Biology 1 – Practice for Final Exam

**Note: These questions have not been evaluated by any of the biology 1 professors. This review should be a supplement to your studying for the final.

***Highlighted are answers and bolded are **notes** regarding the topics.

1. Which of the following is an example of a null hypothesis?
    a. Captive dolphins are calmer than wild dolphins.
    b. There is no difference between the squirrels in NYC and the squirrels in Orlando.
    c. Dogs fed wet food live longer than dogs fed dry food.
    d. Wild cheetahs run faster than captive cheetahs.
2. Which of the following taxonomic levels is the least inclusive?
    a. Phylum
    b. Order
    c. Class
    d. Genus

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

3. How many valence electrons does Sulfur have? Atomic number = 16
    a. 16
    b. 2
    c. 6
    d. 8
4. What type of chemical bond does H_2O have?
    a. Nonpolar Covalent
    b. Ionic
    c. Polar Covalent
    d. No bond

Polar: unequal sharing/big difference of electronegativity

Nonpolar: equal sharing

5. Elements with different amounts of neutrons are known as:
    a. Isotopes
    b. Cations
    c. Anions
    d. They are different elements

Cations= are "pawsitive" = positively charged

Anions=negatively charge

6. Which of the following is a base?

a. [H+] = $1x10^{7}$
b. [H+] = $1x10^{9}$
c. [H+] = $1x10^{2}$
d. [H+] = $1x10^{5}$

Acids=1-6.9, Neutral=7, Base=7.1-14

7. Which of the following is hydrophilic?
   a. Fats/Oils
   b. Sugar/Salt
   c. CO_2
   d. CH_4

Hydrophilic=polar molecules

Hydrophobic=nonpolar molecules

8. Ice is more dense than liquid water.
   a. True
   b. False

When water freezes (becomes ice) it becomes less dense by expanding.

9. In _____ functional group, carbon is double bonded to oxygen and single bonded to hydroxyl.
   a. Ketone **(Oxygen double bonded to a carbon in the middle)**
   b. Aldehyde **(Oxygen double bonded to a carbon at the end)**
   c. Carboxyl (COOH)
   d. Hydroxyl **(OH)**
10. Match the definitions to the correct chemical isomer.

    Cis-Trans: C Structural: A Enantiomers: B

    a. Same molecular formula but different covalent bond arrangement
    b. Mirror images of each other
    c. Same molecular formula but different spatial arrangements around a double bond
11. _____ is the synthesis of polymers and water is released, while _____ is the breakdown of polymers and water is required.
    a. Condensation; glycosidic linkage
    b. Glycosidic linkage; hydrolysis
    c. Condensation; hydrolysis
    d. Hydrolysis; polypeptides
12. Match the bond with the correct macromolecule. One will have two.

    Proteins: B+ D Nucleic Acids: C Carbohydrates: A

a. Glycosidic Linkage
b. Peptide Bonds
c. Phosphodiester Bonds
d. Hydrogen Bonds

Proteins form peptide bonds between amino acids during their primary structure to form polypeptides, and they also form hydrogen bonds between segments of the polypeptides in their secondary structure to form a protein.

Lipids have no specific bond + no specific monomer.

13. What type of lipid contains only single bonds between its carbon atoms?
    a. Saturated Fat
    b. Unsaturated Fat **(at least 1 double bond)**
    c. Phospholipids **(has both types of fat)**
    d. Steroids **(ring structure)**
14. Which of the following are pyrimidines? Select all that applies.
    a. Cytosine
    b. Thymine
    c. Adenine
    d. Uracil
    e. Guanine

Pyrimidines =single rings; Purines = double rings

Pyrimidines bind with purines.

15. Which of the following organelles is not included in all cells?
    a. Ribosomes
    b. Plasma Membrane
    c. Cell Wall **(only in plant cells + prokaryotes)**
    d. Cytosol/Cytoplasm
16. Which of the following organelles has digestive vesicles that contain acidic fluid to breakdown macromolecules, waste, and foreign materials?
    a. Peroxisomes **(converting H_2O_2 to H_2O)**
    b. Golgi Apparatus **(FedEx/Further Modification)**
    c. Lysosomes
17. What do animal cells have that plant cells don't? Select all that applies.
    a. Lysosomes
    b. Cell Wall
    c. Chloroplasts
    d. Central Vacuole
    e. Centrosomes

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The other three organelles are what plant cells have, and animal cells don't.

18. What does the rough ER produce?
    a. Polypeptides **(rough ER has ribosomes that produce proteins)**
    b. Lipids **(smooth ER produces)**
    c. Carbohydrates
    d. Nucleic Acids
19. Which type of transport does not use transport proteins?
    a. Simple Diffusion
    b. Facilitated Diffusion
    c. Phagocytosis
    d. Sodium-Potassium Pump

Simple + facilitated diffusion are both passive types of transport because they go with the concentration gradient, but facilitated required transport proteins for ions, polar, or large molecules.

