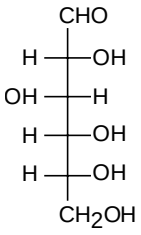
Chem 250 Final Exam

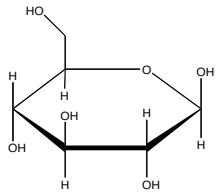
This exam is composed of **50** questions.

As discussed in the course syllabus, honesty and integrity are absolute essentials for this class. In fairness to others, dishonest behavior will be dealt with to the full extent of University regulations.

I hereby state that all answers on this exam are my own and that I have neither gained unfairly from others nor have I assisted others in obtaining an unfair advantage on this exam.



D-glucose



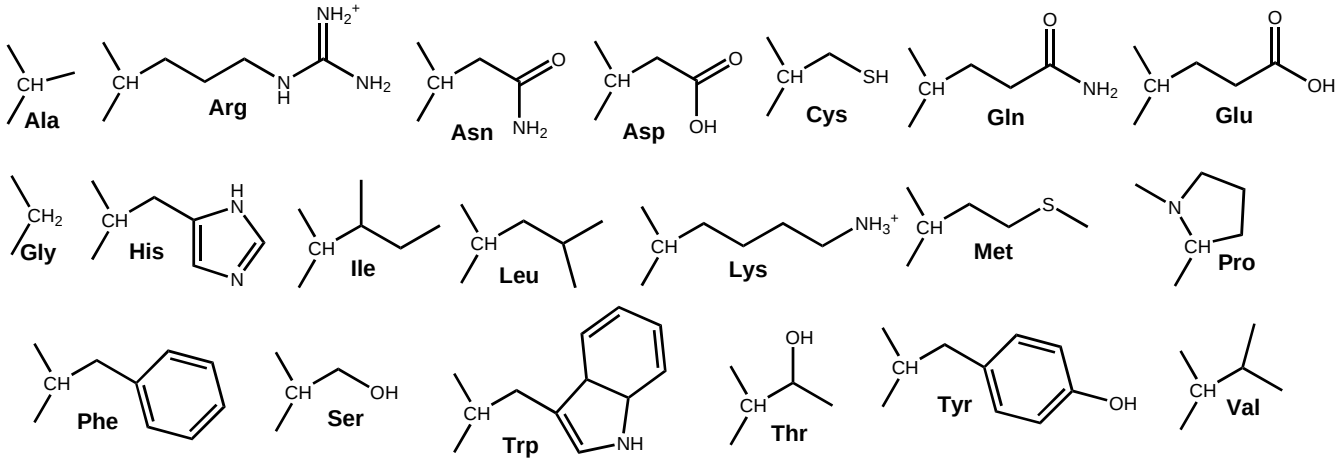
β-D-Glucose

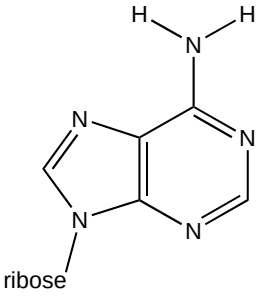
_____ ..
Signature

PERIODIC TABLE OF THE ELEMENTS

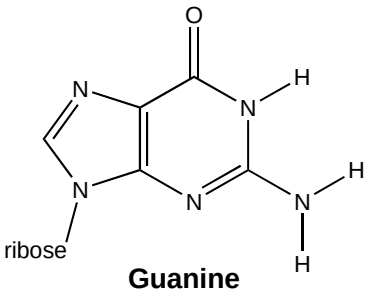
1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
1 H 1.008																	2 He 4.003
3 Li 6.939	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
f19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 181.0	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Unq (261)	105 Unp (262)	106 Unh (263)	107 Uns (262)	108 Uno (265)	109 Une (266)									

.

