Biology Final Exam Review Guide, Unit 1: Ecosystem Dynamics
(Please answer in red boldface)

1. List 5 different terrestrial biomes and 2 different aquatic biomes. For each, identify their characteristics (climate; location; sample organisms)

   Terrestrial biomes:
   rainforest
   taiga
   tundra
   desert

   Aquatic biomes:
   freshwater
   marine

2. Which biomes are wettest? Driest? Most biologically diverse? Why?
tropical rainforests, deserts, tundra, tropical rainforests are the most diverse because they have the most biodiversity

3. Distinguish between habitat, niche, ecosystem, and biome.
   habitats are places where both animals and plants can live together, ecosystems are a community or group of living organisms that live in and interact with each other in a specific environment, a biome is a place with multiple ecosystems and habitats and multiple populations and communities, and lastly, a niche is an organism's environment, behaviors, and interactions.

4. Which of the above is the human gut? Why?
   ecosystem, because there are multiple organisms and species living amongst each other
5. Which of the above is the fur of a sloth? Why?
   I think it's an ecosystem because it contains both biotic and abiotic factors
6. Give 3 examples from the nature of biotic factors interacting with abiotic factors.
   an animal standing on a rock
   a tree's leaves getting blown off by the wind
   a wildfire causing deforestation

7. Which abiotic factor(s) is/are necessary present in ALL ecosystems, including anaerobic ones? Why?
   abiotic factors that are necessary for all ecosystems include water, sunlight, oxygen, soil, and temperature because without these factors it wouldn't be considered an ecosystem, and the biotic factors wouldn't be able to survive or grow without these abiotic factors

   anaerobic factors that are necessary for all ecosystems include excess moisture, inadequate porosity, a rapidly degrading substrate, and excessive pile size because without these factors animals would have a harder time surviving and finding habitats

8. Which biotic factor(s) is/are usually present, even when not readily visible? Why?
   producers or autotrophs, consumers or heterotrophs, and decomposers or detritivores because all of these biotic factors are included inside an ecosystem even if we can't always see them

9. Distinguish between independent, dependent, and controlled variables. Identify the IDVs, DVs, and Controlled in the Pillbug lab? ([See question #13 on the Unit 1 practice test](#))

the independent variable is the isopods, the dependent variable is the isopods own preference of dry or moist soil, and the controlled variable is how many isopods there are

10. How many IDVs should a good experiment have? Why?
    only ONE

11. How many controlled variables should a good experiment have? Why?
    up to 3

12. Identify 3 special variables that should be controlled especially when doing **human experiments**. Explain why they need to be kept constant.
    a hypothesis, an independent and also a dependent variable

13. What is a placebo? What function does it serve in a human drug experiment? Why is it necessary?
    a placebo is a harmless pill, and it helps experiment more freely and gives a wider variety of experiments while still not harming the human, and it's necessary because without a placebo the test subject could get hurt or could even die.

14. Which kind of graph should be used when all data is numerical and continuous (e.g., change in mass over time; or change in energy vs temperature)?
    a scatter plot graph or a line graph

15. Which kind of graph should be used when one or more of the variables is non-numerical or non-continuous (e.g., # of different car brands sold; or # of students who prefer blue vs red vs purple).
    a bar graph or pie chart

16. List 5 characteristics that should be included in all graphs.
    ● A title which describes the experiment
    ● The graph should fill the space allotted for the graph
    ● Each axis should be labeled with the quantity being measured and the units of measurement
    ● Each data point should be plotted in the proper position
    ● A line of best fit

17. Which types of communities have the greatest resilience? Why?
    communities that live in coastal wetlands because they have tons and tons of different habitats and foods and ecosystems

18. What is a monoculture? What kind of biodiversity index do they have? Are they very resilient? Why?
    monoculture is the practice of growing a single crop in a massive area. Their biodiversity isn't too high but they are pretty resilient because they have bunch of small animals like rabbits, rats, etc, as well as bugs and worms and plants

19. Where are the most diverse biomes located? Why?
    The tropical rainforest because they have tons and tons of ecosystems and populations and communities, and they have plenty of resources for the animals to eat. They also hold many different habitats for animals to survive and live in.

