SCCA EOC Study Guide - Part 1

Semester A Content Review

1. Describe the differences between covalent and ionic bonds.

2. Rank the three types of bonds (covalent, ionic, and hydrogen) from the strongest to the weakest.

3. What might happen in terms of energy when a bond is broken?

4. Where is the chemical energy stored?

Organic Molecule	Subunits (monomers)	Function	Examples
Carbohydrates			
Lipids (Fats)			
Proteins			
Nucleic Acids			

5. IMPORTANT: Enzymes, hormones, antibodies, and receptor molecules are all _____, which means they are all composed of _____ _____.

6. Match the molecule with its function, subunit or example:

_____ Cellulose	A. How plants store starch; made of sugars and starches
_____ Insulin	B. To destroy pathogens in the body; made of amino acids
_____ Glycogen	C. The produce of photosynthesis; made of sugars
_____ Enzymes	D. To speed up reactions; made of amino acids
_____ Hemoglobin	E. To store genetic information; made of nucleotides
_____ DNA	F. To send chemical messages; made of amino acids
_____ RNA	G. To store genetic messages; made of nucleotides
_____ Glucose	H. To transport oxygen in the blood; made of amino acids
_____ Hormones	I. Regulate the amount of blood sugar; made of amino acids
_____ Antibodies	J. How animals store starch; made of sugars and starches

Substance	pH
Hydrochloric acid	1.0
Sulfuric acid	1.2
Tomatoes	4.2
Rainwater	6.2
Pure water	7.0
Sea water	8.5
Ammonium chloride	11.1
Sodium hydroxide	13.0

7. Look at the chart above. Which substance is the most acidic? Why?

8. Look at the chart above. Which substance is the most basic? Why?

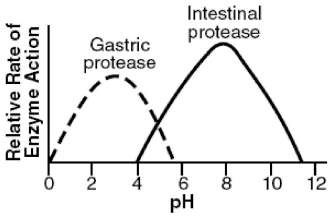
9. What substance in the chart above is neutral? Why?

10. Compare enzyme activity to a lock and key. What is the lock and key model?

11. Describe three characteristics of enzymes.

12.. Draw an enzyme-substrate complex. Label the enzyme, substrate and active site.

13. Look at the graph below. What would be the optimum pH for Intestinal Protease to function? Is it an acidic, basic, or neutral environment?



14. What might happen if an enzyme changes shape due to extreme temperatures?

15. What type of macromolecules will an enzyme always be?

16. What does the ending -**ase** tell you?

17.. Do enzymes always break down molecules (substrates)?

18. Do enzymes always put together (synthesis) molecules?

19.

	Function
Nucleus	
Cell Membrane	
Cell Wall	
Mitochondria	
Vacuoles	
Chloroplasts	
Ribosomes	

20. Sketch and label a Plant Cell and an Animal Cell in the space below or on another sheet of paper.

21 Name three things that plant cells have that animal cells DO NOT:

22. Name three ways that prokaryotes and eukaryotes are different. What are the 3 organelles that prokaryotic cells have?:

23. Sketch and label a cell membrane in the space below or on another sheet of paper.

24. In <u>osmosis</u>, **water** moves from an area of _____ to an area of _____ concentration with no energy used.

25. In <u>diffusion</u>, **molecules** move from an area of _____ to an area of _____ concentration with no energy used.

26. In <u>facilitated diffusion</u>, **molecules** move from an area of _____ to an area of _____ concentration with no energy used. However, a _____ is used to transport the molecules.

27. In active <u>transport</u>, **molecules** move from an area of _____ to an area of _____ concentration using energy and a _____.

28. Compare/Contrast

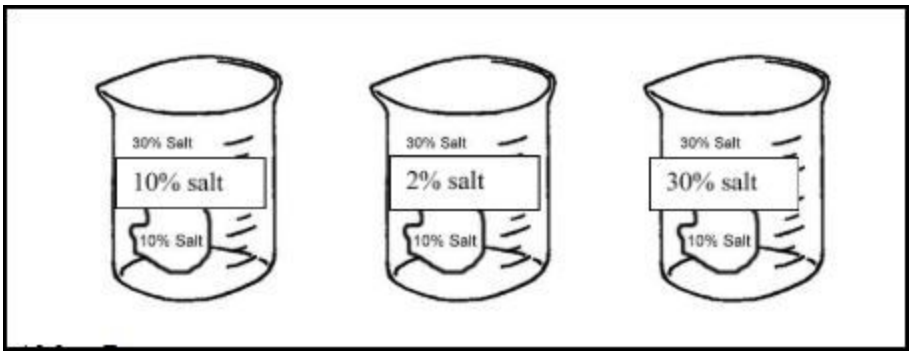
	PASSIVE TRANSPORT	ACTIVE TRANSPORT
Requires energy?		
Low to high concentration - or - high to low concentration?		

