

Name _____

TA _____

MCDB 1A FINAL EXAMINATION

DECEMBER 9, 2011

Scantron instructions:

1. Use a #2 pencil to complete the form.
2. Write your name and fill in the appropriate bubbles.
3. Write your **perm. number in the ID number box and fill in the bubbles.**
4. Write the color of your test in the space underneath the I.D. number box.
5. Fill in the entire rectangle of the **best** answer.

Part I.	Biochemistry	Dr. Feinstein	Questions 1-17 (3 pts each)	51 points
Part II.	Cell Biology:	Dr. Low	Questions 18-37 (1 or 3 pts each)	50 points
Part III.	Genetics:	Dr. Christoffersen	Questions 38-89 (3 pts each)	156 points
			Test Color	<u>1 point</u>
				258 points

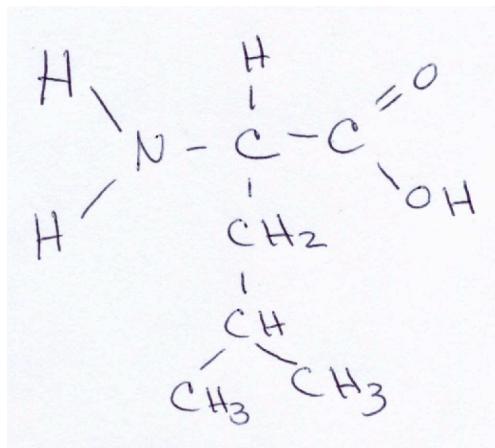
Part I. Biochemistry—Dr. Feinstein

Questions 1 -17 (3 pts each: 51 points total)

Choose the one answer that best completes the statement or answers the question.
Stay Calm and Good Luck

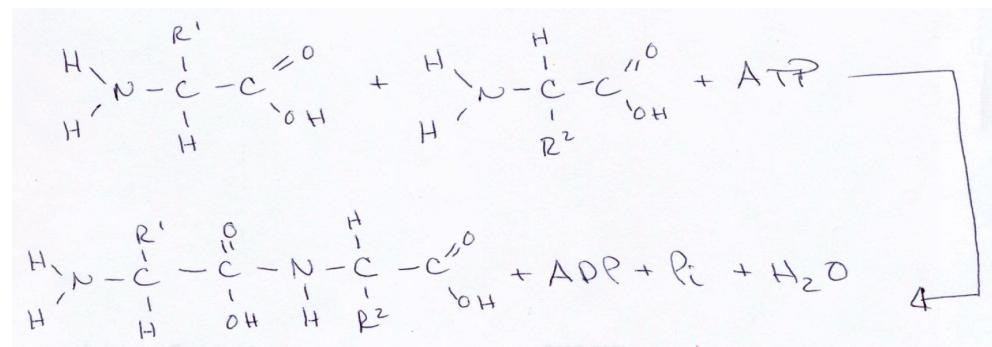
The GENETIC CODE and METABOLIC PATHWAYS are at the end of the Exam.

1. Consider the amino acid leucine (structure below). The "R" group is?



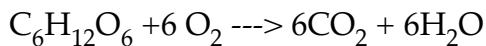
- A. polar and charged
- B. amphipathic
- C. non-polar
- D. polar but uncharged
- E. none of the above is a correct answer

2. Is this the correct chemistry for peptide bond formation?



- A. Yes
- B. No

3. The overall reaction for the metabolic breakdown of glucose is:



In what stage of metabolism are most of the carbon atoms from glucose oxidized?

- A. the citric acid cycle
- B. electron transport/oxidative phosphorylation
- C. Glycolysis
- D. the "pre-entry reaction" (pyruvate to acetyl CoA)
- E. none is a correct answer because the carbon atoms are oxidized in all stages of metabolism.

4. Pick the best answer. Hydrogen bonds can be involved in which levels of protein structure?

- A. secondary, tertiary
- B. only quaternary
- C. primary, secondary, tertiary, quaternary
- D. secondary, tertiary, quaternary

5. Consider the following mRNA:

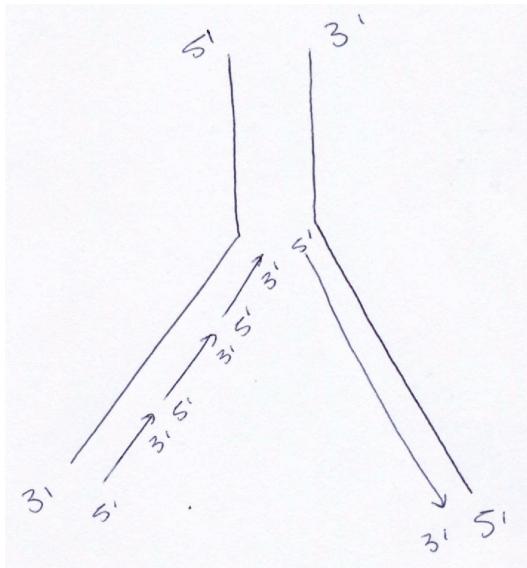
5' GGGCGAUGUUUAGGGUAGGGCCCGGGCAACCUAGGUGUCUGA

How many amino acids would be in the encoded protein?

