BI 215- Principles of Genetics: Practice Final Exam Key

Circle Answer:

1. If 4/16 of the offspring of two heterozygous parents die, the lethal allele is	Dominant	Recessive
2. In which cell phase is chromatin visible with a light microscope?	Interphase	Prophase
3. Which form of cell division allows shuffling of genetic material?	Mitosis	Meiosis
4. Mitochondrial DNA inheritance	Mendelian	Maternal
5. All traits are inherited via Mendelian genetics	True	False
6. Gene expression alters _____	phenotype	genotype
7. Human females are homogametic	True	False
8. After transcription, prokaryotic DNA must move to the cytoplasm	True	False
9. Relative distances between genes are measured in	Map units	Nanometers
10. Mutation from ATCGCA -> ATTGCA	Point	Frameshift
11. Mutation from ATCGCA -> ATTCGCA	Point	Frameshift
12. Has genetic material with circular chromosomes	Eukaryotes	Prokaryotes
13. Mutation from a purine to a purine	Transition	Transversion
14. Proteins with multiple polypeptide chains have this kind of structure	Tertiary	Quaternary
15. A mutation that occurs outside of the coding region	Nonsense	Neutral
16. Regions of the transcript expressed in the protein	Introns	Exons
17. Sequence upstream of translation, prokaryotes	Kozak	Shine-Dalgarno
18. A given amino acid is specified by more than one codon	Degenerate	Unambiguous
19. Indicates transcription initiation site in ~~eukaryotes~~ prokaryotes	Pribnow box	TATA box
20 RNA polymerase used to transcribe eukaryotic DNA to mRNA	RNA Pol II	RNA Pol III
21. Coat color in Labrador retrievers is an example of	Epistasis	Codominance
22. A feature of the Genetic Code?	Overlapping	Unambiguous
23. Encoded by a single codon	Methionine	Leucine
24. 2n + x chromosomes	Aneuploidy	Euploidy
25. Rearrangement of a gene sequence including the centromere	Paracentric	Pericentric
26. Physical expression of a trait	Phenotype	Genotype
27.. An intercalary deletion occurs where on the chromosome?	End	Within

Matching

A. Nucleus	B. Cytoplasm	C. Ribosome	D. Glycocalyx	E. Karyotype	F. DNA polymerase III
G. Dihybrid	H. Purine	I. Turner	J. Klinefelter	K. Helicase	L. Pyrimidine
M. Histone	N. Okazaki	O. ssb proteins	P. Chargaff	Q. DNA gyrase	R. Watson, Crick
S. Euploidy	T. Trisomy	U. Deletion	V. Inversion	W. Duplication	X. Mitosis
Y. Meiosis	Z. Polynucleotide phosphorylase				

C 28. Location of protein synthesis

O 29. Proteins that stabilize single-stranded DNA

H 30. Adenine and Guanine are this type of base

G 31. A Mendelian cross with two factors

D 32. Expresses biochemical identity and hosts receptor molecules

L 33. Cytosine, Thymine, and Uracil are all this type of base

J 34. Syndrome characterized by XXY

Q 35. Enzyme that relieves coiling tension ahead of DNA helix unwinding

A 36. Site of eukaryotic transcription

V 37. A gene sequence rearrangement; can be paracentric or pericentric

K 38. Enzyme that unwinds the double helix in preparation for replication

E 39. A visualization of an organism's chromosomes

T 40. Having three copies of a chromosome (2n + 1); Down syndrome, for example

S 41. Several chromosomes that fall into sets in a multiple of n.

N 42. Short fragments of DNA made on the lagging strand

Y 43. Cell division in preparation for sexual reproduction

Z 44. Enzyme that artificially builds RNA

F 45. Enzyme used to replicate DNA

W 46. A repeated segment of a chromosome

R 47. Recognized for the currently accepted model of DNA structure

I 48. Syndrome characterized by XO

X 49. Cell division: parent cell produces two cells with chromosome number equal to that of the parent cell

U 50. A missing region in a chromosome

61. If humans had 18 amino acids, how many tRNA synthetases would humans have?

A. 20 C. 25
B. 18 D. 4

62. The secondary structure of a protein is defined by the _____

A. Amino acid sequence C. Covalent bonds between fibroin residues
B. Alpha helices & Beta-pleated sheets D. Hydrogen bonds formed between peptides

63. If a true-breeding tall pea plant (D) was crossed with a true-breeding dwarf plant (d), what would the F1 generation look like?