29. If a freshwater plant cell is put in salt water, what will the cell do?

30.. If a saltwater plant cell is put in fresh water, what will the cell do?

31. In your own words, what is homeostasis?

32. In each of the situations pictured, indicate whether the cell will gain water, lose water, or stay the same. Draw arrows to show which way the water will move (**REMEMBER: SALT DOESN'T MOVE!!**) In each case, the cell in the beaker is 10% salt.



33. . Write the equation for photosynthesis:

34. In what organelle does photosynthesis occur?

35. What type of gas does a plant use?

36. What type of gas does a plant produce/release?

37. Write the equation for cellular respiration:

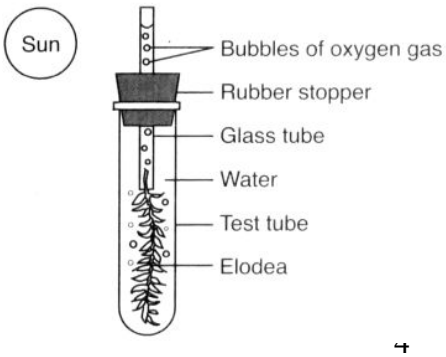
38. . In what organelle does cellular respiration occur?

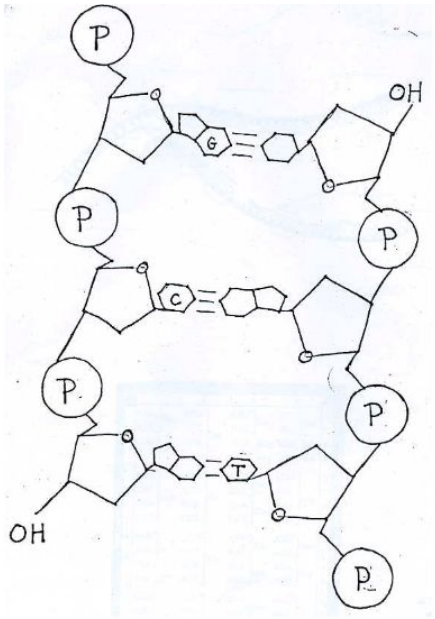
39. What is different about aerobic and anaerobic respiration?

40. What is lactic acid fermentation?

41. What is alcoholic fermentation? What are the PRODUCTS?

42. What process is happening in this image to the right? Give 3 ways you can tell.





43. Label the DNA molecule to the left using these terms: phosphate, sugar, C, G, A, hydrogen bonds

44. Give the nucleotide sequence that would be included on the complementary strand to A-C-C-T-G-A: ___ ___ ___ ___ ___ ___

45. What is the full name of DNA?

46. If the strand of DNA TTC-AGC undergoes **transcription,** what will mRNA be? _____ - _____

47. After **translation,** what would the amino acid sequence be? (see codon chart) _____ - _____

48. What is a codon?

2nd base in codon

1st base in codon	U	C	A	G	3rd base in codon
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	STOP	STOP	A
	Leu	Ser	STOP	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

49. Compare RNA and DNA in the following table

	RNA	DNA
Sugar		
Bases		
Strand (#)		
Where In Cell		
Function		

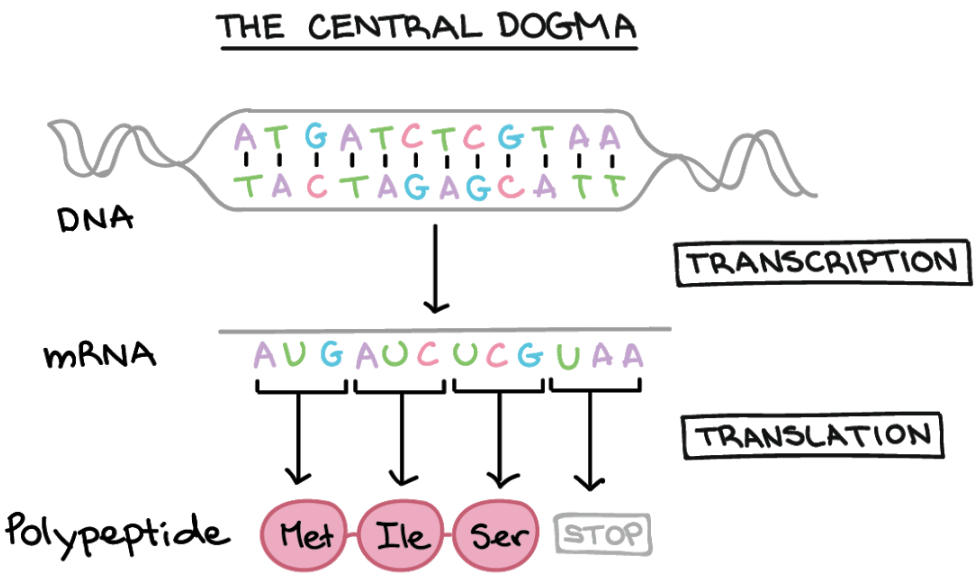
50. What kind of bonds hold amino acids together? _____

