

Here is a set of practice questions for Exam #2. The exam will cover lecture sets 5-9 (material from text chapters 4, 5, 7, 8, 11, 12).

1. Which of the following is not found in a prokaryotic cell?

- a. DNA
- b. Cell wall
- c. Plasma membrane
- d. Ribosomes
- e. Endoplasmic reticulum

2. All but one of the following are found in both plant and animal cells. Which one is not?

- a. Mitochondria
- b. Nucleus
- c. Chloroplasts
- d. Ribosomes
- e. Endoplasmic reticulum

3. Which of the following is a component of cilia and flagella?

- a. Cell wall
- b. Microtubules
- c. Microfilaments
- d. Intermediate filaments
- e. Actin fibers

4. For any 3-d shape of length L:

- a. Surface area is equal to  $L^2$
- b. Surface area is proportional to  $L^3$
- c. Volume is proportional to  $L^3$
- d. Volume is equal to  $L^2$

5. As a cell or other object gets smaller, its surface area/volume ratio:

- a. gets larger.
- b. gets smaller.

6. The difference in size between you and your cells, in an absolute sense, is about:

- a. 2 micrometers
- b. 2 millimeters
- c. 2 centimeters
- d. 2 meters

7. The difference in size between you and your cells, in a relative sense, is roughly the same as the difference between you and: (don't get hung up on being exact here- just consider "orders of magnitude")

- a. Earth ( $1.3 \times 10^7$  m) (12,742 km)
- b. North America ( $5 \times 10^6$  m) (5000 km)
- c. Missouri ( $4.5 \times 10^5$  m) (450 km)
- d. Springfield ( $1.3 \times 10^4$  m) (13 km)

8. Which type of microscopy would be most useful for observing the surface features of a preserved cell?

- a. Bright-field light
- b. Phase contrast light
- c. Confocal light
- d. Transmission electron
- e. Scanning electron

The next five questions refer to the list below. Match the function with the appropriate structure. Answers may be used more than once.

- a. ribosome
- b. mitochondrion
- c. cell membrane
- d. endoplasmic reticulum
- e. microtubules

9. catalyzes protein synthesis.

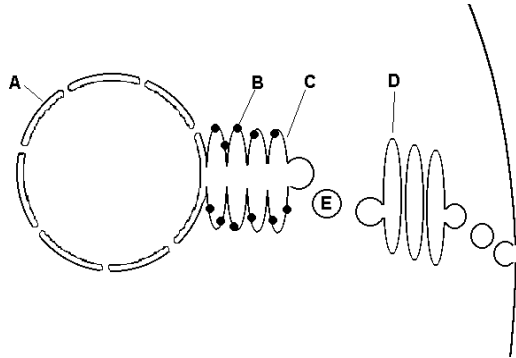
10. site of endocytosis.

11. continuous with nuclear membrane.

12. Which is evidence for an endosymbiotic origin of mitochondria?

- a. chemiosmosis
- b. electron transport
- c. mitochondrial DNA
- d. ATP synthase
- e. Kreb's cycle

The next five questions are based on the diagram below. Choose the letter indicating the appropriate structure from the diagram. Answers may be used more than once.



- 13. endoplasmic reticulum
- 14. nuclear envelope
- 15. Golgi apparatus
- 16. Ribosome

17. Energy use by cells results largely from active transport of:

- a.  $Mg^{++}$  in and  $Cl^-$  out
- b.  $Cl^-$  in and  $Mg^{++}$  out
- c.  $Na^+$  out and  $Cl^-$  in
- d.  $Na^+$  out and  $K^+$  in

18. If a red blood cell is placed in a hypertonic solution, the cell will:

- a. shrink.
- b. swell and burst.
- c. swell until restrained by the cell wall.
- d. not change in volume.

