

DO NOT WRITE ON THIS TEST PAPER

AYP Genetics Test February 2010

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

1. A 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.

2. Which of the following genotypes show dominant phenotypes?

- a. *aa*
- b. *Aa*
- c. *AA*
- d. *Aa* and *AA*
- e. *AA* and *aa*

3. According to Mendel, what kind of genes "disappear" in F_1 pea plants?

- a. sex-linked
- b. dominant
- c. recessive
- d. codominant
- e. lethal

4. If tall (*D*) is dominant to dwarf (*d*), and two homozygous varieties *DD* and *dd* are crossed, then what kind of offspring will be produced?

- a. all intermediate forms
- b. all tall
- c. all dwarf
- d. 1/2 tall, 1/2 dwarf
- e. 3/4 tall, 1/4 dwarf

5. A testcross involves

- a. two dominant individuals.
- b. a dominant individual and a heterozygous organism.
- c. two parental organisms.
- d. a dominant individual and the homozygous dominant parent.
- e. a dominant individual and an organism that is homozygous recessive for that trait.

6. The theory of segregation

- a. deals with the alleles governing two different traits.
- b. applies only to linked genes.
- c. applies only to sex-linked genes.
- d. explains the behavior of a pair of alleles during meiosis.
- e. none of these

7. Mendel's principle of independent assortment states that

- a. one allele is always dominant to another.
- b. hereditary units from the male and female parents are blended in the offspring.
- c. the two hereditary units that influence a certain trait segregate during gamete formation.
- d. each hereditary unit is inherited separately from other hereditary units.
- e. all of these

8. In cocker spaniels, black coat color (B) is dominant over red (b), and solid color (S) is dominant over spotted (s). If a red spotted male was crossed with a black solid female and all the offspring from several crosses were only black and solid, the genotype of the female would be
- $BB SS$.
 - $Bb SS$.
 - $Bb Ss$.
 - $BB Ss$.
 - none of these
9. In cocker spaniels, black coat color (B) is dominant over red (b), and solid color (S) is dominant over spotted (s). A cross of $Bb Ss$ with $Bb Ss$ would produce the phenotypic ratio
- 9:3:3:1.
 - 1:1:1:1.
 - 1:2:1.
 - 3:1.
 - none of these
10. If a child belonged to blood type O, he or she could not have been produced by which set of parents?
- Type A mother and type B father
 - Type A mother and type O father
 - Type AB mother and type O father
 - Type O mother and type O father
 - Type O mother and type B father
11. If a child has an AB blood type, the parents
- must both have different blood types.
 - must be A and B, but not AB.
 - must both be AB.
 - can be any blood type.
 - can have different blood types, but neither can be blood type O.
12. In incomplete dominance,
- one allele is not dominant to another allele.
 - the genotype can be determined by the phenotype.
 - the heterozygote is somewhat intermediate to the two homozygotes.
 - the intermediate phenotype may be the result of enzyme insufficiency.
 - all of these
13. Multiple effects of a single gene, such as is seen in Sickle Cell Anemia, is known as
- expressivity.
 - penetrance.
 - codominance.
 - pleiotropy.
 - multiple alleles.
14. Which of the following genotypes is not pure breeding?
- $AA BB$
 - $Aa BB$
 - $AA bb$
 - $aa BB$
 - $aa bb$

15. 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

16. Chromosomes other than those involved in sex determination are known as

- a. nucleosomes.
- b. heterosomes.
- c. alleles.
- d. autosomes.
- e. liposomes.

17. Different molecular forms of the same locus are called

- a. homologues.
- b. alleles.
- c. autosomes.
- d. loci.
- e. gametes.

18. Sex chromosomes

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

19. Which of the following designates a normal human female?

- a. XXY
- b. XY
- c. XX
- d. XYY
- e. XO

20. A karyotype

- a. compares one set of chromosomes to another.
- b. is a visual display of chromosomes arranged according to size.
- c. is a photograph of cells undergoing mitosis during anaphase.
- d. of a normal human cell shows 48 chromosomes.
- e. cannot be used to identify individual chromosomes beyond the fact that two chromosomes are homologues.