20. Calculate the biodiversity index for the following communities:

Species	Community 1	Community 2	Community 3	Community 4

A	0	2	1	5
B	55	110	79	350
C	1500	1100	500	500
D	0	15	0	0
E	0	15	25	15
F	20	15	25	15
G	0	10	0	0
H	0	10	25	15
I	1000	200	1000	1000
Total # of organisms	2,575	1,477	1,655	1,900
Total # of Different Species	4	9	7	7
Biodiversity Index	**0.0015**	**0.0060**	**0.0042**	**0.0036**

21. Which of the above communities is probably the most resilient? Why?

    community 2 because they have the highest level of biodiversity

22. How does the genetic diversity of a community increase resilience?
    Diversity creates resilience both in ecosystems and living organisms. Yet, although genetic diversity protects organisms from many diseases and disorders, it also makes it much harder for geneticists to identify the risk factors that lead to common diseases. Thus, humans too create resilience by increasing biodiversity.

Biology Final Exam Review Guide, Unit 2: Populations & Symbiosis
(Please answer in red boldface)

23. Give 2-3 examples of each relationship: competition, predation, parasitism, mutualism, commensalism
    Competition: a bull fighting another for a female, and a lion fighting another for territory

    Predation: a fox eating a rabbit, and a squirrel getting eaten by an eagle

    Parasitism: a leech sucking on a humans blood, and a worm going inside fruit and poisoning whatever eats the fruit

    Mutualism: clownfish and sea anemone, fungus and an ant

    Commensalism: remora sucking on a sharks blood while the shark thinks the remora is cleaning him, and a bee stealing pollen from a flower

24. Which of the above types of relationships occurs when organisms occupy the same niche? Why?

3

any of them can happen, it just depends on the organism

25. Define the following: Immigration, Emigration, Mortality, Natality

    immigration is coming inside of a population, **emigration** is exiting/leaving a population, **mortality** is being subject to the state of death, and **natality** is the birth rate of a population (the ratio of the number of births to the size of the population)

26. What happens to population size when mortality exceeds natality?

    it overshoots its carry capacity and overpopulation occurs causing it's resources to go lower which then brings the population to extinction.

27. What happens when emigration exceeds immigration?

    then too many will be leaving the population causing the populations numbers to go down which then leads to too many resources which could also cause overpopulation

28. What is the term for anything that <u>**limits**</u> the size of a population?

    a limiting factor

29. What does carrying capacity mean?

    the max amount of organisms a population can carry

30. List 5 examples of biotic factors that can limit a population's size. Give 5 examples of abiotic factors that can limit population size. For each example, explain how it limits population size.

    biotic limiting factors: water, because they will die of thirst if they don't have water, food because they need it to survive, availability of mates because they need mates to reproduce, predators because they can die easily from an attack, and diseases because they could die or go extinct from the result of a disease.

    abiotic limiting factors: temperature because it could cause animals to be forced out of their habitat, water because they can't live without water, pollution because they could die from pollution, climate because if it stays hot for too long or cold for too long they could die depending on their adaptations, natural disasters because it could cause them to go habitatless and could expose them to possible predators.

31. What will happen to a prey population if the predators increase in number? If they decrease?

    they will increase if predators decrease and vice versa

32. What if the prey population increases, would this affect the predator population size? How? Why?

    it would increase predator population because they get a lot of food but then they would overpopulate and die out, because they went over their carry capacity.