19. Water moves toward:

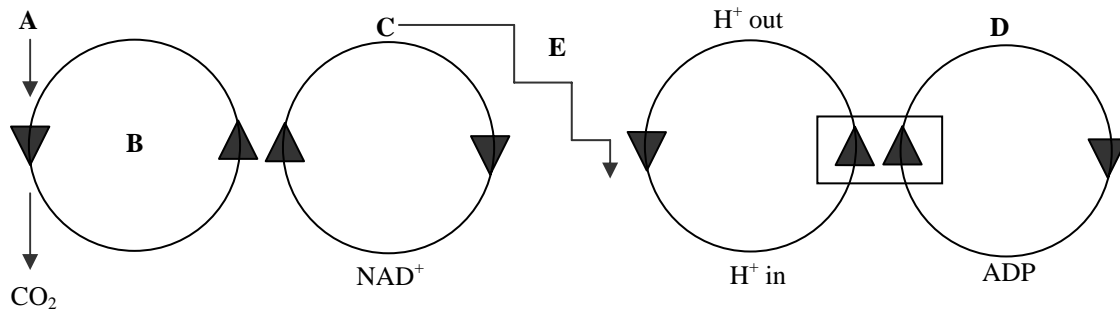
- a. higher solute concentration
- b. lower water concentration
- c. lower solute concentration
- d. both a & b

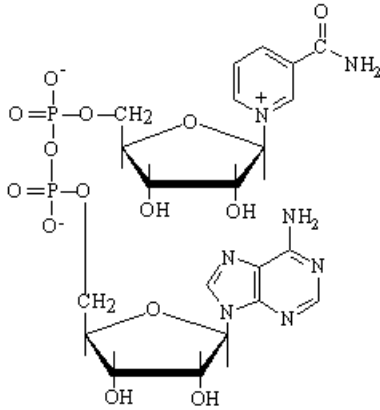
20. In the most general sense, a molecule that is "reduced" is one that has:

- a. gained an oxygen.
- b. lost an electron.
- c. gained an electron.
- d. lost an oxygen.

Indicate appropriate structure on diagram below. Answers may be used more than once.

- 21. electron transport chain
- 22. pyruvate
- 23. NADH
- 24. Kreb's cycle
- 25. ATP





26. The molecule diagrammed above is:

- a. ATP
- b. ADP
- c. AMP
- d.  $\text{NAD}^+$
- e. NADH

27. Comparing anaerobic and aerobic metabolism in muscle, aerobic metabolism has potentially:

- a. greater efficiency and greater power.
- b. greater efficiency but lower power.
- c. lower efficiency and lower power.
- d. lower efficiency but greater power.

28. Anaerobic metabolism is less efficient than respiration, meaning that:

- a. ATP can't be made as rapidly
- b. more oxygen is needed
- c. fewer ATP are made per glucose
- d. both a and b
- e. both a and c

29. A champion weight lifter would probably have unusually high concentrations of the enzymes of:

- a. Krebs's cycle
- b. glycolysis

30. Chemical reactions that transfer phosphate directly to ATP from another molecule (such as phosphoenolpyruvate) are called:

- a. substrate-level phosphorylation.
- b. oxidative phosphorylation.
- c. redox reactions.
- d. hydrolysis.

31. Krebs's cycle occurs in the:

- a. cytoplasm
- b. ribosomes
- c. cell nucleus
- d. mitochondrial matrix

32. The most important contribution of the Krebs's cycle to the overall mechanism of ATP production in an aerobic cell is:

- a. substrate level phosphorylation.
- b. pumping  $\text{H}^+$  across the inner mitochondrial membrane..
- c. reduction of  $\text{NAD}^+$  to NADH.
- d. all of the above

33. The main role of the electron transport chain in the mitochondrion is:

- a. substrate level phosphorylation.
- b. pumping  $\text{H}^+$  across the inner mitochondrial membrane.
- c. reduction of  $\text{NAD}^+$  to NADH.
- d.  $\text{CO}_2$  production.
- e. all of the above

34. The role of oxygen in metabolic respiration is to act as a(an):

- a. enzyme.
- b. reducing agent.
- c. oxidizing agent.
- d. electron acceptor.
- e. both c and d.

