

FINAL 2005: COMPLETE 51-84 ON BACK OF SCANTRON - GALVAN (1-50) ON FRONT

51. True-breeders

- a. always display the dominant phenotype
- b. always give 2:1 dominant:recessive offspring ratio when crossed
- c. always give 3:1 dominant:recessive offspring ratio when crossed
- d. were used in all Mendel's F1 generation crosses
- e. were used in all Mendel's P generation crosses

52. The Law of Independent Assortment was based on experiments

- a. that found a 9:3:3:1 ratio following a F1XF1 cross
- b. that found a 3:1 ratio following a F1XF1 cross
- c. that found a 9:3:3:1 ratio following a P1XP1 cross
- d. that found a 3:1 ratio following a P1XP1 cross
- e. that found a 4:4:1:1 ratio following a testcross

53. The Law of Independent Assortment describes

- a. the events of mitotic metaphase and anaphase
- b. prophase I
- c. prophase II
- d. metaphase I and anaphase I
- e. metaphase II and anaphase II

54. When crossing sex-linked traits, a recessive female X dominant male gives

- a. recessive females and dominant males
- b. recessive males and dominant females
- c. all heterozygous dominant males and females
- d. heterozygous females and dominant males
- e. half heterozygous dominants and half recessives - all equally mixed between genders

55. Which of the following statements about blood-typing genetics is true?

- a. Allele A is said to be codominant with respect to allele O
- b. blood typing alleles follow Mendelian genetics
- c. Type A phenotype individuals have only 1 possible genotype
- d. Type AB phenotype individuals have only 1 possible genotype
- e. there are 3 alleles - red, white, and pink

56. Linked autosomal genes that are 20 map units apart will give offspring ratios of:

- a. 40:40:10:10
- b. 45:45:5:5
- c. 30:30:20:20
- d. 9:3:3:1
- e. 1:1:1:1

57. Chargaff

- a. showed that %A=%T and %G=%C in DNA
- b. demonstrated transformation using bacteria
- c. showed that all species had the same % of A, T, G, and C
- d. produced pictures of DNA using X-ray crystallography
- e. first proposed DNA was a double helix

58. Translation

- a. is defined as the synthesis of protein from RNA
- b. occurs during S phase
- c. is signaled by the promoter
- d. involves helicase
- e. is carried out by RNA Pol

59. Replication is signaled by

- a. promoter sequence
- b. the first AUG
- c. origin sequence
- d. operator sequence
- e. telomere sequence

60. DNA and RNA Pol BOTH

- a. read only the 5' to 3' strand as their template
- b. unwind DNA
- c. adds nucleotides only to the 3'OH
- d. synthesize proteins
- e. are made of rRNA and protein

61. Lagging strands

- a. are longer than leading strands
- b. are synthesized in the 3' to 5' direction
- c. point toward helicase
- d. are synthesized by RNA Pol
- e. must be completed with ligase

62. Anticodons are part of the

- a. mRNA
- b. tRNA
- c. rRNA
- d. DNA
- e. proteins

63. Primers

- a. are made of RNA
- b. are required for both replication and transcription
- c. provide a 5'-OH scaffold
- d. unwind DNA at the replication fork
- e. are protective junk sequences stamped onto linear chromosome ends

64. An anticodon for the amino acid Asp would be

- a. PSA
- b. GAU
- c. UAG
- d. CUA
- e. MET

65. During translation initiation, the first thing to make contact with the mRNA is the

- a. P site
- b. large subunit
- c. small subunit
- d. A site
- e. tRNA-Met

66. In the lac operon model, if lactose was absent

- a. RNA Pol would be able to move past the promoter
- b. the allosteric site of repressor would be empty
- c. the operator would be empty
- d. the allosteric site of repressor would be bound by operator
- e. mRNA transcripts would be made

67. All somatic cells within a single organism contain the same

- a. DNA
- b. RNA
- c. proteins
- d. both a and b are true
- e. a, b, and c are true

68. While studying blood alleles, you obtain Chi Square = 1.09

- a. This corresponds to a probability of 70-90
- b. This corresponds to a probability of 50-70
- c. This corresponds to a probability of 30-50
- d. This corresponds to a probability of 10-30
- e. This corresponds to a probability of 0-10

	90	70	50	30	10
1	0.02	0.15	0.46	1.07	2.71
2	0.21	0.71	1.39	2.41	4.60
3	0.58	1.42	2.37	3.66	6.25
4	1.06	2.20	3.36	4.88	7.78

