

The material covered on Exam 3 includes lecture since the last exam and Sadava text chapters 9, 10, 11, 12. Other review questions are provided at the end of the text chapters. Know why the correct answer is the best one. Memorizing the answers, without understanding why the answer is correct, is not likely to improve your score.

1. The genetic information in cells consists of the sequential arrangement of:

- amino acids in proteins.
- nucleotides in nucleic acids.
- monosaccharides in polysaccharides.
- fatty acids in triglycerides.
- carbon atoms in hydrocarbons.

2. The purpose of the genetic message is to direct the synthesis of:

- amino acids.
- nucleotides.
- proteins.
- carbohydrates.
- lipids.

3. The sense strand (=template strand) of the DNA is the pattern for making:

- proteins.
- the antisense strand.
- both a and b.

4. If you have a 3-letter alphabet and make words which are 4 letters long, how many unique words can you make? (Use the rule...X different letters taken Y at a time makes X^Y different words)

- 3
- 6
- 16
- 64
- 81

5. The correspondence between codons and amino acids (GAA means glutamate, GCG means alanine, et cetera) is called the:

- double helix.
- genetic information.
- genetic program.
- genetic code.
- nucleotide sequence.

6. The two elemental symbols (bits: 0,1) used by binary digital computers are analogous to _____ in the genetic code.

- nucleotides
- codons
- amino acids
- tRNA's
- genes

7. The fact that that adenine and thymine are always present in equal amounts in DNA is explained by:

- alternation of phosphate and sugar.
- the helical structure of DNA.
- the presence of deoxyribose.
- complementary base-pairing.

8. The pairing of nucleotides between the two strands of DNA is specific because of hydrogen bonds between the:

- phosphate groups.
- ribose sugars.
- amino acids.
- water molecules.
- nitrogenous bases.

9. The successive bases in a single DNA strand are held together by:

- covalent bonds between phosphates.
- covalent bonds between phosphate and deoxyribose.
- covalent bonds between bases.
- hydrogen bonds between phosphates.
- hydrogen bonds between bases.

10. The 5' and 3' ends of a single DNA strand refer to the positions of carbon atoms in the:

- nitrogenous base.
- phosphate group.
- deoxyribose sugar.
- ribose sugar .

11. A molecule of DNA can be replicated because the two strands are:

- a. identical.
- b. reversed.
- c. mirror images.
- d. complementary.

12. DNA synthesis on the lagging strand:

- a. proceeds in the opposite direction as the leading strand.
- b. is primed with short lengths of RNA.
- c. occurs in short lengths called Okazaki fragments.
- d. all of the above.
- e. only leading strand is synthesized.

13. RNA differs from DNA in that RNA usually:

- a. is single stranded.
- b. is made of nucleotides.
- c. includes the nucleotide "A".
- d. includes the nucleotide "C".
- e. includes phosphate.

14. The role of a transfer RNA molecule (tRNA) is to:

- a. bind a particular kind of amino acid.
- b. recognize a codon on the messenger RNA.
- c. all of the above.
- d. none of the above.

15. The role of ribosomal RNA (rRNA) is to:

- a. bind a particular kind of amino acid
- b. form part of the ribosome
- c. recognize each codon
- d. link the Okazaki fragments
- e. all of the above

16. The roles of RNA include:

- a. structural component of ribosomes.
- b. transfer of amino acids to ribosomes.
- c. processing of mRNA transcripts.
- d. all of the above.

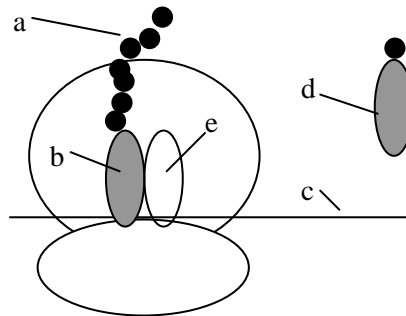
17. After RNA processing, the edited mRNA molecule:

- a. is shorter.
- b. has a GTP cap.
- c. lacks introns.
- d. has a poly-adenosine tail.
- e. all of the above.

18. Which feature is thought to facilitate the evolution of new proteins by permitting the mixing and matching of functional domains?

- a. histones
- b. exons and introns
- d. hydrogen bonding
- c. antiparallel strands
- e. semiconservative replication

Answer the next 5 questions by choosing the appropriate labels from the diagram below:



- 19. a-site
- 20. peptide
- 21. mRNA
- 22. peptidyl-tRNA
- 23. aminoacyl-tRNA

24. Which of the following is not directly involved in translation?

- a. mRNA
- b. DNA
- c. tRNA
- d. ribosomes
- e. amino acids

25. "Recognition" of the codons on the mRNA involves their binding to:

- a. anticodons on the ribosome.
- b. genes on the DNA.
- c. phosphates on the ribosome.
- d. anticodons on the tRNA's
- e. ribose on the polypeptide.

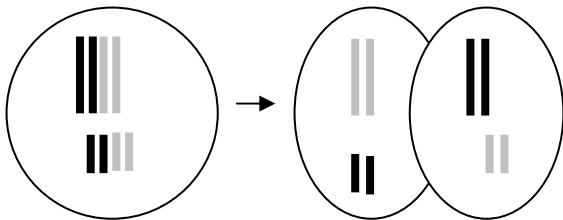
26. During translation, which of the following individual structures would be recycled (used over and over)?