35. The metabolic function of the fermentation of pyruvate to lactate is:

- a. production of lactate for the Krebs's cycle.
- b. oxidation of NADH to NAD<sup>+</sup>.
- c. oxidation of NAD<sup>+</sup> to NADH.
- d. proton pumping.
- e. all of the above.

36. Cyanide acts as a metabolic poison because it blocks:

- a. glycolysis
- b. pyruvate fermentation
- c. glucose uptake
- d. Na/K transport
- e. electron transport

37. The energy for ATP synthase is derived from a:

- a. pH gradient
- b. proton gradient
- c. hydrogen ion gradient
- d. all of the above.

38. The transfer of light energy to chemical reactions begins with the process called:

- a. chemiosmosis
- b. carbon fixation
- c. photooxidation
- d. proton pumping
- e. hydrolysis

39. What happens in photooxidation?

- a. An image is produced.
- b. Heat is transferred to sugar.
- c. An electron gains energy.
- d. Oxygen binds to the chlorophyll.
- e. Combustion begins.

40. Plants are green because green light:

- a. has the longest wavelengths.
- b. has the highest energy per photon.
- c. is not absorbed by the pigments.
- d. is most useful for photosynthesis.

41. The light reactions of photosynthesis supply the Calvin cycle with:

- a. light
- b. CO<sub>2</sub>
- c. H<sub>2</sub>O
- d. ATP
- e. sugar

42. NADPH in chloroplasts is used in:

- a. electron transport for ATP synthesis.
- b. biosynthesis (Calvin cycle).
- c. pyruvate transport.
- d. photooxidation.
- e. autolysis

43. The production of carbohydrate occurs during (the)

- a. Calvin cycle
- b. electron transport
- c. chemiosmosis
- d. light reactions

44. C<sub>4</sub> photosynthesis:

- a. is less energy efficient than C<sub>3</sub>
- b. is more water efficient than C<sub>3</sub>
- c. separates CO<sub>2</sub> fixation and Calvin cycle
- d. utilizes PEP carboxylase
- e. all of the above

45. Pineapple plants utilize CAM. Therefore a pineapple plant must:

- a. lack stomates
- b. open stomates at night
- c. open stomates during the day
- d. keep stomates constantly open

46. The genetic information in cells consists of the sequential arrangement of:

- a. amino acids in proteins.
- b. nucleotides in nucleic acids.
- c. monosaccharides in polysaccharides.
- d. fatty acids in triglycerides.
- e. carbon atoms in hydrocarbons.

47. The purpose of the genetic message is to direct the synthesis of:

- a. amino acids.
- b. nucleotides.
- c. proteins.
- d. carbohydrates.
- e. lipids.

48. The sense strand (=template strand) of the DNA is the pattern for making:

- a. proteins.
- b. the antisense strand.
- c. both a and b.

49. If you have a 3-letter alphabet and make words which are 4 letters long, how many unique words can you make? (Use the rule...X different letters taken Y at a time makes  $X^Y$  different words)

- a. 3
- b. 6
- c. 16
- d. 64
- e. 81

50. The correspondence between codons and amino acids (GAA means glutamate, GCG means alanine, et cetera) is called the:

- a. double helix.
- b. genetic information.
- c. genetic program.
- d. genetic code.
- e. nucleotide sequence.

51. The two elemental symbols (bits: 0,1) used by binary digital computers are analogous to \_\_\_\_\_ in the genetic code.

- a. nucleotides
- b. codons
- c. amino acids
- d. tRNA's
- e. genes

52. The fact that that adenine and thymine are always present in equal amounts in DNA is explained by:

- a. alternation of phosphate and sugar.
- b. the helical structure of DNA.
- c. the presence of deoxyribose.
- d. complementary base-pairing.

53. The pairing of nucleotides between the two strands of DNA is specific because of hydrogen bonds between the:

- a. phosphate groups.
- b. ribose sugars.
- c. amino acids.
- d. water molecules.
- e. nitrogenous bases.

