour-blind   d. sterile

6. A family has seven sons and no daughters. The chance that their eighth child will be a daughter is

     a. 1 in 7   b. 1 in 8   c. 1 in 2   d. 7 in 8

7. An expectant mom's '*amniocentesis*' reveals that the embryo has Tay Sachs disease, a recessive genetic condition (**tt** =Tay Sachs). What are the genotypes of the parents if the parents do not have the disease?

    a. Tt X Tt   b. TT X TT

    c. tt X tt   d. t X t

8. Amniocentesis reveals that the embryo does have Tay Sachs disease, a recessive gene. From the previous question what are the chances that a later child **will** have Tay Sachs?

    a. No chance   b. 100%   c. 25%   d.50%

9. A pedigree is:

    a. a diagram or documentation that depicts the biological relationships between an organism and its ancestors.

    b. documentation of the orthomorphic, anthroprogenic and dyslexic tendency of an extinct extoplastic organism

    c. a certificate for graduating university with a degree in Biology.

    d. no longer relevant ever since the Cambrian era explosion of life on the planet.

OPEN REPONSE

9. Blue eyes is an autosomal recessive trait, brown dominant. If a blue-eyed woman had children with a heterozygous brown-eyed man;

    a. Show the Punnett Square

    b. Determine the probability any of their children having blue eyes.

UNIT C – EVOLUTION

OPEN RESPONSE

1.   Explain the difference between a genome and a gene pool.

2.   **Types of natural selection**. State the three types of natural selection that occur on polygenic traits and give an example of each with their graphs.

TRUE / FALSE

True False. Is the following sentence True or False? Circle the correct response **T** or **F**.   (1 Mark each)

a.   Natural selection is the only source of evolutionary change.
T / F

b.   The theory of evolution states that species change over time
T / F

c.   The inheritance of *acquired* characteristics during an individual organism's lifetime was one mechanism of evolution supported by Darwin. **T / F**

d.   The two major ideas that Darwin presented in *The Origin of Species* were that evolution occurred and that natural selection was its mechanism. **T / F**

e.   Evolution by natural selection works best on a population having no genetic variation. **T / F**

f.   Evolution by natural selection selects based on the phenotype, not the genotype.   **T / F**

g. A vestigial structure is inherited from ancestors but has lost much or all of its original function.   **T / F**

h. Evolution, in genetic terms, is not affected by a change in the frequency of alleles in population over time.   **T / F**

i. The height of humans is an excellent example of a single gene trait.   **T / F**

MULTIPLE CHOICE – Circle the letter of the *one* best answer.

1. The occurrence of large or small beak sizes among seed crackers in the absence of medium-sized beaks is an example of:

    a.   directional selection

    b.   stabilizing selection

    c.   disruptive selection

    d.   none of the above

2. The random change in allele frequency in a population is called:

    a.   mutation

    b.   selective pressure

    c.   genetic drift

    d.   electrophoresis

5. The disruption of a population's genetic equilibrium **cannot** be caused by:

    a.   non-random mating   b.   mutations

    c.   natural selection   d.   polygenic traits

6. Which single statement most accurately reflects what population geneticists refer to as "fitness"?

   a. Fitness is the measure of an organism's ability to survive and reproduce.

   b. Fitness reflects the number of mates each individual of the population selects.

   c. Fitness refers to the relative health of each individual in the population.

   d. Fitness is a measure of the contribution of a genotype to the gene pool of the next generation.

7. Which one of the following populations would most quickly lead to two groups with few shared traits?

   a. a population with disruptive selection

   b. a population with directional selection

   c. a population with stabilizing selection

   d. a population with no selection

   e. none of the above

8. An example of speciation caused by **temporal isolation** is:

   a. organisms are only temporary and never reach fertility

   b. the season in which the organisms mate becomes different

   c. the feather plumage of one is not pretty enough to attract a mate

   d. the mating call of the organism is not sufficiently melodic.

9. Label the two graphs to show which one represents a single-gene trait and which one represents a polygenic trait.

_____   _____
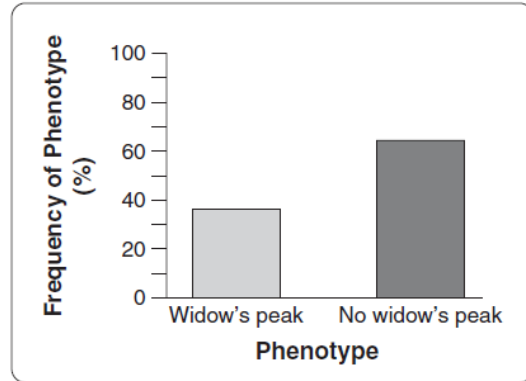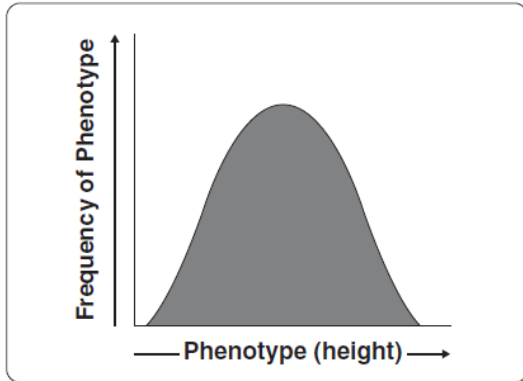
10. Traits, such as human height, that are controlled by more than one gene are known as:
    a. single-gene traits
    b. polygenic traits
    c. recessive traits
    d. dominant traits

