ADVANCED BIOLOGY FINAL EXAM REVIEW QUESTIONS

LAB SKILLS, MICROSCOPE WORK, AND SCIENTIFIC EXPERIMENTATION (CH 1, 4, 12, 10)

1. Explain what an experimental variable and a control setup are in scientific experiments. 1.6

2. Know how a microscope works and calculate the magnification of a microscope 4.2

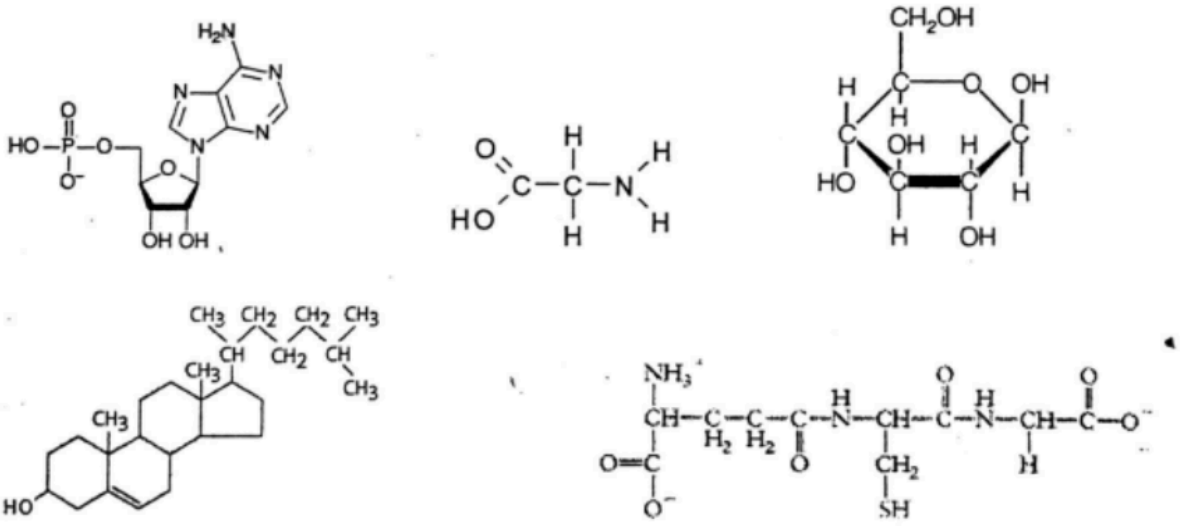
THE STUDY OF LIFE (CH 1 and CH 41)

3. Name the three types of symbiotic relationships and give an example of each. – 41.1 – 41.2

BIOCHEMISTRY (CH 2 & 3)

4. Identify the 4 elements that are found in all living things. – HONC lab, chapter 2

5. Give the function and examples of each of the following: Carbohydrates, Lipids, Proteins, and Nucleic Acids - 3

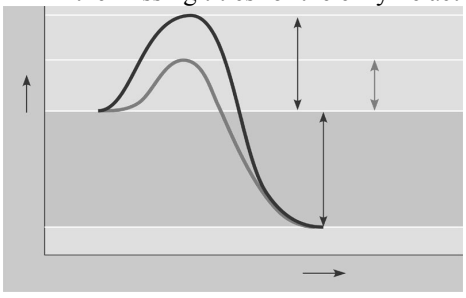


6. How can you recognize the structural formulas of Carbohydrates, Lipids, Proteins, and Nucleic Acids?

7. What is dehydration synthesis? What is hydrolysis? - Labs and sheets, 3.2 – 3.4

8. What are enzymes, what do they do, and what factors affect enzyme function ? - 5.3-5.4, Enzyme Labs

Fill in the missing titles for the enzyme activity graph below.