54. The successive bases in a single DNA strand are held together by:

- a. covalent bonds between phosphates.
- b. covalent bonds between phosphate and deoxyribose.
- c. covalent bonds between bases.
- d. hydrogen bonds between phosphates.
- e. hydrogen bonds between bases.

55. The 5' and 3' ends of a single DNA strand refer to the positions of carbon atoms in the:

- a. nitrogenous base.
- b. phosphate group.
- c. deoxyribose sugar.
- d. ribose sugar .

56. A molecule of DNA can be replicated because the two strands are:

- a. identical.
- b. reversed.
- c. mirror images.
- d. complementary.

57. DNA synthesis on the lagging strand:

- a. proceeds in the opposite direction as the leading strand.
- b. is primed with short lengths of RNA.
- c. occurs in short lengths called Okazaki fragments.
- d. all of the above.
- e. only leading strand is synthesized.

58. RNA differs from DNA in that RNA usually:

- a. is single stranded.
- b. is made of nucleotides.
- c. includes the nucleotide "A".
- d. includes the nucleotide "C".
- e. includes phosphate.

59. The role of a transfer RNA molecule (tRNA) is to:

- a. bind a particular kind of amino acid.
- b. recognize a codon on the messenger RNA.
- c. all of the above.
- d. none of the above.

60. The role of ribosomal RNA (rRNA) is to:

- a. bind a particular kind of amino acid
- b. form part of the ribosome
- c. recognize each codon
- d. link the Okazaki fragments
- e. all of the above

61. The roles of RNA include:

- a. structural component of ribosomes.
- b. transfer of amino acids to ribosomes.
- c. processing of mRNA transcripts.
- d. all of the above.

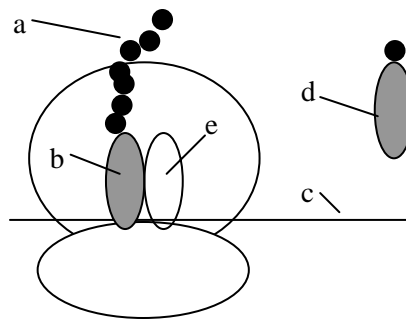
62. After RNA processing, the edited mRNA molecule:

- a. is shorter.
- b. has a GTP cap.
- c. lacks introns.
- d. has a poly-adenosine tail.
- e. all of the above.

63. Which feature is thought to facilitate the evolution of new proteins by permitting the mixing and matching of functional domains?

- a. histones
- b. exons and introns
- d. hydrogen bonding
- c. antiparallel strands
- e. semiconservative replication

Answer the next 5 questions by choosing the appropriate labels from the diagram below:



- 64. a-site
- 65. peptide
- 66. mRNA
- 67. peptidyl-tRNA
- 68. aminoacyl-tRNA

69. Which of the following is not directly involved in translation?

- a. mRNA
- b. DNA
- c. tRNA
- d. ribosomes
- e. amino acids

70. "Recognition" of the codons on the mRNA involves their binding to:

- a. anticodons on the ribosome.
- b. genes on the DNA.
- c. phosphates on the ribosome.
- d. anticodons on the tRNA's
- e. ribose on the polypeptide.

71. During translation, which of the following individual structures would be recycled (used over and over)?

- a. messenger RNA molecule
- b. ribosome
- c. transfer RNA molecule
- d. all of the above
- e. none of the above

Key for Practice Exam 2

1 E	15 D	29 B	43 A	57 D
2 C	16 B	30 A	44 E	58 A
3 B	17 D	31 D	45 B	59 C
4 C	18 A	32 C	46 B	60 B
5 A	19 D	33 B	47 C	61 D
6 D	20 C	34 E	48 C	62 E
7 C	21 E	35 B	49 E	63 B
8 E	22 A	36 E	50 D	64 E
9 A	23 C	37 D	51 A	65 A
10 C	24 B	38 C	52 D	66 C
11 D	25 D	39 C	53 E	67 B
12 C	26 D	40 C	54 B	68 D
13 C	27 B	41 D	55 C	69 B
14 A	28 C	42 B	56 D	70 D
				71 D