51. Complete Chart

	DNA	mRNA	tRNA/Amino Acids	Proteins
Function of molecule				
What happens to DNA when a mutation occurs?		How does this affect the mRNA?	How can this affect translation?	How does this affect the structure and shape of the resulting protein?

52. Complete the paragraph below using the words: amino acid, mRNA, nucleus, protein, tRNA, cytoplasm, ribosome

Biology Central Dogma: Transcription occurs in the _____ of a cell and makes a copy of _____ from DNA. Then mRNA leaves the nucleus and goes to the _____ to bind to a _____. The anticodon on the _____ molecule binds to the codon on the mRNA. This molecule has an _____ _____ attached to it. Amino acids are linked together to create a _____.



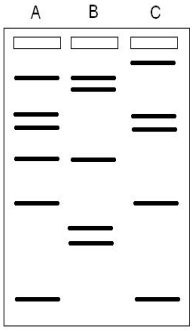
53. **True or False?:** All of an organism's cells has the exact same DNA. _____
Explain how you know this?

54. What is the purpose of the Human Genome Project?

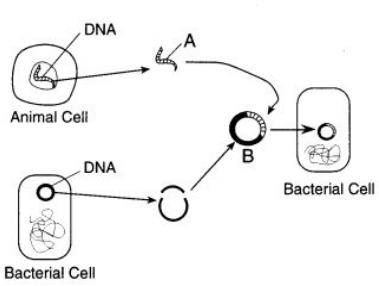
55. What is cloning, in your own words?

56. What process creates a DNA fingerprinting?

57. Look at the DNA fingerprint below. Which individuals are most closely related? How do you know?



58. Describe how biotechnology is used in:

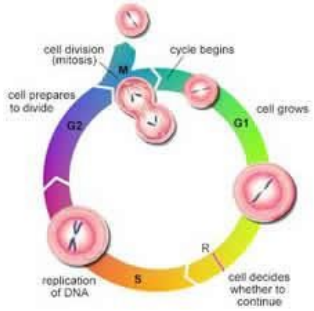


Agriculture:

Medicine:

Forensic Science:

59.



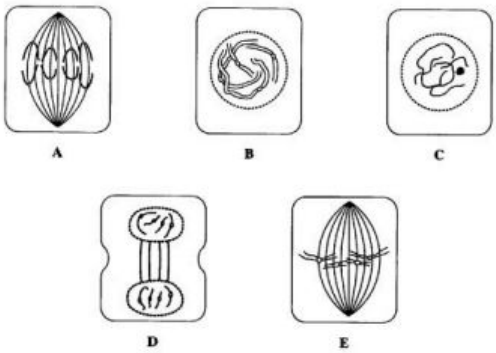
The Cell Cycle: Describe what is happening at each –
G1 (gap 1):
S (Synthesis):
G2 (Gap 2):
M (Mitosis):

Which 3 happen during interphase?

60. Complete the following table:

	MITOSIS	MEIOSIS
Type of reproduction (Asexual or sexual)		
Chromosome number of mother cell (1N=haploid or 2N=diploid)		
Chromosome number of daughter cells (1N=haploid or 2N=diploid)		
Number of cell divisions		
Number of cells produced		
Type of cells this produces		
If there are 50 chromosomes in the mother cell, how many are in the daughter cells?		
When does DNA replication happen?		
SOURCES OF VARIATION	INDICATE IF THEY HAPPEN IN EACH PROCESS OR NOT	
Crossing over		
Random assortment of chromosomes		
Gene mutations		
Nondisjunction		
Fertilization		

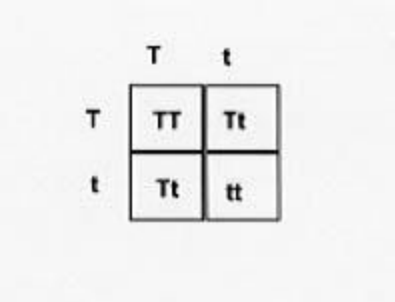
61. Put the following stages of mitosis (cell division) in order and describe what is happening at each. .



