

**BIOL 4374/BCHS 4313**  
**Cell Biology**  
**Exam #1**  
**February 13, 2001**

SS# \_\_\_\_\_

Name \_\_\_\_\_

This exam is worth a total of 100 points. The number of points each question is worth is shown in parentheses. Good luck!

1. (2) The base in the wobble position of a codon: answer - b
  - a) is the 5' (first) base.
  - b) is the 3' (third) base.
  - c) is the second base.
  - d) often contains adenine.
  
2. (4) The enzyme aminoacyltransferase pairs \_\_\_\_\_ tRNA \_\_\_\_\_ with the proper \_\_\_\_\_ amino acid \_\_\_\_\_ .
  
3. (2) The following mRNA would encode a protein containing \_\_\_\_\_ 9 \_\_\_\_\_ amino acids.

5' GAUCACCCACCAAUGGUACAUCUACAUAUACAGGACUGACAUGUAAUAG 3'

4. (2) What enzyme within the ribosome is responsible for making peptide bonds?  
Peptidyl transferase
  
5. (2) During the initiation of translation, the mRNA is associated with the \_\_\_\_\_ small \_\_\_\_\_ ribosomal subunit.
  
6. (2) During the elongation phase of translation, the growing peptide chain bound to the tRNA in the \_\_\_\_\_ P \_\_\_\_\_ site is donated to the aminoacyl-tRNA in the \_\_\_\_\_ A \_\_\_\_\_ site through the formation of a peptide bond.

7. (2) Monomeric proteins do not contain a: answer - d

- a) primary structure
- b) secondary structure
- c) tertiary structure
- d) quaternary structure

8. (2) Chaperones assist in the: answer - a

- a) proper folding of proteins
- b) degradation of unfolded proteins
- c) transport of proteins outside the cell
- d) formation of peptide bonds

9. (2) What molecule constitutes a signal that targets proteins to be degraded in the proteasome?

Ubiquitin

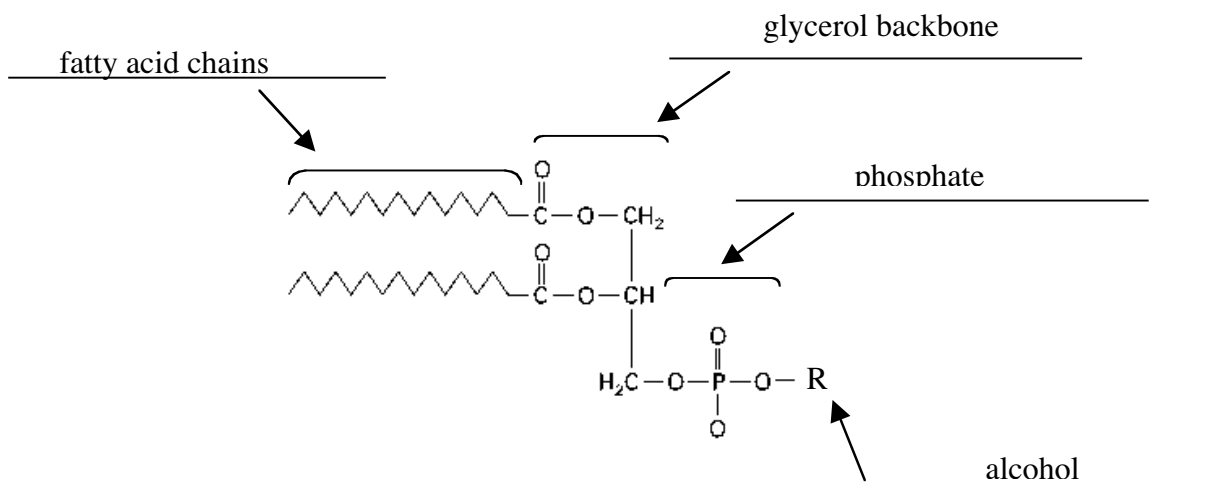
10. (2) All of the following statements about enzymes are true except: answer - b

- a) enzymes lower the activation energy of a reaction
- b) enzymes typically react with many different substrates
- c) enzymes catalyze reactions in aqueous solutions
- d) enzymes increase the rate of a reaction

11. (2) The activity of which protein is regulated by allosteric release of catalytic subunits?