33. Identify the lag, exponential, and stabilizing phases on the curve to the right. Identify the following:

    A. **Lag phase:** increases then stays still for a little and then decreases

    B. **Exponential phase:** increases and goes to the very top

    C. **Carrying capacity:** increases and once carry capacity is reached it decreases

    D. **Overshoot and dieback:** increases then decreases

34. What's it called when a population shoots past the carrying capacity? Can this continue indefinitely? Why?

    it's called overpopulation, and it can't continue because they will die out and go extinct from overpopulating
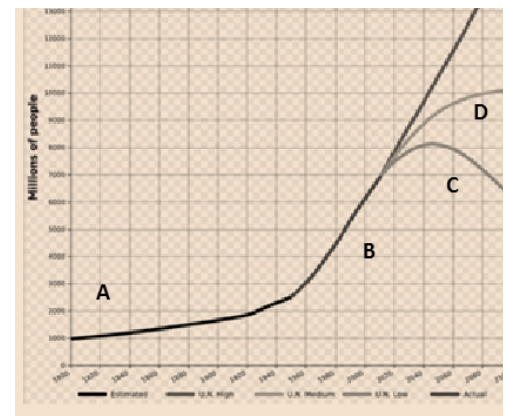
35. Under what conditions would a population experience an overshoot & dieback? Identify this in the curve to the right?

if they overshot their carry capacity then this would happen and overshoot and dieback is D on the graph

36. How can two different species both occupy the same habitat but not compete for resources?

if they have different resources then that can live together and still hunt for other resources

37. What effect does immigration of a species and emigration of a species have on the population

immigration increases their numbers while emigration decreases

38. What happens soon after a population surpasses carrying capacity?

it can't handle that many organisms so they die out due to running out of resources

39. Identify 5 factors that have allowed continued human population growth in a J-shape.

enough water, enough food, mortality and natality rates not higher than one another, many habitats and places to live in, no predators other than natural causes

40. Which condition(s) must exist for a population to continue to grow in a J-shape?

There must be random mating, no mutation, no migration, no natural selection, and a large sample size

41. What is the difference between native species and invasive species?

native species are species that are familiar with other species in their habitat but invasive species are unrecognizable and new species who mean harm to the species around them

42. What are some characteristics of invasive species that allow them to thrive in other ecosystems?
- Fast growth.
- Rapid reproduction.
- High dispersal ability.
- Phenotypic plasticity
- Tolerance of a wide range of environmental conditions

43. Summarize what happened with the Brown Tree Snake in Guam and the Leafy Spurge. How did these invasive species get to their new homes? What kinds of problems have they caused?


Wolf and Moose Populations on Isle Royale
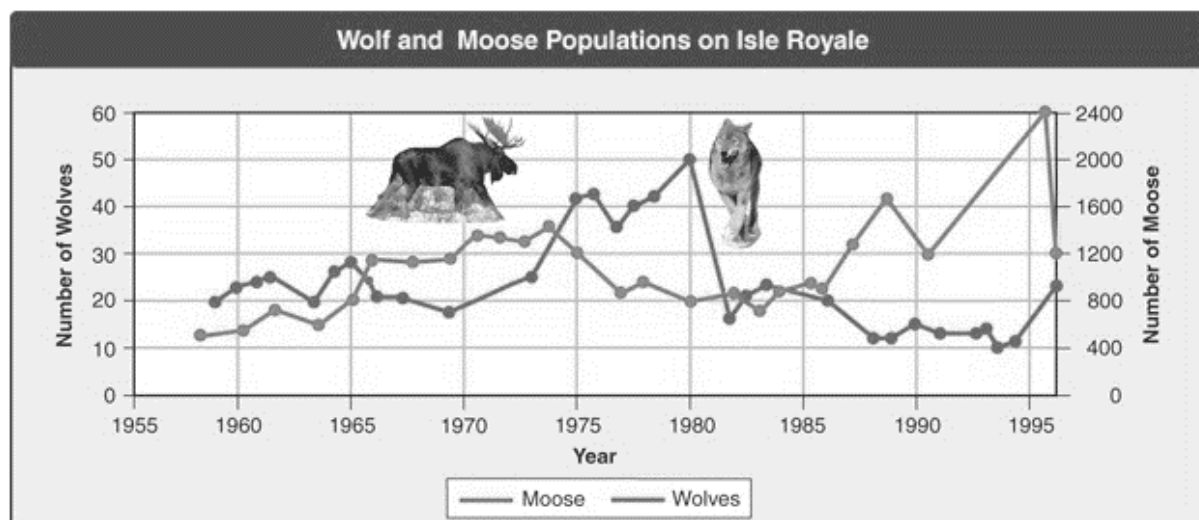
44. In the graph, above, what is the relationship between moose and wolves?
    they depended on one another for survival
45. How does the moose population limit or control the size of the wolf population?
    The moose are the wolves' chief nutritional source, and the wolves, in turn, help keep the moose population in check.
46. How does the wolf population control or limit the size of the moose population?
    The moose are the wolves' chief nutritional source, and the wolves, in turn, help keep the moose population in check.