62. Describe how mitosis is related to cancer.

63. Put the following words in order that they must happen to make a new individual, and draw what is happening at each stage: Mitosis, Meiosis, Fertilization, Gametes, Adult, Zygote, Embryo

64. In the Punnett square to the below, T = tall and t=short. Give the genotype for the parents.



a. Give the phenotype for the parents.

b. What are the genotypes and phenotypes of the offspring?

c. What is the genotypic ratio of the offspring?

d. What is the phenotypic ratio of the offspring?

e. What environmental factors might affect the expression of these genes for height? Explain.

65. Incomplete Dominance=<u>Blending</u> Phenotype!

Cross a pure-breeding red Four-o'-clock flower (RR) with a pure-breeding white Four-o'-clock flower.

a. What colors will be seen in the offspring [what percent]?

b. What will their genotypes be [what percent]?

If two offspring from the above cross are crossing with each other:

a. What colors will be seen in the offspring [what percent]?

b. What will their genotypes be [what percent]?

66. Codominance = <u>Both Show</u> up in the Phenotype!!

A black cat breeds with a tan cat, and their kittens are all black-and-tan tabby. Set up a Punnett square to show how this could happen.

a. What will be the resulting phenotypes [what percent?]

b. What will be the resulting genotypes [what percent?]

c. What will be the genotypes of the parents?

67. Sex-linked traits (X-linked Traits)

a. What are the male sex chromosomes in humans?

b. What are the female sex chromosomes in humans?

c. Colorblindness and hemophilia are sex-linked traits. What chromosome are these genes found on?

d. Cross a female who is a carrier for hemophilia with a normal male.

e. What are the odds they will have a child (son OR daughter) with hemophilia.

f. What are the odds they will have a daughter with hemophilia?

g. What are the odds they will have a daughter who is a carrier for hemophilia?

h. Why are males more likely to show a sex-linked disorder?

68. Multiple Alleles (Blood types)

If a woman with type A blood has a child with a man with type B blood and their first child has type O blood, give the genotypes of the woman and the man and do the cross. (Alleles are A, B, and O)

a. What are the odds that they will have a child with type O blood again?

b. What are the odds that they will have a child with homozygous type A blood?

c. What are the odds that they will have a child with type AB blood?

d. A blood test is done to see if one of three men is the father of a child. The child has type O blood, the mother has type A blood. Man #1 has type AB blood, Man #2 has type A blood, Man #3 has type O blood. Are there any men that can be ruled out as the father. Explain

69. **Polygenic traits**

a. What are 3 examples of polygenic traits?

b. How are polygenic traits and multiple alleles different?

70. Pedigrees

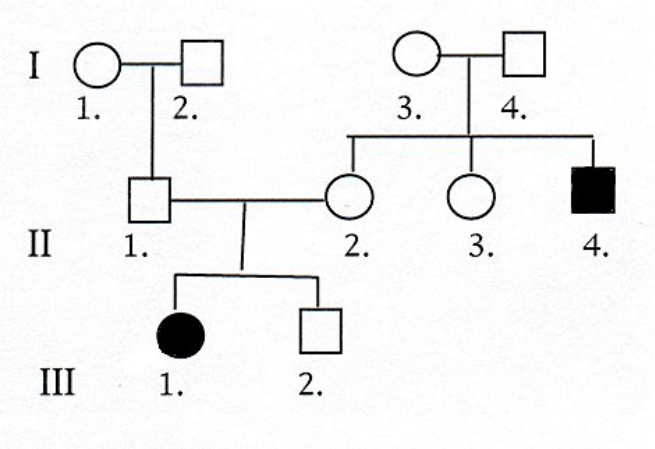
a. What is the inheritance pattern shown by this pedigree? (dominant or recessive?)

b. How do you know?

c. Using the letters A and a, write the genotype of as many individuals as possible. If you cannot tell if it is AA or Aa, write "?"

d. What is the genotype of person II4?

e. What is the genotype of person I3?



71. Karyotypes= pictures of chromosomes

a. What is the sex of the person whose karyotype is shown to the left?

b. What is the disorder that this person has? What is your evidence?

c. How is this disorder caused?