Name:_____ class period:___

Important Vocabulary to know for the Semester 2, 2018 Biology Common Assessment

Make up to 6 concept maps using the vocabulary terms. Check the word when it has been used in a concept map at least once (all words should be used in at least one concept map). In each concept map: 1) Circle/box eachvocab word, 2) put arrows between the words 3) Write descriptions on the arrows to explain the relationship between the words 4) Draw concept maps on this paper and/or in your BILL.

Allele
Amino Acid
Biodiversity
Carrying Capacity
Decomposer
DNA
Ecological Succession
Embyrology
Enzyme
Food Chain
Food Wed
Gene
Genotype
Heterozygous
Homologous
Structures
Homozygous
Invasive Species
Mutation
Natural Selection
Nucleotide
Phenotype
Phylogenetic Tree
Population
Protein
RNA
Selective Pressure
Speciation
Species
Trophic Levels
Variation
Vestigial Structures

Name: _____ **BIOLOGY S2 REVIEW GUIDE FOR FINAL EXAM**

I. Matching. Write the letter of the term that best matches each phrase below. You may use each term more than once, or not at all.

sickle cell / albinism

(E), A 1. Genetic conditions such as cystic fibrosis or hemophilia can result from a change in this

(B) E 2. One piece of DNA (one gene) codes for the production of this

F 3. Made of a phosphate group, a sugar molecule, and a nitrogen base; the building block of nucleic acids (DNA and RNA)

C 4. A mistake in DNA (the wrong base is added, deleted, or substituted)

A 5. How information is passed from parents to offspring

B 6. During transcription, DNA information is rewritten as this

A, B 7. These TWO molecules both contain genetic codes based on sequences of bases

a. DNA
b. mRNA
c. mutation
d. lipid
e. protein
f. Nucleotide

II. Write the mRNA and amino acids coded for by the following DNA sequence. (refer to the chart in your notebook)

nucleus transcription ribosome translation

DNA: T A C | G G A | T C G | A T C

mRNA: A U G | C C U | A G C | U A G

amino acids: codon met pro ser stop - translation ↳ no amino acid

III. Write the correct term that matches each definition below. (use your notebook or worksheets for a list of terms, if you need help)

heterozygous 1. The alleles of a particular gene are different (for example, Hh)

phenotype 2. Physical appearance of a trait

homozygous 3. When the two alleles of a particular gene are the same (for example, PP or pp)

allele 4. Different versions of a gene H or h

deterministic

genotype 5. Set of alleles that an individual has for a particular gene

MC1R
TYR
HBB

SCENARIO

Several genes are associated with the risk of cardiovascular (heart) diseases. One example is the T235 gene. Individuals that have a mutation in the T235 gene have a higher risk of heart disease than those without the mutation.

variation

TP53

risk

dom. rec.

At the T235 gene location, there are two possibilities: the "normal" allele, A, or the mutated allele, a. Individuals with heart disease were tested to determine their genotypes for the T235 gene, and the data is shown below.

Genotype for T235	% individuals with heart disease (likelihood of heart disease diagnosis)
AA	10%
Aa	25%
aa	40%

not 100%

However, a new analysis of data from more than 55,000 people finds that by living right — by not smoking, by exercising moderately and by eating a healthy diet heavy in fruits, vegetables and grains — people can tamp down even the worst genetic risk. "DNA is not destiny; it is not deterministic for this disease," said Dr. Sekar Kathiresan, the director of the Center for Human Genetic Research at Massachusetts General Hospital. "You do have control over the problem, even if you have been dealt a bad genetic hand."

1. How many copies of the T235 gene does each person have? Explain.

2- 1 allele from mom, 1 allele from dad — law of segregation

2. People with how many copies of the mutated T235 allele are most likely to develop heart disease? Explain.

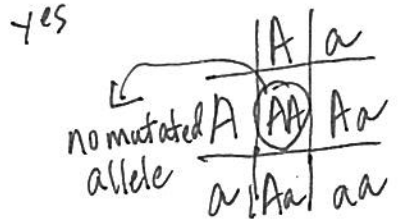
2- aa - 40% - greater risk w/ environmental factors

3. Will everyone that has the mutated version of the gene develop heart disease? Explain why or why not.

No, 25-40% likely to develop the disease

4. Is it possible for a mother and father that BOTH have heart disease and BOTH have an allele for heart disease to have a child without the disease? Explain your answer, and use a punnett square to help support your claim.