9. What is homeostasis? 25.3

CELL STRUCTURE AND FUNCTION (CH 4, 32, 34, 5, 18)

10. What are the 3 parts of the Cell Theory? – 34.2

11. What are the differences between prokaryotic and eukaryotic cells ? - 4.4, 4.6 Relate this to the endosymbiotic theory

12. What are the major differences between plant and animal cells? – 4.10, Lab on Onion Cells, Cheek Cells, Elodea Cells

13. Match the cell organelles and their functions below . – 4.3 - 4.12, Sheets

	1. internal framework that anchors organelles, gives shape	A) cell membrane
	2. cellular "ropes" made of repeating units of the protein *actin*	B) cell wall
	3. hollow tubes for transport, movement, made of actin & tubulin proteins	C) centriole
	4. vesicles pinch off these structures; proteins modified and packaged here	D) chloroplast
	5. cellular "stomach"	E) chromosome
	6. selectively permeable "doorman"	F) cilia
	7. the most important plastid, turns CO_2, H_2O, sunlight into glucose	G) cytoskeleton
	8. membrane-bound spheres that store water & dissolved materials. Membrane surrounding it is called a *tonoplast*. Plants have a large, central one.	H) flagella
	9. site of rRNA production in nucleus	I) Golgi body
	10. rod-like structures that package the DNA into neat, discrete units; play role in cell division	J) lysosomes
	11. used for movement, and to move material past cell. Beat back and forth like little oars	K) microfilament
	12. site of lipid synthesis	L) microtubule
	13. appearance due to being peppered with ribosomes; this membranous network receives the just-synthesized protein and may modify it	M) mitochondria
	14. the "brain" of the cell	N) nucleolus
	15. this organelle has a double membrane and converts glucose and O_2 to produce energy in the form of ATP	O) nucleus
	16. enclose plant cells. Strong cellulose fibers give rigidity	P) plastids
	17. small organelles in plants that contain pigments or store starch	Q) ribosome
	18. small membranous spheres that transport materials around cell, out of cell via exocytosis, and into cell via endocytosis	R) rough endoplasmic reticulum
	19. made of rRNA and protein, these small, numerous organelles are the site of protein synthesis	S) smooth endoplasmic reticulum
	20. twin barrel like structures in animal cells that play a role in cell division; have 9 + 2 arrangement of microtubules	T) vacuoles
	21. whip-like structures used for movement in unicellular organisms; have 9 + 2 arrangement of microtubules	U) vesicle

14. Define Semipermeable Membrane, Diffusion, Osmosis, Active Transport - 5.6 - 5.7, Egg Lab

15. Define Hypertonic, Isotonic, Hypotonic. – 5.6 Complete the questions below .

A semipermeable sack containing 4% NaCl (salt), 1 % Glucose, and 10% protein is suspended in a solution with the following composition: 10% NaCl, 10% Glucose and 40% protein. Assume the sack **is permeable to all substances except protein**. Use the choices and insert the letter indicating the correct event.

A. moves into the sac B. moves out of the sack C. does not move

1. ____ glucose 2. ____ water 3. ____ protein 4. ____ NaCl

Is this an isotonic, hypertonic or hypotonic solution? _____

16. Endosymbiotic theory – 18.4- 18.5 What structural evidence in these two organelles supports this hypothesis? What type of transport was used to bring either the mitochondria or the chloroplast within the larger cell?

PHOTOSYNTHESIS AND RESPIRATION (CH 6 & CH 7 & CH 5 & CH 42)

17. Draw the ATP/ADP Cycle. – 5.2

18. What is photosynthesis (in words)? - 6.3

19. Write an equation to represent the process of photosynthesis. - 6.3

20. What organelle is involved in photosynthesis? What organisms perform photosynthesis? 6.1 – 6.4, 42.1

21. What happens during the light reaction of photosynthesis? What occurs in the Calvin-Benson reaction?

22. What is cellular respiration (in words)? 7.1

23. Write an equation to represent the process of cellular respiration – 7.1 – 7.3

24. What organelle is involved in cellular respiration? What organisms perform cellular respiration? – 7.1 – 7.3

25. Describe glycolysis, the Krebs cycle, and electron transport in aerobic respiration.

26. How does anaerobic respiration differ from aerobic respiration?(Compare and contrast reactants, products, site of reactions) - 7.2, 7.4, 7.5

CELL DIVISION (CH 8 & CH 4 & CH 9)

27. What factors affecting cell size? – 4.1, Lab on Surface Area of Agar Cubes

28. What processes involve cell division? – 8.1- 8.4

29. Describe the stages of the cell cycle. – 8.3- 8.4, Lab on Onion Root Tip

Vinblastine is a drug that interferes with the assembly of microtubules. It is widely used for chemotherapy in treating cancer patients. **Suggest a hypothesis** to explain how vinblastine slows tumour growth by inhibiting cell division