- A. 9
- B. 10
- C. 5
- D. 6
- E. some other number

6. What amino acid would be at position 2?
- A. alanine
 - B. arginine
 - C. phenylalanine
 - D. serine
 - E. some other amino acid
7. If you had a mutation that caused a codon to change from AAU to AAA, what would you expect to happen?
- A. the mutant protein that would get synthesized would be shorter than the normal protein
 - B. the mutant protein would be the same size as usual, just different in its composition and perhaps its function
 - C. the mutant protein that would get synthesized would be longer than the normal protein
8. What kind(s) of chemical interactions hold a protein's secondary structure together?
- A. weak forces only
 - B. weak forces and covalent bonds
 - C. covalent bonds only
 - D. more information is required to answer the question
9. Consider a protein named "Boscoisgreat". Let's say this protein has 191 amino acids. Based upon what you know about protein synthesis, which of the following mutations would be most likely to have severe consequences for the structure and function of the protein?
- A. deletion of a T at the third position of codon 24
 - B. addition of three nucleotides after codon 43
 - C. substitution of a C for a T at the third position of codon 10.
 - D. addition of a G after the third nucleotide of codon 179
10. How many fatty acids are required to build a phospholipid molecule?
- A. 3
 - B. 2
 - C. 4
 - D. 0
 - E. 1
11. Imagine that you are a hungry cell and somehow you get a large supply of pyruvate. How many ATPs can you make from each of those pyruvate molecules, using all of the metabolic pathways.
- A. 14
 - B. 15
 - C. 12
 - D. 13
 - E. some other number
12. Disulfide bonds are most commonly a part of the
- A. tertiary structure of a protein.
 - B. quaternary structure of a protein.
 - C. primary structure of a protein.
 - D. secondary structure of a protein.

13. Is this a correct depiction of a replication fork?



- A. yes
- B. no

14. Consider the following transcription bubble. If the upper strand is going to be the template for transcription, is the coding sequence located to the left or right of the bubble?



- A. left
- B. right
- C. insufficient information to answer the question

15. Why does glucose require a special protein to transport it across the plasma membrane?

- A. It is too hydrophilic to get past the interior of the lipid bilayer.
- B. It is too hydrophilic to get past the phospholipid head groups of the lipid bilayer.
- C. It is too green
- D. It is too hydrophobic to get past the phospholipid head groups of the lipid bilayer.
- E. It is too hydrophobic to get past the interior of the lipid bilayer.

16. Which of the following molecules has the largest number of monomer subunits assembled into a polymer?
- an average phospholipid
 - an average DNA molecule
 - an average protein
 - an average tRNA molecule
 - an average mRNA molecule
17. In the Meselson-Stahl experiment, "heavy" and "light" nitrogen was used to label DNA. What part of the DNA was being labelled?
- the backbone
 - the pyrimidines
 - the purines
 - more than one of the above is correct
 - none of the above is correct
-

Part II. Cell Biology—Dr. Low

Questions 18-37 (3 points each unless noted otherwise), 50 points total

Choose the one answer that best completes the statement or answers the question.

18. When vesicles from the Golgi apparatus deliver their contents to the exterior of the cell, they add their membranes to the plasma membrane. The plasma membrane does not increase in size, because
- membrane vesicles carry proteins from the endoplasmic reticulum to the Golgi apparatus.
 - new phospholipids are synthesized in the endoplasmic reticulum.
 - the phospholipids become more tightly packed together in the membrane.
 - some vesicles from the Golgi apparatus fuse with the lysosomes.
 - membrane is continually being lost from the plasma membrane by endocytosis.
19. If you removed the pili from a bacterial cell, which of the following would you expect to happen?
- The bacterium would dry out.
 - The shape of the bacterium would change.
 - The bacterium would no longer be able to swim.
 - The bacterium would not adhere to other cells as well.
 - The bacterium would no longer be able to regulate the movement of molecules into and out of the cell.
20. After gastrulation, the endodermal cells contribute predominantly to the developing
- digestive and respiratory tracts.
 - sweat glands and milk secretory glands.
 - brain, nervous system, and nails.
 - skeletal system and muscles.
 - None of the above

21. A set of cells in the intestinal epithelium divide continually to replace dead cells lost from the surface of the intestinal lining. If you examined this continually dividing population of intestinal epithelial cells under the microscope, most of the cells would
- A. be in meiosis.
 - B. be in mitosis.
 - C. be in interphase.
 - D. have condensed chromatin.
 - E. Both b and d
22. Ribosomes are made up of RNA and proteins (1 point).
- A. True
 - B. False
23. During mitosis, anaphase B involves
- A. kinesin motors that push the two poles apart
 - B. shortening of microtubules which are tethered at their plus ends to the kinetochores
 - C. shortening of microtubule minus ends at the kinetochores
 - D. elongation of the microtubules that are attached to the kinetochores
 - E. all of the above.
24. The plasma membranes of winter wheat are able to remain fluid when it is extremely cold by
- A. replacing saturated fatty acids with unsaturated fatty acids.
 - B. using fatty acids with longer tails.
 - C. increasing the number of cholesterol molecules present.
 - D. closing protein channels.
 - E. decreasing the number of hydrophobic proteins present.
25. Which of the following statements about asexual reproduction is *false*?
- A. Genetic diversity in a population is generated in changing environments.
 - B. No energy expenditure is required for mating and fertilization.
 - C. Cell division occurs only by mitosis.
 - D. Populations can grow until limited by resources.
 - E. Single individuals can produce offspring.
26. Plasma membrane glycoproteins have their sugar moieties only on the extracellular surface (1 point).
- A. True
 - B. False
27. Tay Sachs disease is caused by
- A. nondisjunction during meiosis 1
 - B. defective peroxisomes
 - C. non functional lysosomal enzyme.
 - D. aneuploidy
 - E. the absence of a receptor required for receptor mediated endocytosis