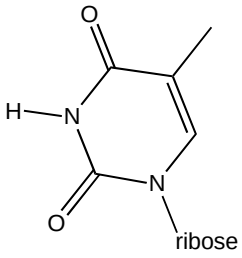




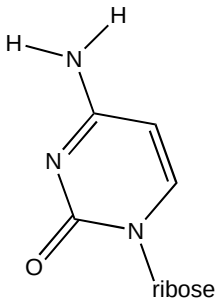
Adenine



Guanine



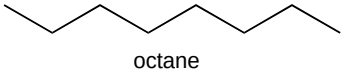
Thymine

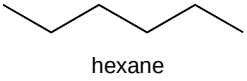


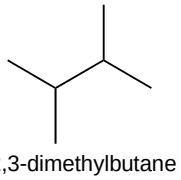
Cytidine

---

1. Which molecule below has the highest boiling point?

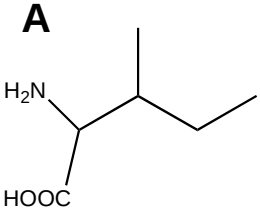




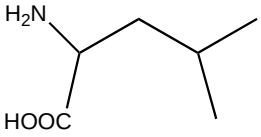


1) octane 2) hexane 3) 2,3-dimethylbutane

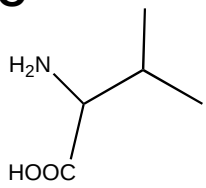
A



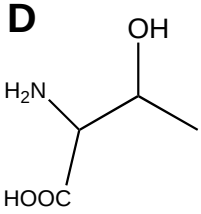
B



C



D

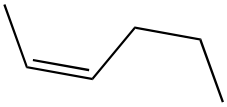


2. Which two molecules above are constitutional isomers?

1) A and D 2) C and D 3) B and C

4) A and B 5) none are constitutional isomers of each other

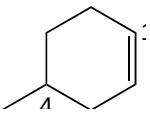
3. The molecule at right is



1) a cis isomer 2) a trans isomer 3) not an isomer

4.In the molecule at right, the ideal bond angle around the 1-carbon is:

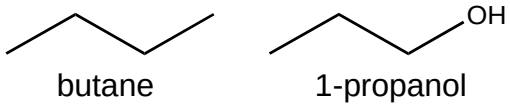
1) 120° 2) 109° 3) 90° 4) 180°



5.The addition reaction product of the reaction of HCl and 3-hexene is:

1) 6-dodecene 2) 1-dodecane 3) 3-chlorohexane
4) 1-chlorohexane 5) 3,4-dichlorohexane

6. Which molecule below has the highest boiling point?

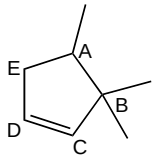


1) butane 2) 1-propanol

7. Which is the weaker acid?

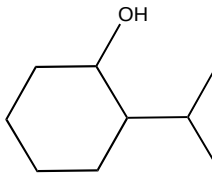
1) cyclohexanol 2) phenol 3) they are the same

8. In the molecule at right, which atom is a chiral center?



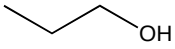
1) A 2) B 3) C 4) D 5) E

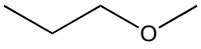
9. How many stereoisomers are possible for the molecule at right?

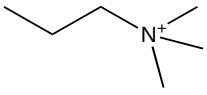


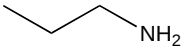
1) 0 2) 1 3) 2 4) 4 5) 8

10. Which is the strongest base?

1) 

2) 

3) 

4) 

11. Aldehydes are reduced by H_2 and an appropriate catalyst to

1) esters 2) alcohols 3) carboxylic acids 4) the parent alkanes
5) aldehydes are not readily reduced

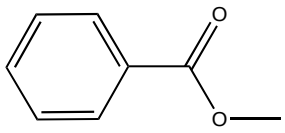
12. The molecules shown at right represent

1) Tautomers – two ways of looking at the same molecule
2) Tautomers – two inteconverting, but different molecules
3) Resonance Forms – two ways of looking at the same molecule
4) Resonance Forms – two interconverting, but different molecules

13. The reaction of butanoic acid and $LiAlH_4$ in water yields:

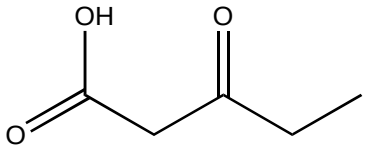
1) CO_2 and propanal
2) CO_2 and propanoic acid
3) water and butanal
4) water and butanol
5) nothing. No reaction occurs.