The other two are types of active transport.

20. A cell with a 45% water concentration is placed into a beaker with a 65% water concentration. Which correctly describes what will happen?
    a. The cell is hypertonic to the solution and will crenate.
    b. The cell is hypertonic to the solution and will lyse.
    c. The cell is hypotonic to the solution and will crenate.
    d. The cell is hypotonic to the solution and will lyse.

Hypertonic=more solute than water or low H2O concentration

Hypotonic=more water than solute or high H2O concentration

Lyse=burst; Crenate=shrivel

21. What correctly describes the anabolic pathway?
    a. Endergonic, $+\Delta G$, synthesizes large molecules
    b. Endergonic, $+\Delta G$, breaks down large molecules
    c. Exergonic, $-\Delta G$, breaks down large molecules
    d. Exergonic, $+\Delta G$, synthesizes large molecules

Catabolic Pathway = C

22. How do enzymes speed up reactions?
    a. Makes a reaction occur quicker
    b. Adds energy to the reaction
    c. Changes ΔG
    d. By lowering the Activation Energy (E_A)

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23. Where does pyruvate oxidation and citric acid cycle occur?
    a. Mitochondrial Matrix
    b. Cytosol/Cytoplasm **(glycolysis)**
    c. Electron Transport Chain (ETC) **(oxidative phosphorylation)**
    d. Nucleus
24. How do electrons flow through the ETC? Note: the roman numerals refer to the protein complexes. Correct Answer=B
    a. $I \rightarrow II \rightarrow III \rightarrow IV$
    b. $I\ or\ II \rightarrow Mobile\ Carrier\ Q \rightarrow III \rightarrow Mobile\ Carrier\ C \rightarrow IV$
    c. $Mobile\ Carrier\ Q \rightarrow III \rightarrow Mobile\ Carrier\ C \rightarrow IV$

Protein Complex I is where NADH begins electron flow, while Protein Complex II is where FADH2 will begin.

25. What powers chemiosmosis in ATP Synthase?
    a. Free electrons in the plasma membrane
    b. The diffusion of H+ ions that were pumped into the intermembrane space from the movement of electrons in the protein complexes in the ETC
    c. The exhaling of carbon dioxide
    d. ATP
26. What are the products of the citric acid cycle?
    a. 2 NADH, 2 ATP, 2 Pyruvate Molecules
    b. 2 CO_2, 2 NADH, 2 Acetyl Coenzyme A
    c. 4 CO_2, 6 NADH, 2 ATP, 2 $FADH_2$
    d. 26-28 ATP, H_2O

A=glycolysis

B=pyruvate oxidation

D=oxidative phosphorylation

27. What part(s) of cellular respiration does fermentation complete?
    a. Only glycolysis
    b. All of cellular respiration
    c. Only glycolysis and pyruvate oxidation
    d. None of cellular respiration
28. Where does the light reaction of photosynthesis occur?
    a. Outer membrane of the chloroplast
    b. In the cell wall
    c. Thylakoid membrane
    d. Thylakoid space
29. What are the products of the Calvin cycle of photosynthesis?

a. 9 ATP, 6 Glucose
b. 9 ADP, 6 $NADP^+$, 6 G3P
c. 9 ATP, 6 CO_2, 6 G3P
d. 9 ADP, 6 CO_2, 6 $NADP^+$, 6 G3P

30. Similar to the light reaction of photosynthesis, the Calvin cycle is light dependent.
    a. True
    b. False
31. If 2n=24, how many sister chromatids are there during prophase of mitosis?
    a. 12
    b. 24
    c. 48
    d. 6

Interphase=duplication of our chromosomes (24 times 2 = 48)

32. What are the products of mitosis?
    a. Four diploid cells
    b. Four haploid cells
    c. Two diploid cells
    d. Two haploid cells
33. What occurs during prometaphase of mitosis?
    a. Nuclear envelope breaks down and kinetochores form at centromeres of each chromatid
    b. Microtubules pull sister chromatids apart
    c. Cytokinesis divides cytoplasm into two cells
    d. Nucleolus disappears and chromatin condenses

B=anaphase

C=cytokinesis

D=prophase

34. How does the cell pass the Gap2 checkpoint?
    a. The cell automatically passes
    b. By having DNA damage
    c. By having all kinetochores attached to a microtubule
    d. By having high cyclin levels
35. What are the products of meiosis 1?
    a. Four diploid cells
    b. Two diploid cells
    c. Four haploid cells
    d. Two haploid cells