28. The acrosomal reaction
- A. is required for formation of the zygote nucleus inside the egg
 - B. occurs inside the egg at the end of fertilization
 - C. helps the sperm penetrate the jelly coat and fuse with the egg
 - D. creates the fast block to polyspermy
 - E. involves the rapid formation of a cable-like structure composed of intermediate filament proteins
29. In a hypothetical study, cells are placed in a solution of glucose in which the concentration of glucose is gradually increased. At first, the rate at which glucose enters the cells is found to increase as the concentration of the glucose solution is increased. But when the glucose concentration of the solution is increased above 5 M, the rate no longer increases. Which of the following is the likely mechanism for glucose transport into these cells?
- A. Pinocytosis
 - B. Secondary active transport
 - C. Symport
 - D. Facilitated diffusion via a carrier protein
 - E. Active transport
30. Unlike spermatogenesis, oogenesis in humans
- A. produces four haploid gametes.
 - B. occurs at a rapid rate.
 - C. results in swimming cells.
 - D. involves asymmetric cytoplasmic division.
 - E. is continuous over the life of the woman.
31. Ribosomes are not visible under a light microscope, but they can be seen with an electron microscope because
- A. electron microscopes focus light with magnets.
 - B. electrons have such high energy that they pass through biological samples.
 - C. living cells can be observed under the electron microscope.
 - D. all molecules are made of atoms containing electrons.
 - E. electron microscopes have more resolving power than light microscopes.
32. The earliest stage of development is called the _____ stage.
- A. blastula
 - B. trophoblast
 - C. fetal
 - D. cleavage
 - E. gastrula
33. If you were to discover a mutation in sea urchins that caused them to produce eggs with an overly dense vitelline envelope, what would you expect to see if you fertilized these eggs with normal sperm?
- A. The formation of multiple identical quadruplets from the fertilized egg
 - B. A failure of normal sperm to fertilize these eggs
 - C. Polyspermy
 - D. A thicker zona pellucida than normal
 - E. All of the above

Match the description of a cell on the left with the cell stages listed on the right. Each item may be used once, more than once, or not at all. (1 point each).

34. First haploid germ cell produced A. Ootid
35. Stage of prolonged developmental arrest B. Primary oocyte
 C. Secondary oocyte
 D. First polar body
 E. Oogonium
36. Divides by mitosis
37. The difference between tight junctions, desmosomes, and gap junctions is that
- A. Tight junctions and desmosomes have mechanical roles, whereas gap junctions facilitate communication between cells.
 - B. Desmosomes and gap junctions are found in epithelial tissue, whereas tight junctions are found in nerve cells.
 - C. Desmosomes and gap junctions contain keratin, whereas tight junctions do not.
 - D. Gap junctions and tight junctions have specialized protein channels called connexons; desmosomes do not.
 - E. They all have different functions; however, their structure is the same.

Part III. Genetics—Dr. Christoffersen

Questions 38-89 (3 points each); 156points total

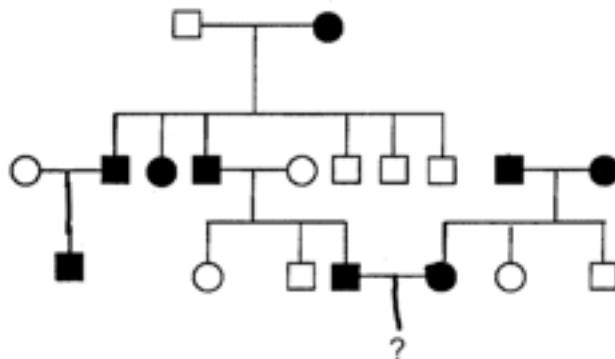
If a question states "Mark all that apply," bubble in all the choices that apply

Assume genes will follow Mendelian inheritance unless indicated

38. The site on the chromosome occupied by a gene is called a(n)
- A. locus
 - B. type
 - C. allele
 - D. region
 - E. phenotype
39. Despite the law of independent assortment, when two loci are on the same chromosome, the phenotypes of the progeny sometimes do not fit the predicted phenotypes due to
- A. linkage.
 - B. chromatid affinities.
 - C. reciprocal chromosomal exchanges.
 - D. translocation.
 - E. inversions.