14. From what parent molecules can the molecule at right be synthesized?



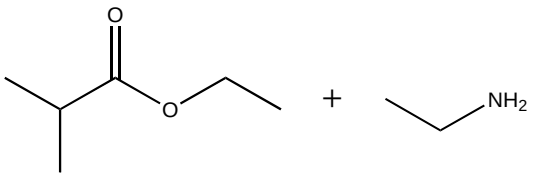
1) toluene and methyl acetate
2) benzoic acid and methanol
3) benzene and acetic acid
4) acetic acid and phenol

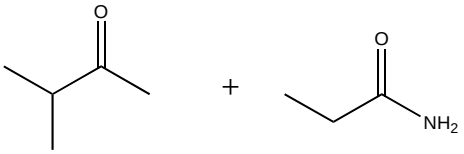
15. Heating the molecule at right yields which products?

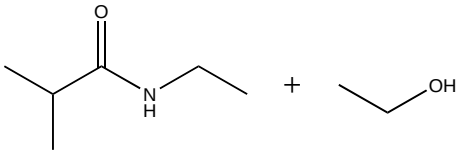


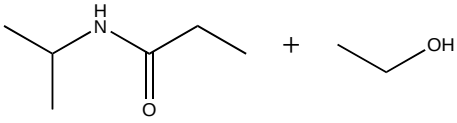
1) propanoic acid and carbon dioxide
2) acetic acid and propanoic acid
3) 2-butanone and carbon dioxide
4) butanoic anhydride
5) no reaction occurs

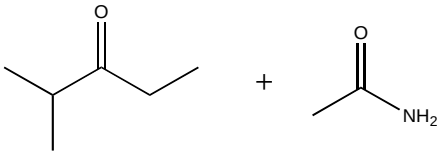
16. The products of the following reaction are



1) 

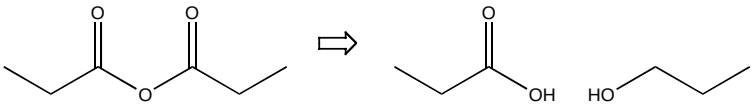
2) 

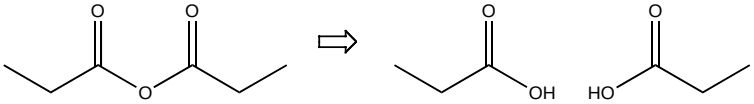
3) 

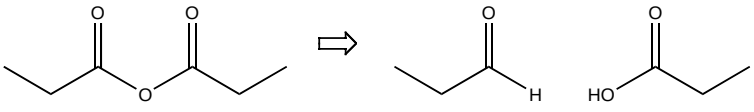
4) 

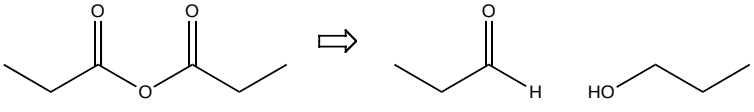
5) None of the above

17. Hydrolysis of propyl anhydride is represented by which reaction below?

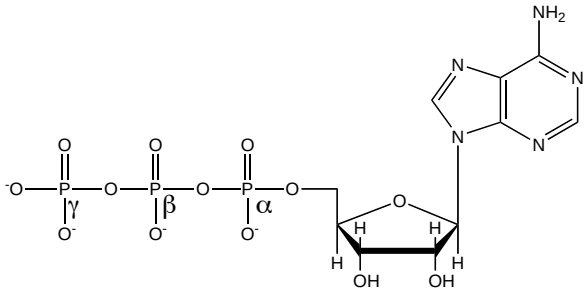
1) 

2) 

3) 

4) 

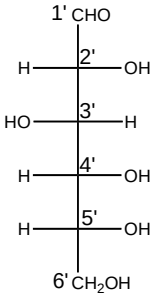
18. In the conversion of ATP to ADP, which is most likely?



