Name: _____ **Class:** _____ **Date:** _____ **ID: A**

AP-DNA Packet

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. During Mendel's lifetime, most people believed that
   a. all genetic traits bred true. b. only certain forms of domesticated plants and animals bred true. c. the characteristics of parents were blended in the offspring. d. the mother contributed all the hereditary material for the new generation. e. the father contributed all the hereditary material for the new generation.

2. A gene locus is
   a. a recessive gene. b. an unmatched allele. c. a sex chromosome. d. the location of an allele on a chromosome. e. a dominant gene.

3. Diploid organisms
   a. have corresponding alleles on homologous chromosomes. b. are usually the result of the fusion of two haploid gametes. c. have two sets of chromosomes. d. have pairs of homologous chromosomes. e. have all of these qualities.

4. Which of the following is a homozygous genotype?
   a. *AaBB* b. *aABB* c. *aaBB* d. *aaBb* e. *AaBb*

5. Genes are
   a. located on chromosomes. b. inherited in the same way as chromosomes. c. arranged in linear sequence on chromosomes. d. assorted independently during meiosis. e. all of these.

6. Chromosomes other than those involved in sex determination are known as
   a. nucleosomes. b. hematosomes. c. alleles. d. autosomes. e. liposomes.

7. Sex chromosomes
   a. determine gender. b. vary from one sex to another. c. carry some genes that have nothing to do with sex. d. were unknown to Mendel. e. are all of these.

8. Which statement is false regarding the Philadelphia chromosome?
   a. It is identified through spectral karyotyping. b. It is the first to be specifically correlated with leukemia. c. It is shorter than the usual human chromosome 9. d. It contains an extra translocated gene. e. It results in an abnormal cell cycle.

9. In an autosomal dominant disorder such as Huntington disease, the probability of two parents with the gene passing this disorder on to a child is
   a. 0%. b. 25%. c. 50%. d. 75%. e. 100%.

10. A woman is diagnosed to have a gene for the genetic disorder known as Huntington disease. It is a rare defect caused by an autosomal dominant allele. The chance for any one of her children to inherit the gene is
    a. dependent on the sex of the child. b. 1/3. c. 1/2. d. 3/4. e. 1.00 (or 100 percent).

11. An autosomal recessive disorder
a. requires that only one parent be a carrier. b. displays its symptoms only in heterozygotes. c. is more frequent in males than females. d. will appear only in children of parents who both carry the gene. e. is dominant in females.

12. Who was the first to use fruit flies in genetics experiments?
a. Morgan b. Mendel c. Darwin d. Watson e. Hutchinson

13. A human X-linked gene is
a. found only in males. b. more frequently expressed in females. c. found on the Y chromosome. d. transmitted from father to son. e. found on the X chromosome.

14. Which of the following individuals would be considered a carrier of a sex-linked recessive defect?
a. a man with the defect b. a woman with the defect c. a father of a son with the defect d. the normal daughter whose father had the defect e. a son of two unaffected parents

15. Color blindness is an X-linked trait in humans. If a color-blind woman marries a man with normal vision, the children will be
a. all color-blind daughters, but normal sons. b. all color-blind sons, but carrier daughters. c. all normal sons, but carrier daughters. d. all color-blind children. e. all normal children.

16. Gene duplications
a. have proved to be adaptive in some cases. b. have resulted in many slightly different hemoglobin molecules in primates. c. always have negative consequences. d. can occur via unequal crossovers at prophase I. e. are all of these EXCEPT "always have negative consequences."

17. Polyploidy
a. can occur naturally. b. occurs when there are more than two sets of chromosomes. c. can be artificially induced by colchicine. d. is responsible for some of our major foods. e. is all of these.

18. The failure of chromosomes to separate during mitosis or meiosis is called
a. genetic displacement. b. trisomy. c. crossing over. d. nondisjunction. e. disjunction.

Selecting the Exception

19. Four of the five statements listed below provide evidence that genes are located on chromosomes. Select the exception.
a. The chromosome number is cut in half by meiosis. b. The original chromosome number is restored by fertilization. c. Some genes tend to be inherited together. d. Environmental factors may influence gene expression. e. There are two sets of chromosomes, one maternal, one paternal, in diploid forms.

20. Four of the five conditions listed below are caused by recessive genes. Select the exception.
a. Huntington disease b. phenylketonuria c. color blindness d. hemophilia e. albinism

21. Four of the five nitrogen-containing bases listed below are bases used to construct DNA. Select the exception.
a. cytosine b. adenine c. thymine d. guanine e. uracil

22. Four of the five enzymes listed below are involved in DNA replication and repair. Select the exception.
a. restriction enzymes b. DNA polymerases c. ligases d. helicases e. glycosylases

23. The major challenge in using adult DNA in the cloning process is
a. purifying the DNA. b. inserting the DNA into cells. c. switching on its genes in controlled ways.
d. turning off unnecessary genes. e. determining what DNA is best to use.

24. Fred Griffith discovered that when he injected mice with a mixture of dead pathogenic S cells and living harmless R cells of *Streptococcus pneumoniae*
a. the harmless dead S bacteria became pathogenic and killed the mice. b. the mice died, and their bodies teemed with living pathogenic S strain cells. c. the pathogenic S strain was transformed into the harmless R strain. d. the mice lived, and their bodies teemed with living harmless R strain cells, and the pathogenic S strain cells were eliminated. e. all of these occurred.