40. A human egg carrying a normal complement of autosomes and two X chromosomes is fertilized by a sperm carrying a normal complement of autosomes plus an X chromosome. The resulting zygote will result in a person that:
- A. has one Barr body and is phenotypically female
 - B. has no Barr bodies and is phenotypically male
 - C. has one Barr body and is phenotypically male
 - D. has two Barr bodies and is phenotypically female
 - E. has no Barr bodies and is phenotypically female
41. The DNA imprinting that marks the inactivated X-chromosome in females is removed during :
- (mark all that apply)
- A. DNA replication
 - B. heterochromatin formation
 - C. meiosis
 - D. mitosis
 - E. none of the above
42. Why are antibiotics useless in combating animal viral infections?
- A. Antibiotics are unable to penetrate the capsid protein coat which protects the virus genome.
 - B. The envelope excludes antibiotics from entering the virus particle.
 - C. Animal viruses have developed a high level of resistance to commonly used antibiotics.
 - D. Viruses use the host cellular machinery to grow and reproduce.
 - E. none of the above.
43. It is found that a certain enzyme is synthesized whenever the solution in which the cells are growing contains substance X. This is most likely _____ gene regulation.
- A. negative
 - B. positive
 - C. inducible
 - D. repressible
 - E. positive-negative
44. Golden Rice has a bright orange color due to genetic engineering. The goal of this project is to:
- A. improve the keeping quality of rice grains
 - B. provide vitamin A in the diet which will prevent blindness
 - C. produce more staple food for starving children
 - D. improve the plants ability to resist diseases
 - E. none of the above
45. MicroRNAs control gene expression by:
- A. preventing activators from binding to enhancers
 - B. cleaving mRNAs
 - C. causing protein degradation
 - D. preventing RNA polymerase from binding to promoters
 - E. preventing export of mRNAs from nuclei

46. The diagram below shows a pedigree of an autosomal dominant trait.

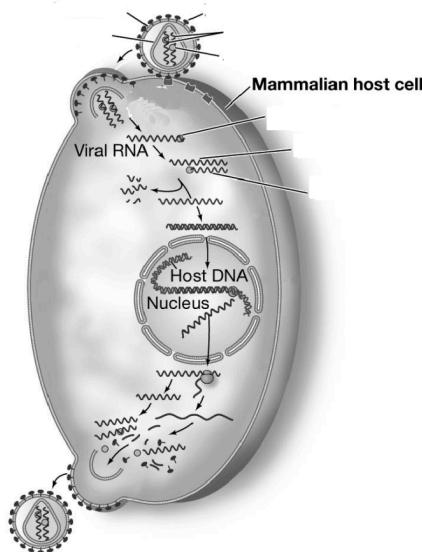


What is the probability that the child indicated by "?" will show the trait?

- A. $\frac{3}{4}$
 - B. $\frac{2}{3}$
 - C. $\frac{1}{2}$
 - D. $\frac{5}{6}$
 - E. 1
47. To express a eukaryotic gene in a bacteria, it is necessary to:
- A. change the eukaryotic codons to bacterial codons.
 - B. replace the eukaryotic promoter with a bacterial promoter
 - C. use an eukaryotic origin of replication
48. One of the genes that is known to be transcribed from the inactive X chromosome is
- A. lithozist.
 - B. methyl-X.
 - C. XIST.
 - D. ZIST.
 - E. inactivation controller protein.
49. A Black Labrador dog with the genotype $BBEE$ was crossed with a yellow Labrador with genotype $bbee$. The offspring from this cross are all black. If these black offspring are allowed to interbreed, what percentage of them would you expect to be brown labs?
(B = black melanins, b = brown melanins; E = allow melanin deposition; e = no melanin deposition)
- A. $\frac{4}{16}$
 - B. $\frac{9}{16}$
 - C. none
 - D. $\frac{1}{16}$
 - E. $\frac{3}{16}$

50. The reason that the H5N1 influenza (bird flu) virus strain has not caused a world-wide epidemic similar to the 1918 Spanish flu pandemic which killed 50 million people is:
- the H5N1 virus is not easily transmitted from human to human.
 - humans have evolved natural resistance to the H5N1 flu since 1918.
 - the H5N1 virus can only infect birds.
 - the H5N1 virus is transmitted by mosquitoes which have been controlled by pesticides.
 - the H5N1 virus can infect humans but is not very lethal so it is not often transmitted to others.

Use The following diagram of the life cycle of HIV to answer the next **two** questions

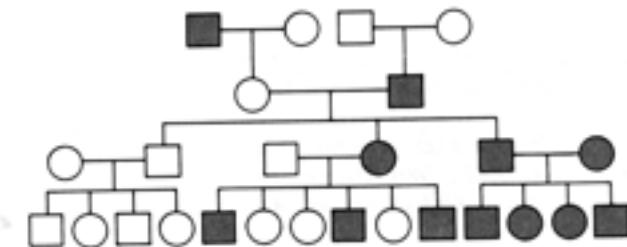


51. After the HIV RNA enters the cell, it is copied by _____ to make _____.
 A. Reverse transcriptase; cDNA
 B. RNA polymerase; cDNA
 C. RNA polymerase; double-strand RNA
 D. DNA polymerase; capsid DNA
 E. Reverse transcriptase; miRNA
52. During entry into the immune system helper T cell, the HIV envelope _____ binds to the _____ receptor on the surface of the host cell.
 A. lipid; BD-4
 B. glycoprotein; CD-4
 C. lipid; membrane
 D. glycoprotein; virus
 E. none of the above
53. If you are a female, your X chromosomes contains genes derived from:
 A. your maternal grandmother, paternal grandmother, and paternal grandfather.
 B. your maternal grandmother and paternal grandmother only.
 C. your maternal grandmother and paternal grandfather only.
 D. your maternal grandmother, maternal grandfather, and paternal grandmother.
 E. your maternal grandmother, paternal grandmother, and paternal grandfather.