yes



25% chance 1:4

5. A mutation that changes the DNA sequence of a gene might cause what to happen in the organism?

1. no effect - same amino acid CCU → CCC still pro
2. little effect - different amino acid same properties
3. lot of effect - different amino acid, no amino acid

6. If every cell in your body contains the same DNA, explain how it is possible to have different types of cells that perform different functions.

each cell make different proteins - gene expression.
- differentiation - make diff. protein to make diff. cells,
- determination - cell's job

7. Briefly describe at least 3 processes that cause genetic variations.

p. 23
- crossing over - homologous chromosome exchange DNA
- mutation - DNA
- meiosis - egg & sperm making
- random fertilization - dom/rec

meiosis

dip → haploid

p. 23

law of segregation

law of independent assortment

8. Why is genetic variation within a species so important?

- allows for selective differences. survival of the fittest

9. Briefly describe how new species form.

- differences in individuals.
- isolation (separated)
- changes enough that they can't produce fertile offspring.

to increase in number (reproduction)	

SCENARIO

One type of plant can have white flowers or yellow flowers. All of the plants in a meadow have had only white flowers for many generations. One day the wind blows some seeds from a yellow-flowered plant into the meadow. The next year, there are a few yellow-flowered plants in the meadow. Over the next several years, the percentage of yellow flowers in the meadow increases each year. People walking through the meadow report that the bees in the area seem to always be found on the yellow flowers, not the white flowers. (Bees are pollinating the yellow flowers more than the white flowers.) Eventually, the meadow becomes filled with all yellow flowers, and there are no white flowers left in this meadow.

A 10. This pattern of white and yellow flowers is most likely due to:

a. simple dominant-recessive inheritance
b. sex-linked inheritance
c. codominance
d. the color of flowers is random, not controlled by genetics

11. In order for natural selection to occur, four factors must be present in the population as described below. In the space provided, explain how this population of flowers might have evolved through natural selection, by writing how each factor might be demonstrated in the flower population.

Factor	Evidence
The genetic variation of individuals in a population	different color variations white & yellow flowers. heritable
Competition for an environment's limited supplies of resources needed to survive and reproduce	-yellow and white are competing for space pollinators - bees go to yellow more often
Some organisms have a version of a trait that gives them an advantage in the environment	*what is the vocabulary term that describes a version of a trait that provides an advantage? adaptation / fitness yellow flower color attracts more bees
An increase in organisms that are better able to survive and reproduce in that environment/ The potential for a species	yellow take over white flowers because the bees prefer them more. population changes so ~~more~~ yellow

5

SCENARIO

Phylogenetic trees (or cladograms) use data to model relatedness of species. Numbers in Figure 2 below show the number of nucleotide differences in a particular gene (Mitochrome C). Higher numbers indicate more differences between two species.

Figure 1: phylogenetic tree for Mitochrome C Relatedness

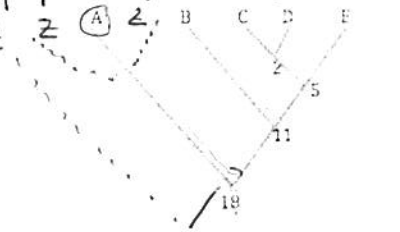


Figure 2: Mitochrome C: DNA sequence differences between species

SPECIES	A	B	C	D	E	Z
A	-	16	17	17	18	12
B	~~16~~	-	10	10	11	15
C	~~17~~	~~10~~	-	2	5	16
D	~~17~~	~~10~~	~~2~~	-	4	16
E	~~18~~	~~11~~	~~5~~	~~4~~	-	18
Z	~~12~~	~~15~~	~~16~~	~~16~~	~~18~~	-

12. Based on the information above, which two species are most closely related? Least related?

closely C-D least A-E

13. If the DNA sequence for Mitochrome C is 50 nucleotides long, how many nucleotides would be the same for species B and E?