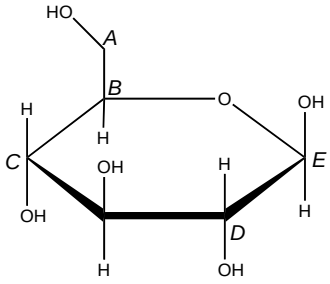
1) water attacks the α phosphate
2) water attacks the γ phosphate
3) the sugar 2'OH attacks the γ phosphate
4) the sugar 2'OH attacks the α phosphate
5) oxygen on the γ phosphate attacks the α phosphate

19. Compare the linear and circular forms of glucose. Carbon 1' in the linear form corresponds to which carbon in the circular form?

1) A 2) B 3) C 4) D 5) E



D-Glucose



β-D-Glucose

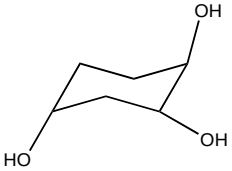
20. The geometry at the 3' carbon in the linear form of glucose is:

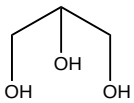
1) square planar 2) tetrahedral 3) trigonal planar

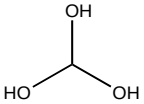
21. Glycolipids contain what characteristic head group?

1) sphingosines 2) phosphates 3) cholesterol
4) steroids 5) carbohydrates

22. Triglycerides are based on which chemical framework?

1) 

2) 

3) 

23. In metabolism, CoA-SH usually reacts directly with

1) anhydrides 2) esters 3) alcohols
4) carboxylic acids 5) water

24. In the Citric Acid cycle, succinate reacts with FAD. In this reaction, succinate:

1) isomerizes

2) is phosphorylated

3) is dephosphorylated

4) is reduced

5) is oxidized

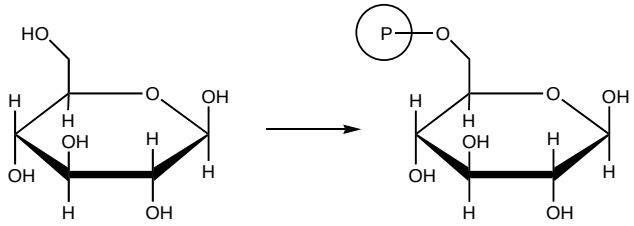
25. In respiration, a H^+ gradient across the mitochondrial membrane is used to drive the following unfavorable reaction:

1) $NAD^+ \rightarrow NADH + H^+$ 2) $NADH + H^+ \rightarrow NAD^+$

3) $ADP + P_i \rightarrow ATP$ 4) $ATP \rightarrow ADP + P_i$

5) β oxidation of fatty acids

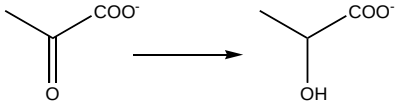
26. In one of the reactions of glycolysis, glucose is phosphorylated:



Which common metabolite is another reactant in this process?

1) NADH 2) Coenzyme A 3) ATP 4) FAD 5) Pyruvate

27. In one of the reactions of glycolysis, pyruvate is converted to lactate:



Which common metabolite is another reactant in this process?

1) NADH 2) Coenzyme A 3) FAD 4) ATP 5) ACP

28. The reactions of gluconeogenesis are simply the reactions of glycolysis run in reverse

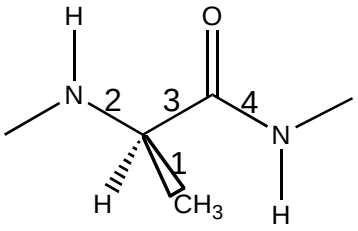
1) True 2) False

29. In the synthesis of fats, fatty acids are activated by reaction with:

1) Coenzyme A 2) NADH 3) FAD 4) ATP 5) Pyruvate

30. In the amino acid linkage shown at right, which bond has a high energy cost for rotation?

1) 1 2) 2 3) 3 4) 4



31. Which of the following amino acids is most likely to be found in the interior of a protein?

1) Asp 2) Lys 3) Asn 4) Val 5) Ser

32. Which of the following amino acids is ***best*** at forming two simultaneous hydrogen bonds with another functional group in a protein or nucleic acid?

1) Ile 2) Lys 3) Asn 4) Ser 5) Thr

33. Which interaction below most likely involves hydrogen bonds between amino acids separated by a large distance in primary sequence?