54. Many mutations have been identified in the lac operon. A particular mutation causes the repressor protein to bind to the operator independent of lactose. Predict the expression of the lac operon in cells with this mutation under the following growth conditions by checking all conditions which will lead to the operon being "on" (for the purposes of these questions, either a extremely low level of expression or completely off are equivalent)

- A. - lactose, - glucose
- B. - lactose, + glucose
- C. +lactose, - glucose
- D. +lactose, + glucose
- E. none of the above

55. The following family pedigree is for a trait that causes an unusual behavior in humans (filled symbols)



What is the most likely mode of inheritance for this trait?

- A. autosomal dominant
 - B. autosomal recessive
 - C. X-linked dominant
 - D. X-linked recessive
 - E. none of the above
56. When cloning DNA to make a genomic library, the insert _____ is ligated to a _____ and then transformed into a host cell.
- A. DNA; vector
 - B. plasmid; vector
 - C. RNA; restriction enzyme
 - D. cDNA; vector
 - E. RNA; plasmid

57. A particular strain contains a mutation in the CRP protein so that it always binds to the lac promoter independent of cAMP concentration. If a cell carrying this mutation was cultured in the different media listed below, which would prevent expression lac operon:

- A. - lactose +glucose
- B. + lactose + glucose
- C. - lactose -glucose
- D. + lactose -glucose
- E. none of the above.

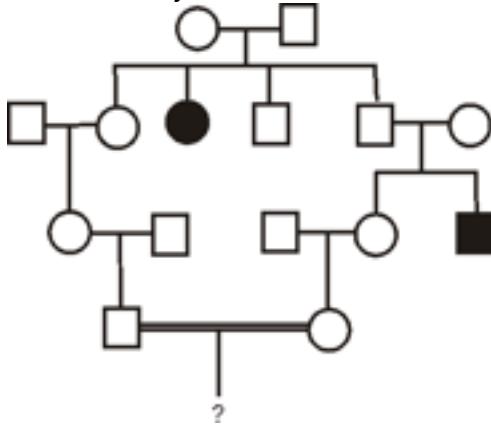
58. The following recombination frequencies (%RF) were observed in dihybrid testcrosses between four different pairs of three genes.

<u>Gene Pair</u>	<u>Observed RF</u>
A - B	40%
A - C	30%
A - D	10%
C - B	10%
D - B	50%

What is the correct gene order of these four genes on the genetic map?

- A. B - A - C - D
- B. D - A - C - B
- C. A - B - C - D
- D. B - A - D - C
- E. The order can't be determined because some of the gene pairs are unlinked.

59. Below is a pedigree chart for a family, with one member exhibiting a rare trait:



What is the probability that the unborn child indicated by the question mark will show the trait?

- A. 1/72
 - B. 1/48
 - C. 1/144
 - D. 1/12
 - E. 1/36
60. Which of the following is an enhancer?
- A. Protein
 - B. RNA
 - C. DNA
 - D. Carbohydrate
 - E. Enzyme

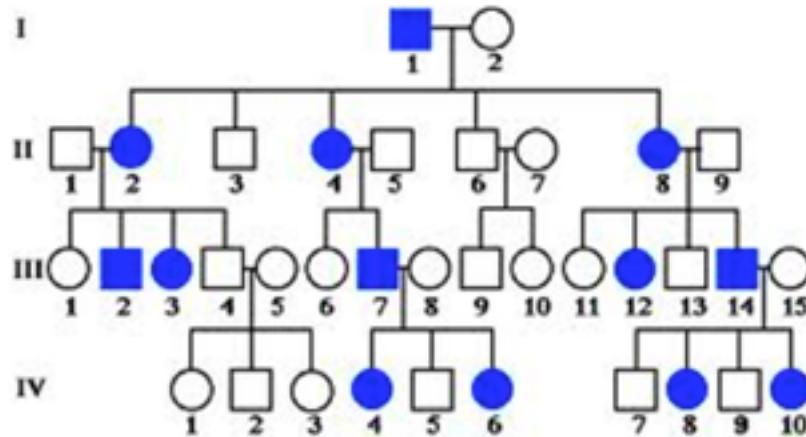
61. Suppose the *A* and *B* genes are on the same chromosome but separated by 20 map units. What fraction of the progeny from the cross *Ab*/*aB* x *Ab*/*aB* would be have the *aB* phenotype?

- A. 24%
- B. 20%
- C. 16%
- D. 18.5%
- E. 40%

62. In females, the selection of which X chromosome will be inactivated and condense into a Barr Body is:

- A. occurs during egg maturation in Meiosis I.
- B. done at the blastula stage of development.
- C. done in each cell after all cell division is completed just before birth.
- D. inherited from the male parent.
- E. occurs in the zygote immediate after fertilization.