- a. messenger RNA molecule
- b. ribosome
- c. transfer RNA molecule
- d. all of the above
- e. none of the above

27. The flowering plant life cycle contains two stages that differ in ploidy. The multicellular haploid stage is called the:

- a. flower
- b. pistil
- c. sporophyte
- d. gametophyte
- e. spore

The next two questions refer to the diagram below:



28. The sketch represents:

- a. the first division in meiosis.
- b. the second division in meiosis.
- c. the division in mitosis.
- d. the replication of the DNA.

29. Judging from the diagram, what process has failed to take place?

- a. separation of homologues.
- b. independent assortment
- c. synapsis
- d. crossing over
- e. cytokinesis

30. Replication of the DNA results in pairs of:

- a. homologous chromosomes.
- b. sister chromatids.
- c. daughter chromosomes.
- d. designer genes.

31. The division and separation of the centromeres results in:

- a. homologous chromosomes
- b. sister chromatids
- c. daughter chromosomes

32. As a result of mitosis:

- a. one diploid cell becomes 2 diploid cells.
- b. one diploid cell becomes 4 haploid cells.
- c. one haploid cell becomes 2 diploid cells.
- d. one haploid cell becomes 3 haploid cells.
- e. none of the above

33. Which of the following processes creates a cell or cells with a different number of chromosomes than before?

- a. DNA replication.
- b. meiosis.
- c. fertilization.
- d. Both b and c.
- e. All of the above.

34. If not for meiosis, after fertilization the number of chromosomes in the zygote would be:

- a. the same as the parent's cells.
- b. double that in the parent's cells.
- c. half that in the parent's cells.

35. Colchicine is a chemical that inhibits microtubule formation. Therefore, it should also inhibit:

- a. DNA synthesis.
- b. translation.
- c. chromosome movement.
- d. nuclear membrane synthesis.
- e. crossing over.

36. A genetic mutation usually results from an error in:

- a. replication.
- b. glycolysis.
- c. transcription.
- d. translation.
- e. judgement.

37. The phenotype of an organism is determined by its:

- a. genotype.
- b. environment.
- c. both a and b

38. The "punctuation" codons indicate:

- a. start and stop translation.
- b. end of each codon.
- c. end of each intron.
- d. beginning of each exon.
- e. all of the above.

39. Mendel studied peas because he:

- a. wanted to understand heredity.
- b. found pea plants convenient for study.
- c. could cause self-fertilization in peas.
- d. found several heritable variations for study.
- e. all of the above.

40. An individual with identical DNA sequences at a locus on each member of a homologous pair of chromosomes, is described as:

- a. epistatic.
- b. pleiotropic.
- c. polygenic.
- d. heterozygous.
- e. homozygous.

41. A recessive allele is one that:

- a. is rare in the population.
- b. never affects the phenotype.
- c. codes for a non-functional protein.
- d. is not expressed if dominant allele present.
- e. all of the above.

42. The processes that result in genetic recombination include:

- a. crossing over
- b. independent assortment
- c. fertilization
- d. all of the above
- e. none of the above

43. The expected phenotypic result of a cross between two heterozygous individuals bearing a dominant and a recessive allele is:

- a. 3:1 dominant:recessive.
- b. 3:1 recessive:dominant.
- c. all dominant.
- d. all recessive.

44. Mendel could be certain that the parents of a pea had identical genes by:

- a. using plants with the same phenotypes.
- b. using plants with different phenotypes.
- c. allowing a plant to self-fertilize.
- d. examining the gene banding patterns.
- e. comparing gene nucleotide sequences.

45. The expected offspring phenotypes from a cross between a homozygous, dominant individual and a homozygous recessive individual is:

- a. 3:1 dominant:recessive.
- b. 3:1 recessive:dominant.
- c. all dominant.
- d. all recessive.

46. Which of the following describes incomplete dominance between alleles?

- a. phenotype of heterozygotes is the same as that of homozygous dominant individuals.
- b. heterozygotes have intermediate phenotype
- c. heterozygote expresses both alleles

47. Which of the following combinations parental and offspring ABO blood group phenotypes is not possible?

- a. Parents: A and B, Child: O
- b. Parents: A and AB, Child: B
- c. Parents: O and AB, Child: B
- d. Parents: O and O, Child: AB

Assume that mouse fur is affected by two gene loci with two possible alleles at each: S=silky s=rough; B=black b=brown. (Upper case indicates the dominant alleles.) Consider the following cross: SsBB X ssbb. Use the choices below to answer the next three questions.

- a. 1/2
- b. 9/16
- c. 3/16
- d. 1/16
- e. 0

48. What is the expected proportion of silky black offspring?

49. What is the expected proportion of rough black offspring?

50. What is the expected proportion of silky brown offspring?

1.	B	26.	D
2.	C	27.	D
3.	C	28.	A
4.	E	29.	D
5.	D	30.	B
6.	A	31.	C
7.	D	32.	A
8.	E	33.	D
9.	B	34.	B
10.	C	35.	C
11.	D	36.	A
12.	D	37.	C
13.	A	38.	A
14.	C	39.	E
15.	B	40.	E
16.	D	41.	D
17.	E	42.	D
18.	B	43.	A
19.	E	44.	C
20.	A	45.	C
21.	C	46.	B
22.	B	47.	D
23.	D	48.	A
24.	B	49.	A
25.	D	50.	E