1) disulfide linkages 2) β-sheets 3) α-helices 4) electrostatics

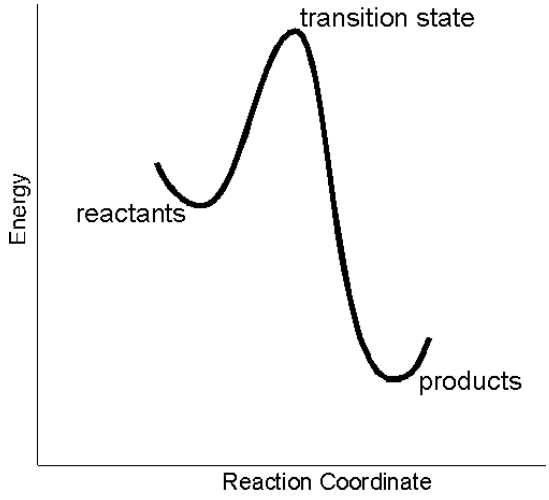
34. A stretch of a protein contains the sequence –Leu-Asn-Ile-Arg-Val-Asp-Ile-Lys-Val-

This stretch most likely lies in

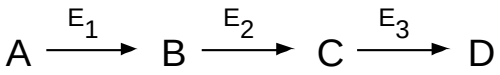
1) in an α-helix in the interior of the folded protein
2) in an α-helix on the surface of the folded protein
3) in a β-sheet in the interior of the folded protein
4) in a β-sheet on the surface of the folded protein
5) in a turn buried in the interior of the folded protein

35. An enzyme can increase the rate of a reaction by

1) raising the energy of the reactants
2) lowering the energy of the transition state
3) lowering the energy of the products
4) raising the temperature of the reactants
5) increasing homeopathic vibrations



36. In the reaction below, "feeback control" refers to:



1) Enzyme E_3 binds to reactant A, preventing its reaction with enzyme E_1

2) Enzyme E_3 is redirected to generate product A, rather than product D

3) Enzyme E_3 binds to and inhibits enzyme E_1

4) Binding of intermediate B to enzyme E_3 inhibits the enzyme

5) Binding of product D to enzyme E_1 inhibits the enzyme

37. Which class of enzyme most likely utilizes NAD^+ as a reactant?

1) transferase 2) hydrolase 3) isomerse 4) dehydrogenase 5) ligase

38. Allostery refers to

1) modifications such as phosphorylation, that modulate enzyme activity

2) the biosynthesis of different forms of an enzyme in different tissues

3) induced fit binding of a substrate in an active site

4) binding of a regulatory molecule at an enzyme site different from the active site

5) a change in structure of the active site to better fit the bound substrate

39. Which amino acid side chain is most likely phosphorylated by ATP by the kinase enzyme? (note you are not expected to know this, but to deduce it from what you've learned in this course)

1) Gly 2) Arg 3) Leu 4) Tyr 5) Ala

40. Which statement below is most correct?

1) Chemical messengers are cells that bind to other cells, injecting chemical signals

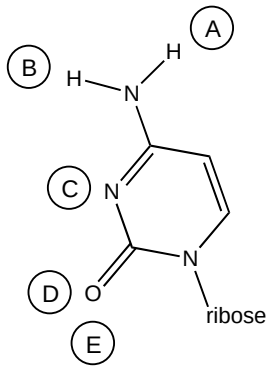
2) Chemical messengers are ligands that bind to protein receptors on cell membranes

3) Chemical messengers penetrate cell membranes to bind to proteins inside the cell

4) Chemical messengers react with other messengers to trigger changes in the cell