63. What is the most likely mode of inheritance for the trait shown in this pedigree?



- A. X-linked Dominant
- B. X-linked Recessive
- C. Autosomal Dominant
- D. Autosomal Recessive
- E. Undetermined from this pedigree.

64. Human gene therapy involves inserting a good copy of a gene into patients who are afflicted by recessive genetic diseases. One approach described in the text is the *ex vivo* method. This involves inserting the good gene into:

- A. isolated eggs prior to fertilization
- B. cells in the body of the patient
- C. shooting microscopic particles coated with DNA into target tissues.
- D. developing embryos
- E. cultured cells isolated from the patient

65. Separation of the alleles of a single gene into different gametes is called

- A. heterozygous separation.
- B. segregation.
- C. synapsis.
- D. recombination.
- E. independent assortment.

66. In eukaryotic cells, gene transcription is controlled by:
(mark all that apply)

- A. Bending of DNA to allow activator proteins to interact with RNA polymerase
- B. modification of histone tails.
- C. chromatin remodeling
- D. activator proteins binding to enhancers
- E. transcription factors binding to promoters

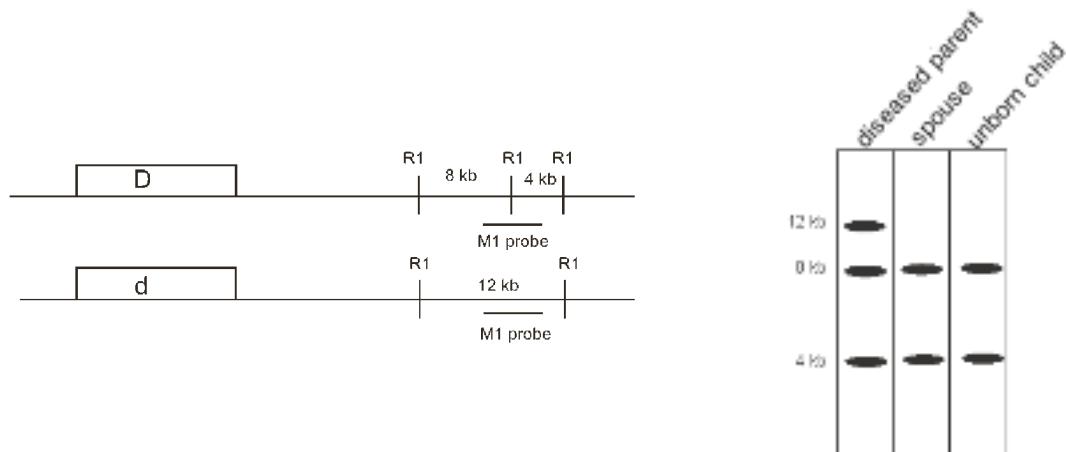
67. Triplet repeat expansion
- A. is caused by transcription stuttering of the RNA polymerase.
 - B. is due to errors in DNA exchange during mitosis.
 - C. is caused by errors in DNA synthesis with reverse transcriptase.
 - D. causes many neurological genetic diseases in humans.
 - E. none of the above
68. Calico cats are heterozygous for two coat color alleles, one for black and the other for orange. Their fur consists of patches of black and orange color. What causes this mosaic pattern of allele expression?
- A. Cross chromosome interference prevents one allele or the other from being expressed.
 - B. Somatic nondisjunction events produce cells which are missing the X-chromosome carrying the black allele and thus some epidermis cells express the orange color which is usually masked by the black pigment.
 - C. Segregation of the X chromosome among the skin cells so each cell patch has a different allele
 - D. Deletion of one allele or the other during early development causes hemizygosity in the coat color locus
 - E. none of the above
69. If the genes A/a and B/b are on the same chromosome and 0 map units apart, a selfed dihybrid with the genotype AB/ab would produce progeny phenotypes in the ratio
- A. 1AB:1Ab:1aB:1ab
 - B. 1Ab:2AB:1aB
 - C. 9Ab:3AB:3ab:1aB
 - D. 9AB:3Ab:3aB:1ab
 - E. none of the above
70. When a heterozygote for two different alleles of a single gene shows both phenotypes associated with each allele when homozygous, this is a case of:
- A. recessive.
 - B. epistasis.
 - C. incomplete dominance
 - D. complete dominance.
 - E. codominance.
71. The alleles on the human X chromosome that have no equivalent allele on the Y chromosome are:
- A. heterozygous
 - B. nondisjunction products
 - C. in the sex determining region (SRY).
 - D. X-linked recessive
 - E. hemizygous
72. The genetic ratio 1:2:1 may indicate:
- A. epistasis.
 - B. recessive lethal.
 - C. complete dominance.
 - D. codominance.
 - E. none of the above

73. The alleles of the I gene determine the ABO blood groups. The AB blood group is an example of interaction between a multiple allelic series with the following alleles: I^A , I^B and i alleles.

A woman with type A blood has a child with type O blood. She is unsure of who the father is among two young men she has known. One of them is type B and the other is type O. What can be concluded concerning the paternity of this child?