- a)  $\alpha$ -chymotrypsin
  - b) budding yeast cdk
  - c) aspartate transcarbamoylase
  - d) cAMP-dependent protein kinase
  - e) hemoglobin
- answer - d

12. (4) Label the phospholipid below .





20. (2) Assuming normal ionic concentrations inside and outside of the cell, the membrane potential would be d if the membrane were permeable to  $\text{Na}^+$  rather than  $\text{K}^+$ .  
 a) -70mV      b) -100mV      c) 0mV      d) +60mV
21. (2) The sarcoplasmic reticulum  $\text{Ca}^{2+}$  ATPase is a P-class ATPase pump with  $\text{Ca}^{2+}$  binding sites on both its cytosolic and luminal sides. The relative binding affinity of these sites for  $\text{Ca}^{2+}$  is:  
 answer - c  
 a) equal    b) luminal higher than cytosolic    c) cytosolic higher than luminal
22. (2) Cystic fibrosis is caused by a defective:      answer - b  
 a) P-class pump    b) ABC pump    c) V-class pump    d) F-class pump  
 e) uniport
23. (2) The symport that transports glucose into the cell uses energy from the simultaneous transport of sodium ions into the cell.
24. (4) In pulmonary capillaries, an antiporter uses the energy from chloride ions moving into the cell to transport bicarbonate out of the cell. Bicarbonate is then converted into carbon dioxide by the enzyme carbonic anhydrase.
25. (2) Epithelial cells use tight junctions to restrict membrane proteins to the apical or basal faces of the cell.
26. (2) Which protein is used to transport glucose from the lumen of the intestine into intestinal epithelial cells?  
 2 sodium ion/glucose symport
27. (2) Aminopterin is present in HAT medium when fusing TK- and HGPRT- cells:  
 a) To overcome the effect of a TK- mutation  
 b) To force cells to use the salvage pathways      answer - b  
 c) As a compound supporting the growth of hybrid cells  
 d) To overcome the effects of the HGPRT- mutation
28. (2) A cell line refers to:  
 a) The first cells that emerge from organ culture.  
 b) A stable culture of immortalized cells.      answer - b  
 c) Hybrid cells without heterokaryons.  
 d) Cells that only grow in HAT medium.

29. (2) The envelop of a virus like the rabies virus:  
 a) Contains receptor binding glycoproteins coded by the viral genome  
 b) Contains components of the host membrane  
 c) Two of the above answer - c  
 d) None of the above
30. (2) When establishing a master plate for the purpose of isolating novel auxotrophs by replica plating, it would be best to use:  
 a) Minimal medium in agar  
 b) Rich medium in agar answer - b  
 c) Rich medium in broth  
 d) Serum-containing medium in agar
31. (4) MPF in *Xenopus* is comprised of a regulatory subunit called cyclin B and a catalytic subunit called cyclin dependent kinase.
32. (4) A destruction box is present in all cyclins, and triggers their degradation in proteasomes by adding ubiquitin to lysine residues.
33. (2) Phosphorylation of Thr-161 on MPF of fission yeast:  
 a) inhibits MPF activity  
 b) is carried out by wee1 protein answer - c  
 c) is required for MPF activity  
 d) is required along with phosphorylation of Tyr-15 for MPF activity.
34. (4) During M phase, phosphorylation of lamin by MPF results in breakdown of the nuclear envelope.
35. (3) In budding yeast, pre-replication complexes formed during G1 phase are inhibited from forming during S phase by SPF/cdc28-C1b.
36. (3) In mammals, the cell cycle restriction point (or cell division commitment point) occurs at the end of G1 phase. As the cell passes the restriction point, Rb is phosphorylated by Cyclin D-Cdk4/6 and Cyclin E-Cdk2, which releases the E2F transcription factor.

37. (4) Match the cell cycle checkpoint with the correct cause for arrest at that checkpoint.

- |                        |                               |
|------------------------|-------------------------------|
| <u>  b  </u> G1 arrest | a) unreplicated DNA           |
| <u>  a  </u> S arrest  | b) DNA damage                 |
| <u>  c  </u> M arrest  | c) Improper spindle formation |
| <u>  b  </u> G2 arrest |                               |

38. (4) In the absence of trophic factors, apoptosis is triggered when Bad binds to Bcl proteins and allows bax to form channels and let ions move into the mitochondria. This ion flux leads to both the release of cytochrome C from the mitochondria and its binding to Apaf1 and the activation of caspase effector proteins.