Biology Final Exam Review Guide, Unit 3: Cycles of Matter & Energy
(Please answer in red boldface)

1. Identify the following as a Carbon **source** or **sink**:
    Photosynthesis sink
    Combustion source
    Decomposition source
    Respiration source
    deforestation source
    healthy forests sink
    the ocean source

2. What is combustion? the process of burning something

3. What are fossil fuels? How did they get produced millions of years ago? How did carbon get into them?
    natural resources. They got produced millions of years ago by dead plants and organisms. Over time the organisms transferred into resources
4. Where is most nitrogen found in the environment? What is its chemical formula?
    Atmosphere. N2
5. How do plants obtain nitrogen? Animals?
    by bacteria. by roots
6. What is eutrophication? What are the consequences? What are the causes?
    excess of nutrients in a body of water. it causes for less plants and more animals to be alive from lack of oxygen
7. What are the reactants for photosynthesis? Products? Which organisms do it? In which organelle?
    carbon dioxide. oxygen. plants. chloroplast
8. What are the 2 parts of photosynthesis called? Which can occur only in the light?
    light dependent reactions and the calvin cycle
9. What are the reactants for respiration? Products? Which organisms do it? In which organelle?
    oxygen and glucose. ATP. all living things. mitochondria.
10. How much ATP is made during glycolysis? Kreb (Citric acid) Cycle? Electron transport chain?
    2. 2. 32.
11. Which organisms do BOTH photosynthesis and respiration?
    plants and some bacteria
12. Complete the following table on fermentation:

Organisms	Reactants	Products	Amount of ATP made
Yeast	glucose	carbon dioxide	2
Mammals, some bacteria	glucose	ATP	38
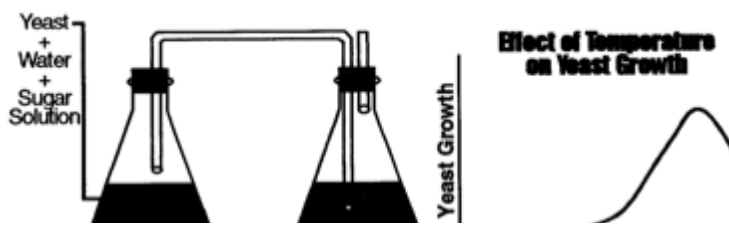
13. What will be made in Flask A? Why? Flask B? Why?
flask A will have alcohol and flask B will absorb CO2

14. What if you repeated the experiment without sugar?
nothing won't happen because the yeast would die

15. What if you repeated the experiment after boiling the yeast and sugar and water?
it would kill the yeast and not reproduce.