- A. Type A is the father
- B. Either one could be the father
- C. Type O is the father
- D. Neither one of the young men could be the father.

74. The diagram on the left shows the genetic map of an individual in the region of a gene that has a dominant allele (D) which is responsible for a human genetic disease. The DNA M1 probe hybridizes to a polymorphic segment of DNA that is known to be about 4 map units away from the D/d gene. The vertical lines represent restriction sites around the DNA region that the probe detects and the horizontal line labeled "M1 probe" indicates the specific region that the probe forms a complex with.



This person marries someone who does not have the disease and is concerned about giving the disease to their potential children. Accordingly, a Southern blot was performed using the M1 probe and DNA extracted from the diseased individual, their spouse, and their unborn child. The results are shown above on the right panel. What is the chance that their child will be born with the disease?

- A. 4%
- B. 2%
- C. 96%
- D. 50%
- E. 48%

75. Nondisjunction can occur at either the first or second division of meiosis. XYY individuals would most likely arise from nondisjunction at the meiotic division in the . (mark all that apply)

- A. first, mother
- B. second, mother
- C. first, father
- D. second, father
- E. none of the above events can lead to an XYY genotype.

76. In rabbits, a dominant gene produces spotted body color, and its recessive allele solid body color. Another dominant gene produces short hair, and its recessive allele long hair. Rabbits heterozygous for both characteristics were mated with homozygous recessive rabbits. The results of this cross were as follows: 48 spotted, short hair; 144 solid, short hair; 156 spotted, long hair; 52 solid, long hair. What is the map distance between the two genes?

- A. 25 m.u.
- B. 12.5 m.u.
- C. 75 m.u.
- D. 50 m.u.
- E. none of the above

77. Hereditary fructose intolerance is a liver enzyme deficiency which inherited as an autosomal recessive trait. Affected individuals cannot digest fruit sugar. When afflicted infants eat fruit it causes vomiting, liver impairment, and weight loss. A man whose aunt has fructose intolerance and a woman whose maternal grandmother also suffered from the same trait, marry and are considering having children. What is the probability that their first child will also have fructose intolerance?

- A. 1/36
- B. 1/64
- C. 1/16
- D. 1/18
- E. 1/24

78. In garden peas, the yellow seed trait is dominant over green seeds. Also, the round-seed trait is dominant over the wrinkled-seed trait. These genes are on separate chromosomes. Suppose that two plants that are heterozygous for both traits are crossed and 800 offspring are produced. About how many progeny will be yellow with round seeds?

- A. 225
- B. 150
- C. 450
- D. 300
- E. none of the above

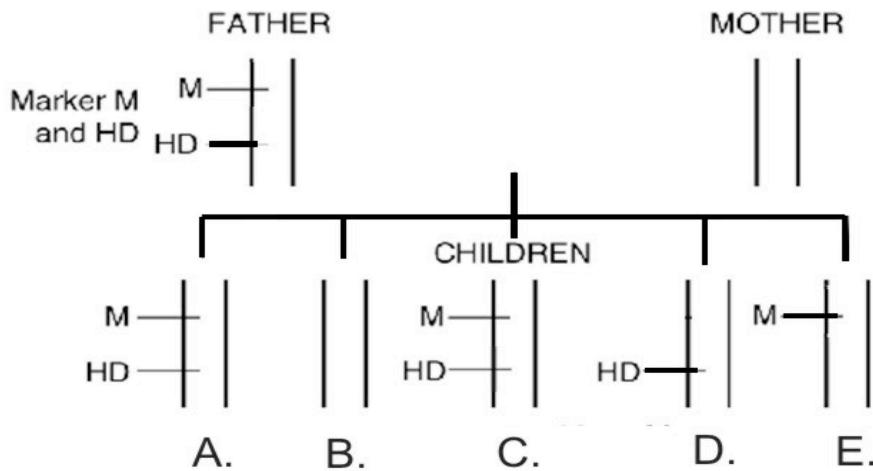
79. The term "lysogeny" refers to

- A. the lysing of a bacterium by a bacteriophage.
- B. mutation induced by a bacteriophage.
- C. the stable integration of bacteriophage DNA into the bacterial chromosome.
- D. exchange of genetic material between a bacteriophage and a bacterium.
- E. the excision of bacteriophage DNA from the bacterial chromosome.

80. When a monohybrid is selfed, it will characteristically produce progeny phenotypes in the ratio

- A. 9:3:3:1
- B. 1:1:1:1
- C. 1:1
- D. 3:1
- E. none of the above

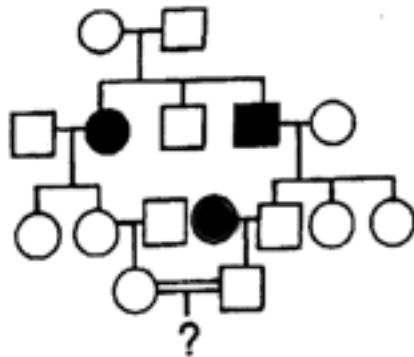
81. In the pedigree below, which among the children would be scored as parental combinations for the HD gene and the molecular marker indicated by M?