A. 100% tall (Dd) C. 100% dwarf (dd)
B. 50% tall (DD or Dd) and 50% dwarf (dd) D. There is no way of knowing

64. What is the probability that, if I were to roll 2 six-sided dice, I would get a 1 and a 6?

A. 2/6 C. 1/36
B. 7 D. There is no way of knowing

65. Which of the following is an example of codominance?

A. ABO blood types in humans C. Height of pea plants
B. Snapdragon flower color D. Coat color in horses

66. If genes are linked, they are likely found where?

A. On the same chromosome, usually far apart C. On different chromosomes
B. On the same chromosome, usually close together D. No genes are ever linked

67. What are Barr bodies?

A. Inactivated Y chromosomes in individuals with more than one Y chromosome.
B. Barr bodies are an indication of sterilization
C. Barr bodies are only found in males
D. Inactivated X chromosomes in individuals with more than one X chromosome.

68. A mutation impacting the number of chromosomes can be sought after in _____.

A. Agriculture- the production of many crops are improved with polyploidy
B. Humans with extra chromosomes have superpowers
C. Humans with less chromosomes may be more intelligent
D. In agriculture, the deletion of chromosomes may result in larger plants

69. Some forms of inheritance come from DNA not found in the nucleus. Where might you find this extranuclear DNA?

A. Golgi apparatus C. Vacuoles
B. Mitochondria D. Ribosomes

70. Why is it harder to break GC rich DNA?

A. Contains more hydrogen bonds B. Contains more phosphodiester bonds
B. The DNA structure is modified to be tighter D. They're easier to melt

Multiple Choice (circle answer)

51. We analyze a sample of DNA and find the % of cytosine. From this information we also know

A. % Adenine
B. % Guanine
C. % Thymine
D. All of these

52. A dinucleotide, trinucleotide, and an oligonucleotide ALL have

A. A free 3' phosphate
B. Covalent bonds between bases
C. A free 5' hydroxyl
D. A free 5' phosphate

53. Where is DNA housed in a eukaryotic cell?

A. Nucleus
B. Nucleoid
C. cytoplasm
D. Ribosome

54. Which of the following is NOT true of homologous pairs of chromosomes?

A. They are the same size
B. They are different sizes
C. Their centromeres are roughly in the same place
D. They contain the same genes in the same places

55. A thymine dimer

A. Can be produced by an alkylating agent
B. Can be produced by UV light
C. If left uncorrected, can cause loss of DNA
D. Binds two ~~purines~~ thymines of different backbones of DNA

56. Gregor Mendel was a monk who is considered the father of transmission genetics, or the study of how genes are transmitted from parents to offspring. What was his model for his hybridization experiments of 1856?

A. Rats
B. Humans
C. Daises
D. Garden peas

57. Which of the following will inherit an X-linked allele from their father?

A. all his daughters
B. all his sons
C. half of his offspring
D. all his offspring

58. DNA polymerase catches approximately what percentage of errors?

A. 90%
B. 99%
C. 80%
D. 85%

59. If two people, one with Type A blood and the other with Type B blood have children, what are the possible blood types of the children?

A. Type AB only
B. Type A only
C. Type AB or A
D. Type A, B, AB or O

60. Due to the wobble hypothesis, which position in the codon, if changed to a different nucleotide, would be least likely to cause a change in the amino acid encountered?

A. First nucleotide of the codon
B. Second nucleotide of the codon
C. Third nucleotide of the codon
D. Any nucleotide of the codon

71. Which of the following components is NOT used to construct deoxyribonucleic acid?

A. Adenine
B. Deoxyribose
C. Phosphate
D. Uracil

72. What is the "central dogma" of molecular biology?

A. RNA -> DNA -> Protein
B. Protein -> RNA -> DNA
C. DNA -> RNA -> Protein
D. DNA -> Protein -> RNA

73. How many ribonucleotide letters are used for a codon?

A. 3
B. 2
C. 1
D. 4

74. Which of the following mutations would most likely have the biggest impact?

A. Deletion of three nucleotides
B. Addition of two nucleotides
C. Insertion of three nucleotides
D. Deletion of six nucleotides

Short Answer – Better for you to answer these on your own

78. Difference between complete and incomplete dominance?

79. Draw the basic amino acid structure with labeled parts:

80. Define T_m. Give an example of 2 base pairings with different T_m and explain why.

81. What is the difference between a primary & secondary sex ratio? Why does a 50/50 sex ratio not always hold true?

82. Give an example of a recessive lethal allele & a dominant lethal allele. How do these alleles impact individuals?

83. What are telomeres? How are they used to address challenges of eukaryotic replication?

84. What are the 3 major stages of interphase? Briefly describe what happens in each stage.

85. *Contrast* mitosis and meiosis.