UNIT D – BIODIVERSITY CLASSIFICTION

1. A group of organisms at any one particular level in a binomial nomenclature classification system is called a

    a.   species   b.   genus   c.   taxon   d.   phylum

2. In the original Linnaean taxonomic system, the taxon 'Class' is a collection of various different:

    a.   classes   b.   phyla   c.   orders

    d.   divisions   e.   kingdoms

3. Physical structures of an organism that have arisen as a result of common evolutionary descent are said to be:

    a.   analogous   b.   homogenous   c.   heterogamous

    d.   homologous   e.   contiguous

5. Which one of the following sequences shows the correct hierarchy of the Linnaean binomial classification system, going from the most inclusive (largest group) to the least inclusive (smallest)?

    a.   Kingdom, Domain, Phylum, Order, Class, Family, Genus, Species

    b.   Domain, Phylum, Kingdom, Genus, Species, Family, Order, Class

    c.   Genus, Species, Kingdom, Phylum, Order, Class, Family

    d.   Species, Genus, Family, Class, Order, Phylum, Kingdom

    e.   Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species

6. True or False. Snakes are in the clade that includes all tetrapods (organisms with four limbs) Circle one: **T** / **F**

7. Give an explanation of why there are no more dinosaurs remaining on earth.

8. It is frequently argued by some that humans (*Homo sapiens*) are descended from monkeys. Explain how this is incorrect.

UNIT E – BIODIVERSITY

1. Energy Pyramid.
    a. Draw an energy pyramid for a four-step food chain.
    b. Given that 100% of the energy is available at the first trophic level (producer), show (label) what percentage of that energy is available at the highest trophic level?

MULTIPLE CHOICE – Circle the letter of the *ONE* best answer.

1. Which of the following describes how ALL autotrophs get their energy?

    a. directly from the sun with photosynthesis or chemosynthesis from hydro thermal vents in the ocean
    b. from eating primary producers
    c. from organic food like hydrogen sulfide
    d. from eating organisms that are living or were once living

2. The total number of individual living organisms at each trophic level in an ecosystem can be shown in a(n)

    a. energy pyramid.   b. biomass pyramid.

    c. pyramid of numbers.   d. biogeochemical cycle.

3. In the following food chain, which organism is the producer?

    grass ------> rabbit -------> snake ------> eagle

    a. Grass   b.   Rabbit   c.   Snake   d.   Hawk

4. A relationship in which one organism is helped and another organism is neither helped nor hurt is called:

    a. parasitism   **b.** mutualism
    c. competition   .   **d. c**ommensalism

5. Which one of the following is an **abiotic** factor in an ecosystem?

    a. Plants   b.   Fungi   c.   Weather   d.   Deer

7. Mushrooms and other fungi are responsible for breaking down dead organic matter. In the ecosystem, they are called:

    a. Producers   b. Consumers
    c. Decomposers   d. Scavengers

8. The amount of energy that is passed from one organism to the next in a food chain is typically:

    a. 5%   b. 10%   c. 15%   d. 20%

9. On what trophic level would you find organisms that use the sun's energy directly to make their own food?

    a. 1   b. 2   c. 3   d. 4

10. One gas that is a major contributor to the greenhouse warming is:

a. H_2SO_4 b. CO_2 c. Helium from the sun   d. mustard

11. An animal that only eats plants is called a

    a. Producer   b. Herbivore
    c. Carnivore   d. Omnivore

12. Which of the following organisms is an autotroph?

    a. Algae   b. A bear

    c. Fungi   d. ecliptic heterotrophs

13. All the beavers in an area would be called a:

    a. Community   b. Population

    c. Habitat   d. Gaggle

14. All of Earth's water, land, and atmosphere within which life exists is known as

    a. a population   b. a community

    c. a biome   d. the biosphere

15. Fires, hurricanes, and other natural disturbances can result in:

    a. commensalism   **b.** competition
    c. parasitism   **d.** succession

OPEN RESPONSE

Do two of the following three questions. If you do all three, the best two will be marked

1. Explain the difference between a habitat and a niche.

2. Explain the meaning of a 'keystone' species.

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3. In the movie '**How Wolves Change Rivers**', explain how the re-introduction of Wolves after 70 years changed the ecosystem back to its natural condition.

4. Symbiosis

    a. Explain, in one sentence, the idea of symbiosis.

    b. List at least **two** of the **three** major types of symbiosis **and** give an example of those two.

Bonuses: (Extra bonus points below)

1. **Explain**. Explain what a heterotroph is. (2 marks)

BONUS FOR **10 MARKS**

2. In rabbits, grey hair is dominant to white hair. Also in rabbits, black eyes are dominant to red eyes.

GG = gray hair   Gg = gray hair
gg = white hair   BB = black eyes
Bb = black eyes   bb = red eyes

A male rabbit with the genotype **Ggbb** is crossed with a female rabbit with the genotype **ggBb**. The Punnet square is set up below. Fill it out the necessary Punnett square(s) and determine the expected **number** of each phenotype in the offspring.

How many out of 16 have grey fur and black eyes? _____

How many out of 16 have grey fur and red eyes? _____

How many out of 16 have white fur and black eyes?

_____

How many out of 16 have white fur and red eyes? _____

3. Explain the greenhouse effect. (two marks bonus)

4. Explain what is a co-dominant trait with an example.

5. Using a proper binomial nomenclature, **name this curious bug** you have discovered by its genus and species.

Be Kind!

The name of this bug is:

_____ _____

Thanks for being a great bunch!
See you soon for some more learning together.