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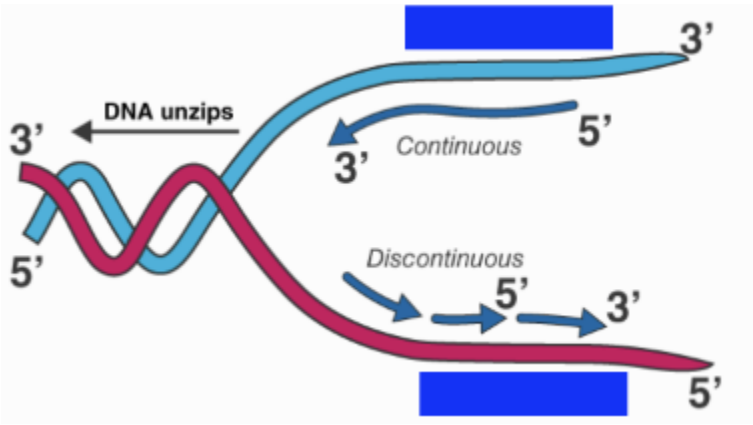
Meiosis II products = C

36. If 2n=24, how many tetrads are present during prophase I?
    a. 12
    b. 24
    c. 48
    d. 6

Interphase=duplication of our chromosomes (24 times 2 = 48)

Tetrads are 4 sister chromatids in 1 so divide duplicated chromosomes by 4. (48/4 = 12)

37. What occurs during meiosis 1 but not meiosis 2?
    a. Prometaphase **(not even during meiosis)**
    b. Interphase
    c. Cytokinesis
    d. Metaphase
38. Meiosis begins with a diploid parent cell just like mitosis.
    a. True
    b. False
39. According to the image below, which strand will act as the template for the leading strand?



Source: BYJU's

    a. Top Strand (light blue)
    b. Bottom Strand (red strand)

Leading strand = go towards where DNA unzipping (Helicase), goes 3'-5'

Synthesizes DNA 5'-3'

40. Match the definitions to the correct part of DNA synthesis.

Primase: E Helicase: B DNA Polymerase III: D Ligase: A Topoisomerase: C

    a. Connects Okazaki fragments of lagging strand

b. Unwinds DNA at origin of replication
c. Prevents strain in replication forks
d. Adds nucleotides to build new complementary DNA strand
e. Adds primer RNA nucleotides to start new complementary DNA strand

41. What gametes can an organism with HhGG produce? Select all that applies.
    a. HG
    b. hG
    c. Hg
    d. Hg

Use FOIL + ignore any duplicate games.

Ex. HG, HG, hG, hG

42. In horses, black coats are dominant to white coats. If a heterozygous horse breeds with a homozygous recessive horse, what is the probability their offspring will have a white coat?
    a. 25%
    b. 50%
    c. 75%
    d. 100%

Black Coats (B) & White Coats (b)

Parents: Bb x bb

	B	**b**
b	**Bb**	**bb**
b	**Bb**	**bb**

43. In monkeys, long tails are dominant to short tails, and small ears are dominant to big ears. If a monkey who is homozygous dominant for tail length and heterozygous for ear size, breeds with a monkey who has a short tail and big ears, what is the phenotype ratio?
    a. 9:3:3:1
    b. 1:1
    c. 1:1:1
    d. 3:1

Long tails (B) & Short Tails (b) & Small Ears (R) & Big Ears (r)

Parents: BBRr x bbrr --> FOIL to find gametes --> BR, Br x br

	BR	**Br**
br	**BbRr**	**Bbrr**

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BbRr = 1 offspring will have a long tail and small ears

Bbrr = 1 offspring will have long tail and large ears

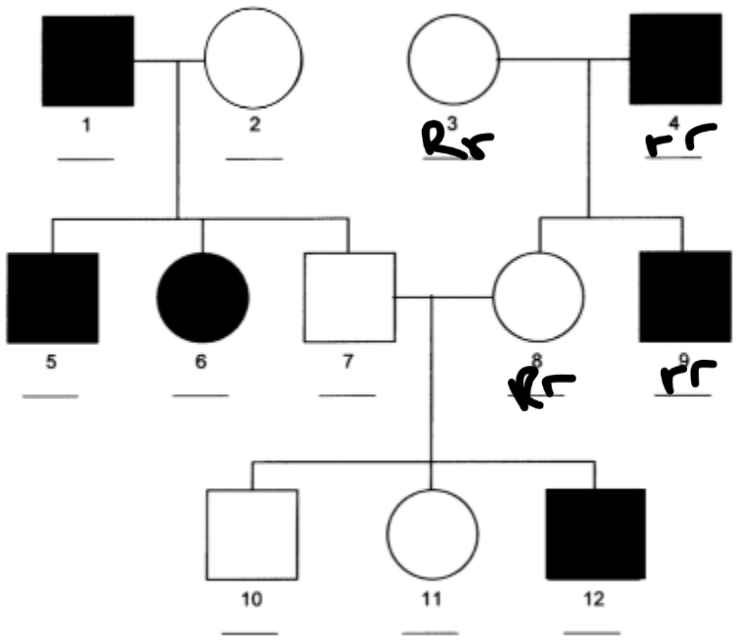
44. In monkeys, long tails are dominant to short tails, and small ears are dominant to big ears. If a monkey who is heterozygous for both tail length and ear size, breeds with a monkey who is also heterozygous for both tail length and ear size, what is the phenotype ratio?
    - **a.** 9:3:3:1
    - b. 1:1
    - c. 1:1:1
    - d. 3:1