39 = 50-11

14. Explain a speciation event that could have led to species C and D.

- hurricane
- traveling to an island
- competition for resources
- drought

15. Besides DNA similarities, what other scientific evidence supports the hypothesis that species are closely related?

- derived traits
- protein similarities
- fossils.
- (3) homologous structure / Similar origin different functions.
- (1) vestigial structures
- (2) analogous structures. different origin same function
- embryology

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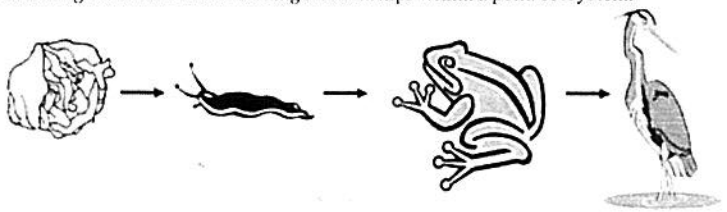
16. If a new species is discovered, species "Z", and found to have the nucleotide differences shown in Figure 2, where would you add species Z to figure 1? Draw it on Figure 1 above.

SCENARIO

The following food chain shows feeding relationships within a pond ecosystem.



algae (water plant) slug/insect frog egret (water bird)

sun → producer (10%) → primary consumer (10%) → secondary consumer → tertiary consumer

17. Describe and/or diagram how energy moves in this ecosystem.

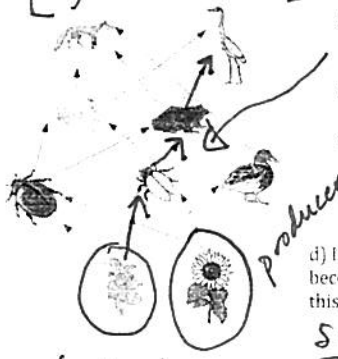
18. Describe and/or diagram how matter, like carbon, moves in this ecosystem.

~~biosynthesis - how we organize food into proteins and our mass~~

matter is recycled, finite amount

matter biosynthesis - how we convert food into proteins and our mass

[algae - air (CO_2)] [algae - sun] energy



a) Identify one food chain in this web

b) circle the organisms that occupy the lowest level in this food web

c) If all of the birds died, what might happen to the other populations?

increase frogs, decrease insects

increase algae

d) If global climate change led to this area flooding, and the pond becoming deep enough for fish to live in it, what might happen to this ecosystem? (Note: fish eat insects and algae).

succession

food web

many food chain less foxes

less/more insects. of different kinds

less algae

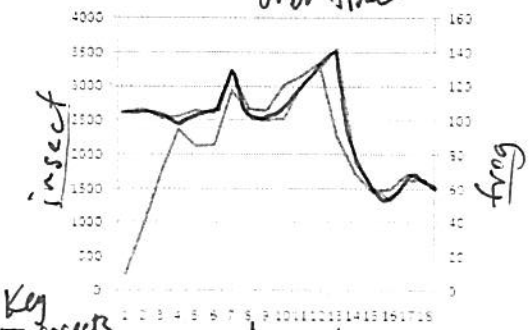
20. Compare the population sizes of foxes and insects in this pond. Explain your comparison.

1,000.s more insects than foxes. 10% energy transfer

21. Scientists measure the insect and frog populations once a year for several years in an ecosystem. Examine their data below.

Year	Insect Population	Frog Population
1	2600	10
3	2500	85
5	2600	85
7	2700	100
9	2600	100
11	3200	120
13	2000	120
15	1500	55
17	1600	65

title: insect and frog populations over time



Key = insects, frogs

a. Create a key for the lines on the graph, title the graph, and label the axes appropriately.

b. In what year can we infer there was an abundance of resources for the insects? Why?

10 abundance reproduce

11 survival

c. What else (besides resource availability) might affect the size of the insect population?

# of frogs (density dependent)

d. Determine rate of change for the insect/frog population between years 1 and 5. Show your work.

Rate = (Final population - Initial population) / (Final time - initial time)

insect $\frac{2600 - 2600}{5 - 1} = \frac{0}{4} = 0$ population

frog $\frac{85 - 10}{5 - 1} = \frac{75}{4} = 19 \frac{\text{frog}}{\text{yr.}}$

e. In this example, the insect population is always larger than the fish population. Will that always be the case? Explain why or why not.

yes, fish eat insects

10% rule

f. Predict what will happen to the frog population if it exceeds its carrying capacity.

~~insects would crash then frogs~~

insect pop. would crash, then frogs

g. If all of the frogs were removed from this ecosystem, what might happen to the insect population?

insects would explode → pop. → grass would die

h. Describe several ways that humans could impact this ecosystem.

- invasive species
- industrialization
- deforestation
- pollution
- insecticides