5) Chemical messengers ride bicycles to deliver key messages

41. In the cytidine base at right, which most completely lists the H–bond acceptors?



1) B, C, and D
2) A and B
3) A and E
4) D and E
5) C, D, and E

42. DNA and RNA can be best characterized as

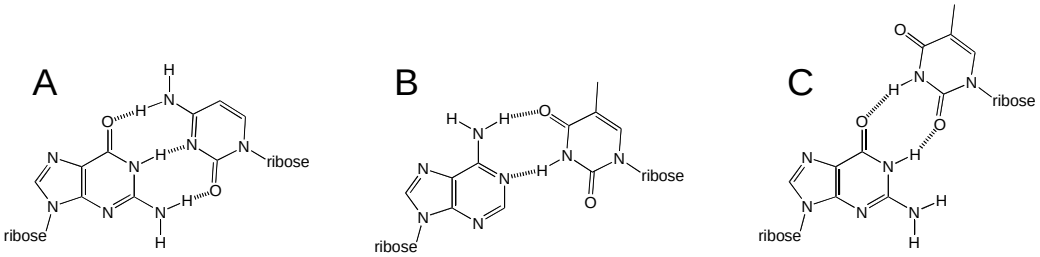
1) nonpolar 2) polar 3) charged
4) all of the above

43. DNA and RNA polymerase active sites distinguish Watson-Crick base pairs from other base pairs by

1) the intrinsic strength of the base pair
2) interactions in the major groove
3) interactions in the minor groove
4) interactions with the sugar and phosphate backbone
5) channeling with the spirit of Francis Crick

44. Which is more likely to have enzyme-like activity?

1) DNA 2) RNA 3) they have the same likelihood



45. Which base pair above is ***not*** a Watson-Crick pair?

1) A 2) B 3) C

46. Which amino acid is best for recognizing an AT base pair via major groove interactions?

1) Gln 2) Ser 3) Lys 4) Arg 5) Pro

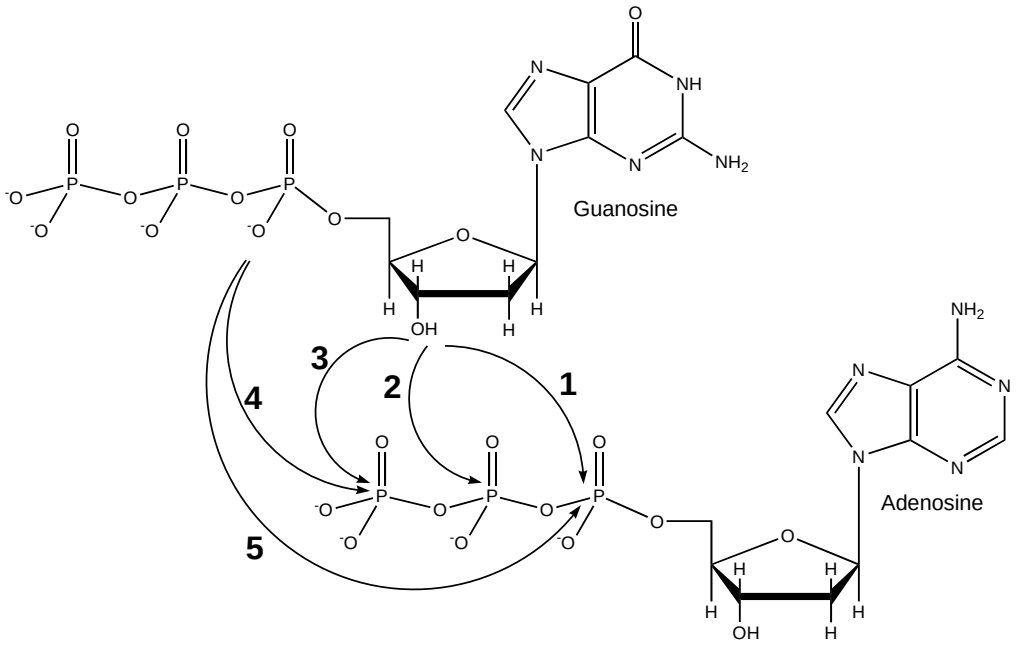
47. In eukaryotes, genes contain

1) introns and exons 2) introns and ribozymes 3) exons and gluons
4) introns and promoters 5) klingons and muggles

48. Water is a unique molecule in that it

1) is very low in mass
2) has polar and nonpolar parts
3) is small and can simultaneously accept 2 and donate 2 H-bonds
4) can solubilize anything
5) can be mass-marketed

-49. Which arrow below represents the nucleophilic attack that would be required in formation of the GA dinucleotide?



50. What is the course number of this class?

1) 250 2) 111 3) 496 4) 728