Two species that are heterozygous for both traits will always have this ratio.

45. In flowers, neither of the alleles for pigment are dominant. All three genotypes produce different phenotypes. This is an example of:
    - a. Codominance
    - b. Incomplete Dominance
    - c. X-Inactivation
    - d. Multiple Alleles **(ex. Blood types)**

When alleles experience incomplete dominance, if a species is heterozygous, their phenotype will be a mix of the two alleles. Ex. Red pigment (R), White pigment (r), Pink pigment (Rr)

46. The pedigree follows an autosomal recessive trait.



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Source: Prof. Dawson's Active Learning #5 Slide 4

What is the genotype of individual 8?

a. RR
b. rr
c. Rr
d. RR or Rr

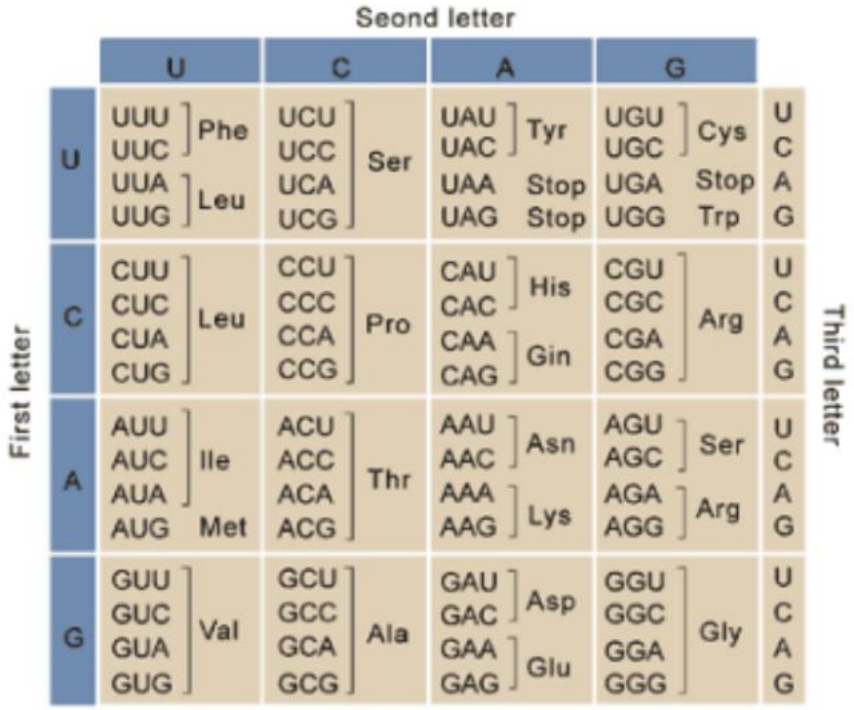
47. There was a mutation in one of the nucleotide pairs in DNA, and it changed the amino acid that was originally coded for, to a stop codon. This is an example of:
    a. Missense **(changes to any other amino acid)**
    b. Silent **(no change in amino acid produced)**
    c. Nonsense
48. In eukaryotes, mRNA is modified to have a cap at the 3' end and a poly-A tail at the 5' end.
    a. True
    b. False

5' Cap + Poly A Tail = protects from degradation, export mRNA from nucleus

5' Cap = facilitates attachment to ribosome

49. In order to synthesize proteins, we must start with:
    a. Unwinding DNA and using it as a template to create mRNA **(transcription)**
    b. tRNA bringing amino acids to ribosomes **(translation)**
    c. Reading codons on mRNA **(translation)**
    d. Modifying mRNA **(in between transcription and translation)**

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50.

Source: Prof. Dawson's Ch. 17 Practice Problems

How would this section of mRNA be translated according to the image above?

5'ACCUAUUGA 3'

a. Thr-Tyr-Stop
b. Arg-Cys-Stop
c. Thr-Tyr-Cys
d. Arg-Cys-Thr