30. How does meiosis differ from mitosis? 8.3 – 8.4, 9.3 – 9.4

31. What are homologous chromosomes?

32. What is the difference between haploid and diploid cells? 9.2, 9.5,

33. Give an example of a human diploid cell. How many chromosomes does it contain?

34. Give an example of a human haploid cell. How many chromosomes does it contain?

REPRODUCTION (CH 33, CH 19, CH 20, CH 28, CH 21, CH 9)

39. Name and describe at least four types of asexual reproduction. – 39.1, 20.4, 28.5, 21.1, 9.5 Reference your notes.

40. What is the advantage of sexual reproduction?

41. Where are sperm formed in humans? Where are eggs formed in humans?

GENETICS (CH 10 & CH 11)

42. State Mendel's Three Laws – Law of Segregation, Law of Independent Assortment, Law of Dominance

43. Albinism is a recessive trait. Give the genotype of two normally pigmented people who have an albino child.

44. Use a Punnett square to show the cross of a man heterozygous for type B Blood with a woman heterozygous for type A blood. What blood types might their children have and what are the chances for each phenotype?

45. What is incomplete dominance? Give an example that demonstrates this pattern of inheritance.

46. Hemophilia is a sex-linked recessive trait.
   A. Use a punnett sqaure to show the cross of a non-carrier normal female with a hemophiliac male.
   B. What is the genotype of their offspring?
   C. What is the phenotype of their offspring?

DNA, GENES, and CHROMOSOMES (CH 11, CH 12, CH 13)

47. Describe the structure of DNA – what subunits is it made of, what shape, number of strands, etc.

48. List the steps involved in DNA Replication

49. What is crossing over?

50. What occurs during nondisjunction?

51. What is a monosomy, and a trisomy? Give examples of disorders caused by each.

PROTEIN SYNTHESIS (CH 13, CH 11, & CH 8)

1. Complete the following:
   DNA Strand 1 TACTACGGGACACTCGATAAT

   Complementary DNA strand

   mRNA strand (based on strand 1)

   tRNA molecules

   Amino acids

2. Describe or sketch the following chromosomal mutations – Deletion, Duplication, Translocation, Inversion

3. Describe or sketch the following gene mutations – frameshift, point mutation

4. What is a mutagen? What is a carcinogen?

BIOTECHNOLOGY (CH 15)

5. What is the difference between natural and artificial selection?

6. What are stem cells? How might knowledge of stem cells be useful in the future?

EVOLUTION (CH 16 & CH 17)

7. Define variation and adaptation.

8. What is meant by "acquired traits"? What did Lamarck say about acquired traits?

9. What did Darwin mean by "descent with modification?"

10. What are the main components of Darwin's Theory of Natural Selection?

11. Define Gradualism and Punctuated Equilibrium

12. Briefly describe the support for Evolution – Fossils, Homologous and Analogous Structures, Vestigial Organs, Embryonic Evidence, Biochemical Evidence

13. What steps might occur in the formation of a new species? Discuss convergent evolution, divergent evolution, adaptive radiation.

14. What is a zone of inhibition on a bacterial culture plate?

15. Describe how antibiotic resistance develops in bacteria, and how this is evidence of evolution in bacteria.

EVIDENCE OF EVOLUTION (CH 16)

16. What is a cladogram and what does it show? What information can be used to construct a cladogram?

17. List at least 4 types of evidence for evolution and list examples.

ECOLOGY (CH 41, 42)

18. Construct a food web consisting of 7 different organisms. Identify each organism as:
autotroph or heterotroph; producer or consumer (primary, secondary, tertiary); herbivore, carnivore, or omnivore.

19. Draw an energy pyramid. Label each level as producer, consumer (primary, secondary, tertiary). Why does the amount of energy at each level decrease?

BIOGEOCHEMICAL CYCLES (CH 42)

Carbon Cycle – 42.7- 47.8

20. Detail how excess carbon dioxide can contribute to acid rain formation.

21. How is respiration linked to the carbon cycle?

22. Why does the fall season contribute to the carbon cycle? (Be specific)

Population Size and Growth – CH 40 (40.1 – 40.5)

23. Define the term carrying capacity and then give a limiting factor that would influence the carrying capacity of an organism's environment.

24. Sketch an S-shaped population growth curve and label the point where the pollution reaches the carrying capacity of the environment.

25. What is exponential growth? What type of curve on a graph shows exponential growth. Make a sketch of the graph.