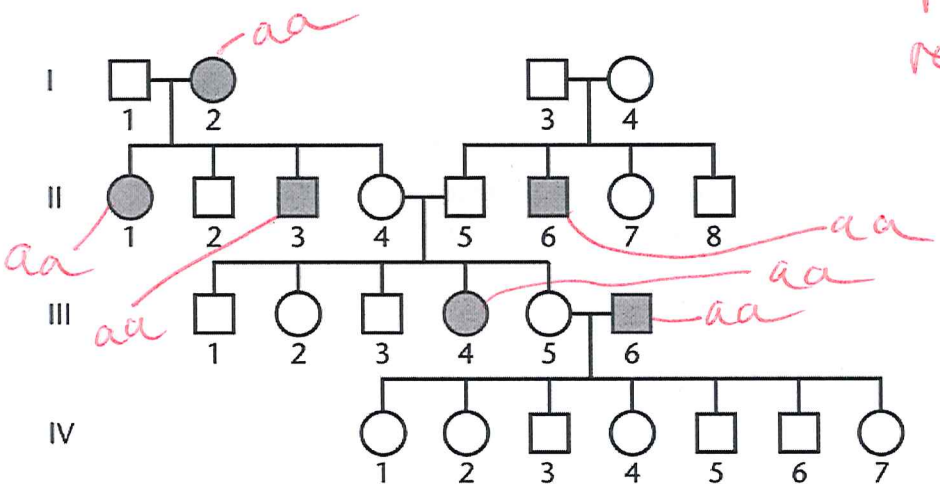
86. Genetics can influence cat coat color (calico & Siamese). Choose 1 and explain how they arise in cats.

87. Compare and contrast the structures of DNA and RNA.

88. Give an example of a mutation that causes human disease. How might the cell repair this issue?

anything we've discussed

89. In the pedigree below, predict whether the disorder is inherited because of a dominant or recessive trait. Determine the most likely genotype for *each individual* based on your prediction.



remember, to express recessive trait, must be aa

in order to have 1 offspring that is aa, what are parents?

Aa x Aa

Do your punnett squares

94. Given the following template strand of DNA

a) Identify the *coding sequence* of DNA – remember to look for start AUG and STOP UAA, UAG or UGA

b) transcribe to mRNA – base pairs 5' to 3', uracil - not thymine

c) translate to an amino acid sequence using amino acid table below:

3' ATACGACCTAAAATTTCTAGCCAATTATACTACGAGCTTACC 5'

break mRNA into 3 bp codons, find codon in table and amino acid it codes for

Second Base in Codon

First Base in Codon	U	C	A	G	Third Base in Codon
U	UUU Phe UUC Phe UUA Leu UUG Leu	UCU Ser UCC Ser UCA Ser UCG Ser	UAU Tyr UAC Tyr UAA Stop UAG Stop	UGU Cys UGC Cys UGA Stop UGG Trp	U C A G
C	CUU Leu CUC Leu CUA Leu CUG Leu	CCU Pro CCC Pro CCA Pro CCG Pro	CAU His CAC His CAA Gln CAG Gln	CGU Arg CGC Arg CGA Arg CGG Arg	U C A G
A	AUU Ile AUC Ile AUA Ile AUG Met or Start	ACU Thr ACC Thr ACA Thr ACG Thr	AAU Asn AAC Asn AAA Lys AAG Lys	AGU Ser AGC Ser AGA Arg AGG Arg	U C A G
G	GUU Val GUC Val GUA Val GUG Val	GCU Ala GCC Ala GCA Ala GCG Ala	GAU Asp GAC Asp GAA Glu GAG Glu	GGU Gly GGC Gly GGA Gly GGG Gly	U C A G