(mark all that apply)

- A. Child A
- B. Child B
- C. Child C
- D. Child D
- E. Child E

82. The following pedigree is for a rare autosomal recessive trait; it also shows a consanguineous marriage.



The probability that a child of IV- 1 and IV-2 will not be affected is

- A. 15/16
- B. 23/24
- C. 3/4
- D. 8/9
- E. 11/12

83. Before transcription factors can bind to a eukaryotic gene, the chromatin surrounding that gene must be:
- A. aggregated
 - B. replicated
 - C. remodeled
 - D. methylated
 - E. none of the above
84. Genes A/a and B/b are linked and known to be 30 map units apart. Individuals heterozygous for both of these genes (genotypes= Ab/ab) were mated with each other. If there are 2000 offspring from this cross, how many of the offspring would you expect to show the ab phenotype combination?
- A. 60
 - B. 45
 - C. 300
 - D. 180
 - E. none of the above
85. Bacteriophages have two different life cycles. One of these involves integration of the viral genome into the bacterial host genome. What selective advantage does this strategy have over the alternative life cycle which immediately kills the host cell?
- A. Rolling circle replication viral genome is enhanced.
 - B. Viral proteins can only be translated from the host genome.
 - C. Integration into the host genome allows transcription of the viral capsid protein.
 - D. Allowing the host cell to continue dividing increases the ultimate number of viral particles.
 - E. None of the above.
86. In a repressible operon, the repressor molecule **(mark all the apply)**
- A. binds to the operator when bound to the corepressor
 - B. displaces the corepressor from the operator
 - C. must first be activated by a corepressor to function.
 - D. prevents the transcription of the operon when the corepressor is present.
 - E. none of the above
87. Genetic regulation of a bacterial metabolic pathway where a constant level of the end product is needed for cell survival will most likely occur through:
- A. Repressible operon
 - B. Catabolite repression
 - C. Feedback inhibition
 - D. Positive feedback loop
 - E. Inducible operon
88. White eyes is a recessive sex-linked trait in fruit flies. If a white-eyed female fruit fly is mated to a red-eyed male, their offspring should be
- A. all white-eyed for both sexes.
 - B. all white-eyed females and all red-eyed males.
 - C. 50 percent red-eyed males and 50 percent white-eyed males and all red-eyed females.
 - D. 50 percent red-eyed and 50 percent white-eyed for both sexes.
 - E. all white-eyed males and all red-eyed females.

89. In a family of six children, two are blood type O; two are type AB; one is type B; and another type A. What are the blood types of the parents?

- A. type AB and type O
- B. type A and type B
- C. type A and type O
- D. type B and type O
- E. both answers (A.) and (B.) are possible

90. Did you bubble in your perm number and what color did you write underneath it?

DATE OF BIRTH			I.D. NUMBER										SEX	
Month	Day	Year											M	F
			9	8	7	6	5	4	9					
JAN	0	0	0	0	0	0	0	0	0	0	0	0	0	
FEB	1	1	1	1	1	1	1	1	1	1	1	1	1	
MAR	2	2	2	2	2	2	2	2	2	2	2	2	2	
APR	3	3	3	3	3	3	3	3	3	3	3	3	3	
MAY	4	4	4	4	4	4	4	4	4	4	4	4	4	
JUN	5	5	5	5	5	5	5	5	5	5	5	5	5	
JUL	6	6	6	6	6	6	6	6	6	6	6	6	6	
AUG	7	7	7	7	7	7	7	7	7	7	7	7	7	
SEP	8	8	8	8	8	8	8	8	8	8	8	8	8	
OCT	9	9	9	9	9	9	9	9	9	9	9	9	9	
NOV														
DEC														

Test Color

IMPORTANT

- USE NO. 2 PENCIL ONLY
- EXAMPLE: B D/E
- ERASE COMPLETELY TO CHANGE

- A. YES!; Pink
- B. Yes!!; Green

End of Exam!

Please Return your scantron and exam to your TA.

If you don't have a TA, return your scantron and exam to Dr. Bush

You can pick up your exam after the first week of class of the Winter Quarter 2005
Scores will be posted on the course web site by Dec. 18

Lab books for MCDB1BL/EEMB2L for the Winter Quarter will be on sale at AS Notes in the UCEN after the first the Year.

Happy Holidays and safe New Years!

The Genetic Code:

		Second letter					
		U	C	A	G		
First letter	U	UUU UUC UUA UUG	UCU UCC UCA UCG	UAU UAC UAA UAG	UGU UGC UGA UGG	Cysteine Stop codon Stop codon	U C A G
	C	CUU CUC CUA CUG	CCU CCC CCA CCG	CAU CAC CAA CAG	CGU CGC CGA CGG	Histidine Glutamine	U C A G
	A	AUU AUC AUA AUG	ACU ACC ACA ACG	AAU AAC AAA AAG	AGU AGC AGA AGG	Arginine Serine Arginine	U C A G
	G	GUU GUC GUA GUG	GCU GCC GCA GCG	GAU GAC GAA GAG	GGU GGC GGA GGG	Valine Alanine Aspartic acid Glutamic acid	U C A G
						Glycine	

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