16. Identify the following from the diagram:
    A. 3 examples of Producers
plants, flowers, fruit

    B. 3 examples of primary consumers
squirrel, deer, tree frog

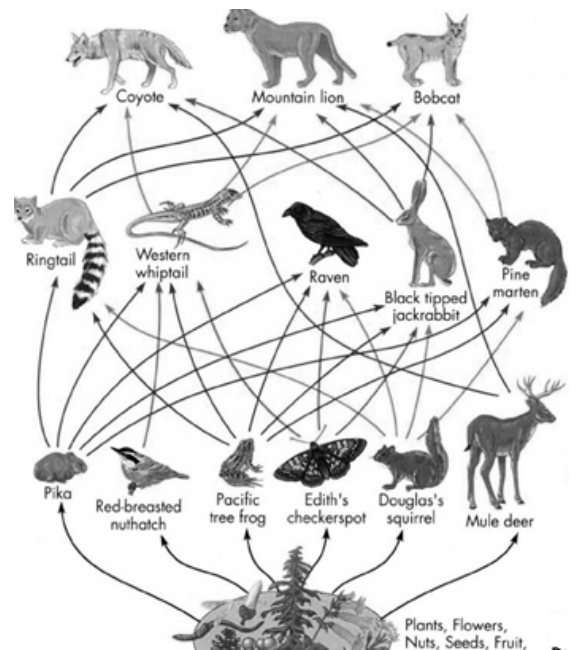   C. 3 examples of secondary consumers
raven, ringtail, jackrabbit

    D. 3 examples of tertiary consumers
coyote, mountain lion, bobcat
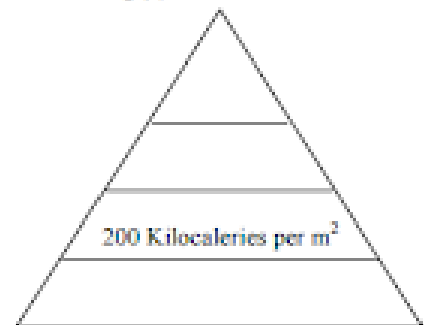

    E. 1 example of an apex predator
mountain lion

17. Complete the energy pyramid to the right using the 10% rule
    A. Level 1 has how many Kcals?___2000___

    B. Level 2 has 200 Kcals per m^2
    C. Level 3 has how many Kcals?_____20_____

    D. Level 4 has how many Kcals?_____2_____

18. Why is only 10% transferred to the each level?
the amount of energy decreases at every level
19. Which organisms make up the trophic level with the greatest amount of energy?
plants
20. Which trophic level contains the greatest amount of biomass? The greatest amount of energy?
producers.
21. If a trophic level requires at least 1 Kcal per square meter in order to sustain life, which of the following
    ecosystems can support life (assume that each makes up a 4-level pyramid like the diagram above)?
        A. Producer level = 1000 kcal- yes

        B. Producers level = 100 kcal- no

        C. Herbivore level = 100 kcal- yes

D. Secondary consumer level = 10 kcal- yes

22. What is biomagnification (bioaccumulation)?
    the amount of toxic things in an organism
23. Which trophic level will have the greatest amount of toxins due to biomagnification? Why?
the organisms on top because the entire chain eventually gets to them because they technically eat
everything below them
24. If you wanted to reduce the amount of toxins in your body, how should you alter your diet? Why?
eat healthy, sleep good, drink water, etc
25. What would be the consequences to the health of a redwood forest if salmon died out? Why? How are
    salmon important to the health of the forest? How are bears important?
        there would be no more bears because they rely on the salmon and the entire chain would get
        messed up, most likely causing a negative impact on the trees too.

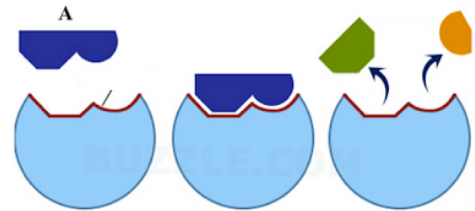## Biology Final Exam Review Guide, Unit 4: Macromolecules & DNA
(Please answer in red boldface)

26. In the diagram to the right, label the following as enzyme;
    substrate; products.
        A. Dark blue shape is__subtrate__
        B. Light blue shape is___products___
        C. Green and Orange shapes are __enzyme___
27. Label the following as monomer, dimer, monosaccharide,
    disaccharide (**each object has 2 of the above answers**)
        A. Dark blue shape is__monomer, monosaccharaide_
        B. Green and Orange shapes are __dimer, disaccharide__

28. Identify the 4 macromolecules and each of their monomers
monosaccharides are the monomers of carbohydrates, amino acids are the monomers of proteins,
glycerol/fatty acids are the monomers of lipids, and nucleotides are the monomers of DNA.