21. Karyotype analysis

- a. is a means of detecting and reducing mutagenic agents.
- b. is a surgical technique that separates chromosomes that have failed to segregate properly during meiosis II.
- c. is used to detect chromosomal mutations and metabolic disorders in embryos.
- d. substitutes defective alleles with normal ones.
- e. all of these

22. If two genes are on the same chromosome,

- a. crossing over occurs frequently.
- b. they assort independently.
- c. they are in the same linkage group.
- d. they are segregated during meiosis.
- e. an inversion will usually occur.

23. Which is NOT a structural-chromosomal mutation?

- a. deletion
- b. nondisjunction
- c. translocation
- d. crossing over
- e. inversion

24. In a pedigree chart, a female who does not demonstrate the trait being studied is represented by a

- a. darkened square.
- b. clear diamond.
- c. clear circle.
- d. darkened triangle.
- e. darkened oval.

25. Red-green colorblindness is an X-linked recessive trait in humans. A colorblind woman and a man with normal vision have a son. What is the probability that the son is colorblind?

- a. 100 percent
- b. 75 percent
- c. 50 percent
- d. 25 percent
- e. 0 percent

26. If a daughter expresses an X-linked recessive gene, she inherited the trait from

- a. her mother.
- b. her father.
- c. both parents.
- d. neither parent.
- e. her grandmother.

27. A chromosome's gene sequence that was ABCDEFG before modification and ABCDCDEFG afterward is an example of

- a. inversion.
- b. deletion.
- c. duplication.
- d. translocation.
- e. crossing over.

28. A chromosome that has been broken and rejoined in a reversal sequence has undergone

- a. inversion.
- b. deletion.
- c. duplication.
- d. translocation.
- e. crossing over.

29. Certain human cancer cells may demonstrate which of the following?

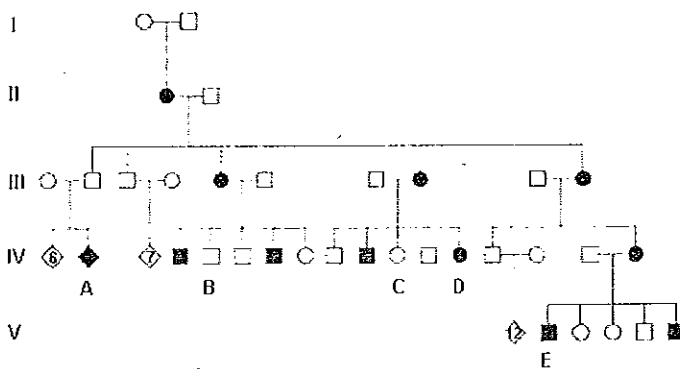
- a. deletion
- b. inversion
- c. translocation
- d. duplication
- e. none of these

30. The condition occurring when an organism has a $2n + 1$ chromosome composition is known as

- a. monosomy.
- b. trisomy.
- c. diploid.
- d. haploid.
- e. both trisomy and haploid.

31. How many chromosomes would be in the somatic cells of a man with two X chromosomes?

- a. 12
- b. 23
- c. 24
- d. 46
- e. 47



Use the pedigree above of an autosomal recessive trait to answer the following four items.

32. Which letter on the pedigree indicates an affected male?

- a. A
- b. B
- c. C
- d. D
- e. E

33. What is the genotype of the individual marked "B"?

- a. aa
- b. Aa
- c. AA
- d. either aa or Aa
- e. either Aa or AA

34. What is the genotype of the individual marked "D"?

- a. aa
- b. Aa
- c. AA
- d. either aa or Aa
- e. either Aa or AA

35. What is the chance of affected offspring from the cross "B" x "D"?

- a. 0 percent
- b. 25 percent
- c. 50 percent
- d. 75 percent
- e. 100 percent

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