69. If $p = 0.2$, the frequency of heterozygotes would be (assume HW conditions exist)?

- a. 0.4
- b. 0.32
- c. 0.16
- d. 0.8
- e. 0.24

70. If $AA = 500$, $Aa = 200$, and $aa = 300$, then the frequency of A is

- a. 1000
- b. 1200
- c. 0.36
- d. 0.6
- e. 0.4

71. In the sickle cell computer modeling you performed

- a. homozygous dominants died because they had sickle cell
- b. all dominant genotypes experienced the same selection pressures
- c. fixation occurred rapidly by comparison with industrial melanism
- d. homozygous recessives lived because they were protected from malaria
- e. some heterozygotes died from sickle cell or malaria

72. Uniformitarianism was the geological/earth history model proposed by

- a. Cuvier
- b. Lyell
- c. Lamarck
- d. Malthus
- e. Hutton

73. Darwin's observation that a natural population's resources are limited was likely influenced by

- a. Lamarck
- b. Lyell
- c. Mendel
- d. Malthus
- e. Wallace

74. Which is NOT a way that diploid eukaryotes generate heritable genetic variation?

- a. independent assortment
- b. crossing over
- c. mutations caused by RNA Polymerase
- d. mutations caused by DNA Polymerase
- e. meiosis

75. Restriction enzymes

- a. are only made by prokaryotes
- b. are only made by viruses
- c. are only made by eukaryotes
- d. cut proteins at specific amino acid sequences
- e. all of the above are true

76. Conjugation refers to

- a. prokaryotes sucking up naked DNA from the environment
- b. the physical exchange of DNA between "mating" bacteria
- c. the lack of proofreading by some viral polymerases
- d. traits that are specifically advantageous for mating success
- e. the formation of dimers by some enzymes

77. An example of artificial selection would be

- a. cheetahs chasing and eating zebras
- b. newts making toxins to avoid being eaten by snakes
- c. cellulose-digesting bacteria living in the guts of cows
- d. people taking antibiotics to fight off infectious bacterial diseases
- e. male peacocks having giant tail plumage

78. Darwin made most of his observations in

- a. Africa
- b. Australia
- c. South America
- d. Asia
- e. North America

79. Bottleneck and founder effect are similar in that BOTH

- a. involve a random reduction in population size
- b. involve a non-random reduction in population size
- c. involve sexual selection
- d. involve natural selection
- e. involve advantageous traits

80. A selective event like the appearance of the plague changes the host population because

- a. it increases the mutation rate, resulting in more people who develop disease resistance
- b. it kills off susceptible people, leaving only resistant people alive to reproduce
- c. it randomly reduces the population size
- d. it causes survivors to mutate so they will become resistant
- e. it causes people to reproduce asexually to avoid coming in contact with the disease

Use the following protein gel data to solve the final multiple choice questions, below.



81. In the gel above, how many lower zone of activity members are heterozygotes?

- a. 1
- b. 2

- c. 3
- d. 4
- e. 5

82. In the gel above, rows 1 and 2 are

- a. isozymes
- b. different zones of activities
- c. allozymes
- d. dimers
- e. different fragments of DNA produced by restriction enzymes

83. In the gel above, how many upper zone of activity members are heterozygotes?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

84. In the gel above, the lower zone of activity shows

- a. that the gene for this protein has 3 alleles
- b. that this enzyme is monomeric
- c. that this enzyme is dimeric
- d. that this enzyme is trimeric
- e. that the gene for this protein is cut into 3 different fragment patterns using restriction enzymes

LONG ANSWER

1. 5 pts. In some squash, yellow is incompletely dominant to green - with orange being the heterozygous phenotype. You cross a yellow and an orange squash. Properly assign genotypes to these parents and, using a Punnett Square, properly predict the offspring.
2. 4 pts. You are studying autosomal linked genes - A/a and B/b. You cross a double heterozygote male with a double recessive female to obtain the following offspring ratios. Draw DAD's chromosomes

Offspring Ratios

- 42% Aabb
- 42% aaBb
- 8% AaBb
- 8% aabb

Dad's Original Chromosomes - Include Distance

6. 4 pts. ALL OR NOTHING. Translate the following: 5-ACCUGAAUGUUUCGCGAGUGAGA-3
7. 3 pts. As done in class, propose SINGLE changes in the codon UAU that would create each of the following substitutions. In each case, translate your mutated codon to explain your reasoning.

	Mutated Codon	Translation and Explanation
Missense:		
Nonsense:		
Silent:		

8. 5 pts. Hardy-Weinberg state that evolution will NOT happen if:
9. 5 pts. Describe - using specific class vocabulary - TWO reasons why protein gel methods underestimate genetic variability? Hint - one answer comes from Boomer's lectures, the other from Galvan's.
10. 6 pts. You are a population geneticist and have just counted 980 recessives and 1020 dominants, determine the frequency of AA, Aa, and aa (assume HW conditions exist).