

**Spring 2011**  
**Exam 2 Preparation Sheet**  
**(As of March 11<sup>th</sup>, you have NOT been introduced to materials to answer any question given below in *italics*)**

**True or False:**

1. Mendel's work with peas supported the hypothesis of blending inheritance.
  - a. True
  - b. False
  
2. All recessive alleles are harmful.
  - a. True
  - b. False
  
3. Gametes always contain pairs of alleles for each trait.
  - a. True
  - b. False
  
4. *A point mutation in the coding region of the DNA will always result in a change in the messenger RNA strand.*
  - a. *True*
  - b. *False*
  
5. The number of heterozygous gene loci determine the number of different types of gametes an individual can produce.
  - a. True
  - b. False
  
6. Meiosis results in four cells all of which are genetically identical to one another.
  - a. True
  - b. False
  
7. Mitosis produces two cells both of which are genetically identical to one another.
  - a. True
  - b. False

8. Sperm cells can result from meiosis.

a. True

b. False

9. *Chargaff's ratios postulated that the amount of thymine in a DNA molecule is equal to the amount of adenine.*

a. *True*

b. *False*

**Choose the best answer:**

**Questions 10 through 14** concern the following parents and their offspring: A man and a woman both with brown eyes marry and start a family. Both the man and the woman have one parent who has blue eyes. (The brown-eye allele is dominant to the blue-eye allele).

10. How many gamete types can the husband generate for eye color?

a. 1

b. 2

c. 4

d. none of the above

11. How many gamete types can the wife generate for eye color?

a. 1

b. 2

c. 4

d. none of the above

12. What is the probability that their first child will have brown eyes?

a. 1.00

b. 0.75

c. 0.50

d. 0.25

e. zero

13. What is the probability that their second child will have brown eyes?

a. 1.00

b. 0.75

c. 0.50

d. 0.25

e. zero

14. Their first child is a heterozygote. What color are its eyes?

a. Brown

b. Blue



21. Prokaryotic “chromosomes” are:

- a. double-stranded    b. single-stranded    c. linear    d. looped

22. Eukaryotic chromosomes are:

- a. double-stranded    b. single-stranded    c. linear    d. looped

23. Hemophilia is caused by a recessive allele on the X-chromosome (i.e. it is sex-linked). A normal man marries a woman who is normal but carries the disease allele on one of her X-chromosomes. What is the probability that they have a child with hemophilia?

- a. 1.00                  b. 0.75                  c. 0.50                  d. 0.25                  e. zero

24. If the couple in question 23, above, have a child with hemophilia, will it be a boy or a girl?

- a. boy    b. girl

25. Cell theory postulates that

- a. cells may be spontaneously generated from non-living matter  
b. matter can be neither created nor destroyed  
c. all life is composed of one or more cells  
d. all life requires pre-made organic energy to survive

26. In eukaryotic cells, the chromosomes are contained in the

- a. mitochondria                          b. chloroplasts  
c. ribosomes                                  d. nucleus

27. In eukaryotic cells, DNA *is absent* from all of the following organelles EXCEPT:

- a. cell walls
- b. mitochondria
- c. ribosomes
- d. lysosomes

**Questions 28 through 30:** Match the membranous organelles with their functions:

- 28. Golgi apparatus
- 29. plasma membrane
- 30. Rough ER
- a. channels nuclear products toward ribosomes
- b. protects the cell from the external environment
- c. packages cell products in membrane-bound vesicles

**Questions 31 through 34:** Match the following organelles with their functions:

- 31. ribosome
- 32. mitochondrion
- 33. chloroplast
- 34. cell wall
- a. generates ATP from organic molecules using O<sub>2</sub>
- b. translates genetic messages into amino acid chains
- c. creates stored chemical energy from inorganic matter
- d. provides structural integrity of many cell types

35. Two organelles in a plant cell are believed to have originated from independent bacterial cells a long, long time ago. These organelles are the:

- a. Golgi complex and rough ER
- b. vacuole and cell wall
- c. lysosome and peroxisome
- d. chloroplast and mitochondrion



41. A point mutation changes the **original DNA template** from the original form to the new form set out below. The point mutation would have what result for the amino acid chain coded by this gene?

<b>Original template DNA</b>	3'	TAC GGA TCT GAA AAC	5'
<b>New, mutated template DNA</b>	3'	TAC GGA TGT GAA AAC	5'

- Change amino acid sequence only
  - Change amino acid chain length only
  - Change both length and sequence of amino acid chain
  - No change
42. Which type of mutation in a coding gene is most likely to result in a complete loss of protein function?
- Point mutation of 1<sup>st</sup> letter of triplet. Example: ACA . . . . → TCA . . . .
  - Point mutation of 2<sup>nd</sup> letter of triplet. Example: ACA . . . . → AGA . . . .
  - Point mutation of 3<sup>rd</sup> letter of triplet. Example: ACA . . . . → ACT . . . .
  - Frame shift mutation (insertion or deletion). Example: ACA . . . . → ATCA . . . .

		Second letter				
		U	C	A	G	
U	U	UUU Phe (F)	UCU	UAU Tyr (Y)	UGU Cys (C)	U C A G
		UUC	UCC Ser (S)	UAC	UGC	
		UUA Leu (L)	UCA	<b>UAA Stop</b>	<b>UGA Stop</b>	
		UUG	UCG	<b>UAG Stop</b>	UGG Trp (W)	
C	C	CUU	CCU	CAU His (H)	CGU	U C A G
		CUC Leu (L)	CCC Pro (P)	CAC	CGC Arg (R)	
		CUA	CCA	CAA Gln (Q)	CGA	
		CUG	CCG	CAG	CGG	
A	A	AUU	ACU	AAU Asn (N)	AGU Ser (S)	U C A G
		AUC Ile (I)	ACC Thr (T)	AAC	AGC	
		AUA	ACA	AAA Lys (K)	AGA Arg (R)	
		<b>AUG Met (M)</b>	ACG	AAG	AGG	
G	G	GUU	GCU	GAU Asp (D)	GGU	U C A G
		GUC Val (V)	GCC Ala (A)	GAC	GGC Gly (G)	
		GUA	GCA	GAA Glu (E)	GGA	
		GUG	GCG	GAG	GGG	

- = Chain termination codon (stop)
- = Initiation codon