25. Which scientist(s) identified the transforming substance involved in changing rough (R) bacteria to smooth (S)?
a. Avery b. Griffith c. Chargaff d. Hershey and Chase e. Pauling

26. DNA contains ____ but NOT ____.
a. sulfur; phosphorus b. phosphorus; sulfur c. potassium; sulfur d. sulfur; potassium e. proteins; phosphorus

27. The significance of the Hershey and Chase experiments in which ^{32}P and ^{35}S were used is that
a. DNA labeled with ^{35}S and proteins labeled with ^{32}P can be traced in the course of an experiment. b. they demonstrated that DNA labeled with ^{32}P is transferred from the bacteriophage to the virus. c. they established that proteins labeled with ^{35}S become deactivated and unable to be transferred. d. they demonstrated that bacteriophages transfer their DNA, not their protein coats, into their hosts. e. DNA may be the hereditary material; although, bacteriophages transfer both DNA and proteins into their hosts.

28. Hydrogen bonding is strongest between
a. adenine and guanine. b. uracil and thymine. c. guanine and uracil. d. adenine and thymine.
e. cytocine and guanine.

29. Rosalind Franklin worked in the research laboratory of
a. Watson and Crick. b. Wilkins. c. Chargaff. d. Hershey and Chase. e. Pauling.

30. Watson and Crick were concerned that ____ would beat them to the discovery of the structure of DNA.
a. Wilkins b. Franklin c. Chargaff d. Pauling e. all of these

31. In the spiral staircase model of DNA, the rungs are
a. deoxyribose sugars. b. hydrogen bonds. c. nucleotide base pairs. d. phosphate groups.
e. composed of all of these.

The following questions refer to the figure above.

32. The figure illustrates
a. DNA repair. b. semiconservative replication. c. the action of the ligases. d. the action of glycosylases. e. DNA hybridization.

33. Strand B has the same order of nucleotides as strand(s)
a. A. b. C. c. D. d. C and D. e. A and D.

34. The primary function of DNA ligase is to
a. cut the two strands of the DNA molecule prior to replication. b. attach free nucleotides to the growing chain. c. remove bases that might be inserted incorrectly. d. seal new short stretches of nucleotides into one continuous strand. e. fragment old DNA that is no longer of use to the cell.

35. Somatic cell nuclear transfer is a type of
a. embryo cloning. b. adult cloning. c. therapeutic cloning. d. artificial twinning. e. stem cell cloning.

36. DNA from bacteria differs from DNA in humans in which of the following ways?
a. base composition b. sugar-phosphate linkage c. nucleotide sequence d. bonding of the helix e. all of these

37. A linear stretch of DNA that specifies the sequence of amino acids in a polypeptide is called a(n)
a. codon. b. intron. c. messenger. d. gene. e. enzyme.

38. The DNA molecule usually is made up of how many strands?
a. 1 b. 2 c. 3 d. 6 e. 12

39. ____ molecules carry protein-assembly instructions from the nucleus to the cytoplasm.
a. Template DNA b. Messenger RNA c. Transfer RNA d. Ribosomal RNA e. All of these

40. The RNA molecule is made up of how many strands?
a. 1 b. 2 c. 3 d. 6 e. 12

41. All the different kinds of RNA are transcribed in the
a. mitochondria. b. cytoplasm. c. ribosomes. d. nucleus. e. endoplasmic reticulum.

42. The synthesis of an RNA molecule from a DNA template strand is
a. replication. b. translation. c. transcription. d. DNA synthesis. e. metabolism.

43. Transcription starts at a region of DNA called a(n)
a. sequencer. b. promoter. c. activator. d. terminator. e. transcriber.

44. The portion of the DNA molecule that is translated is composed of
a. introns. b. anticodons. c. exons. d. transcriptons. e. exons and transcriptons.

45. The portion of the DNA molecule that is not translated and is a noncoding portion of DNA is composed of
a. introns. b. anticodons. c. exons. d. transcriptons. e. exons and transcriptons.

46. If the DNA triplets are ATG–CGT, the mRNA codons are
a. AUG–CGU. b. ATG–CGT. c. UAC–GCA. d. UAG–CGU. e. all of these.

47. If the DNA triplets are ATG–CGT, the tRNA anticodons are
a. AUG–CGU. b. ATG–CGT. c. UAC–GCA. d. UAG–CGU. e. all of these.

48. There are how many different kinds of RNA codons?
a. 3 b. 12 c. 28 d. 64 e. 120

49. Crick and Brenner discovered that the presence of three extra nucleotides inserted in the middle of a gene caused far fewer problems than if only one or two extra nucleotides were inserted. They interpreted this result to mean that
a. the genetic code consists of nonoverlapping triplets of nucleotide bases. b. the longer the sequence of nucleotides that is added to a gene, the more chemically stable the resulting DNA is. c. there had been significant experimental error in their electrophoresis studies. d. the wobble effect accounts for the unpredictability in codon-anticodon pairing at the third base. e. all of these are true.

50. The wobble effect pertains to the matching of
a. codons with anticodons. b. codons with exons. c. exons with introns. d. template DNA with messenger RNA. e. messenger RNA with ribosomal RNA.