29. Which elements are found in all 4 macromolecules?
    carbohydrates, protein, lipids, nucleic acids
30. Which 2 macromolecules contain nitrogen?
    protein and all nucleic acids
31. Which macromolecule contain Sulfur? Phosphorus?
protein. nucleic acid

32. Which of the 4 macromolecules carry out most of a cell's important functions?
nucleic acids
33. What are the 4 DNA bases? Which are complementary?
adenine (A), cytosine (C), guanine (G), or thymine (T)
(A&T, C&G)

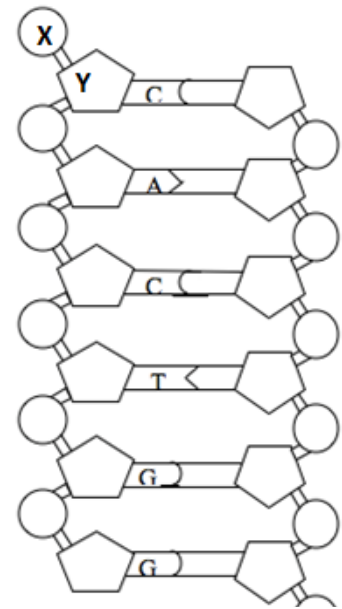34. Which of the 4 macromolecules make up hemoglobin?
        A. Antibodies?
        B. Testosterone?
        C. Starch?
        D. Cellulose?
        E. Neurotransmitters?
        F. Enzymes?

35. Which molecule is represented in the diagram to the right?
dna strand

36. On the diagram to the right, identify the sugar molecule, a nitrogen base and a phosphate.
   A. Circle (X) represents__nucletide___
   B. Pentagon (Y) represents____deoxyrhibose____
   C. A, G, T, C represents_____dna bases_____

37. Fill in the complementary bases: C—A—C—T—G—G
GTGCC

38. Compare and contrast DNA and RNA?
perform different functions in the body, have a different physical structure, and are made up of different things

39. Distinguish between the following types of mutations: insertion, substitution, deletion, frame shift
they affect a dna sequence in different ways

40. Describe the function, location and steps of translation
translate dna into rna

41. Identify the 3 types of RNA and their functions
mrna, trna, rrna

42. What is a codon? Which molecule is it a part of?
   a sequence of three nucleotides that make up dna

43. Distinguish between genes and codons
   hundreds of codons make up genes. not the same thing

44. What is an anticodon? Which molecule is it a part of?
   complementary to its corresponding rna

45. Translate the following mRNA sequence: **AUGAAGAGAGAUUUUGGU**
   UACUUCUCUCUAAAACCA

46. What would it translate to if it mutated to   **AUGAAGUGAGAUUUUGGU**
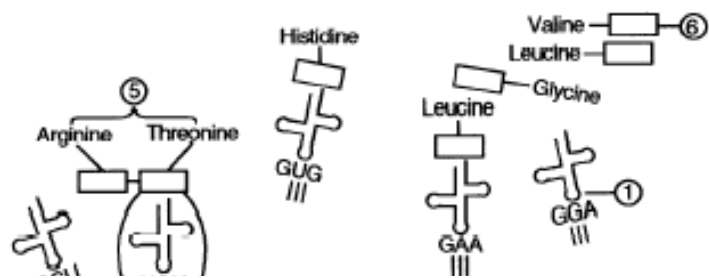   UACUUCACUCUAAAACCA

47. What kind of mutation is this?
   replace

48. What would it translate to if it mutated to   **AUGAAGGAGAUUUUGGU**
   UACUUCCUCUAAAACCA

49. What kind of mutation is this?
   deletion

50. In the diagram to the right, which **number(s)** represent(s)
    (A) Nucleotides 6
    (B) Codons 5
    (C) Anticodons 3
    (D) Proteins or polypeptides 1
    (E) Amino acids 4
    (F) mRNA
    (G) tRNA 2

51. Which codon will Threonine bind to? Histidine? Leucine? Histidine

52. What is the anticodon for Threonine? Histidine? Leucine?

                                                aca, gug, gaa