Chapter 13: Observing Patterns in Inherited Traits

Study Guide

1. A heterozygous individual has a \_\_\_ for a trait being studied:

A. pair of identical alleles

**B. pair of nonidentical alleles**

C. haploid condition, in genetic terms

2. An organism’s observable traits constitute its:

**A. phenotype**

B. variation

C. genotype

D. pedigree

3. In genetics, F stands for filial, which means:

A. friendly

**B. offspring**

C. final

D. hairlike

4. The second-generation offspring of a cross between individuals who are homozygous

for different alleles of a gene are called the:

A. F1 generation

**B. F2 generation**

C. hybrid generation

D. none of the above

5. F1 offspring of the cross *AA* x *aa* are:

A. all *AA*

B. all *aa*

**C. all *Aa***

D. 1/2 *AA* and 1/2 *aa*

6. Assuming complete dominance, the offspring of the cross *Aa* x *Aa* will show a

phenotypic ratio of:

**A. 3:1**

B. 9:1

C. 1:2:1

D. 9:3:3:1

7. A testcross is a way to determine:

A. phenotype

**B. genotype**

C. both a and b

8. Assuming complete dominance, crosses between two dihybrid F1 pea plants, which are

offspring from a cross  *AABB* x *aabb*, result in  F2 phenotype ratios of:

A.1:2:1

B. 3:1

C. 1:1:1:1

**D. 9:3:3:1**

9. The probability of a crossover occurring between two genes on the same chromosome:

A. is unrelated to the distance between them

**B. decreases with the distance between them**

C. increases with the distance between them

10. A gene that affects three traits is:

A. epistatic

B. a multiple allele system

**C. pleiotropic**

D. dominant

11. Although DNA was not proven to be hereditary material until the 1950s, who

discovered the units of heredity almost a century before:

A. Francis Crick

B. Rosalind Franklin

**C. Gregory Mendel**

D. Charles Darwin

12. An allele is dominant if it:

A. is masked by its paired recessive allele

B. is part of the genotype but not the phenotype

C. works with another allele to express a mixed trait

**D. masks its paired recessive allele**

13. Consider a purple-flowered pea plant with one allele that specifies purple flowers (P)

and another allele that specifies white flowers (p). Which one of the following could

be true:

A. it is homozygous for the gene that encodes flower color; the genotype is Pp

and the phenotype is purple flowers

**B. it is heterozygous for the gene that encodes flower color; the genotype is**

**Pp and the phenotype is purple flowers**

C. it is heterozygous for the gene that encodes flower color; the phenotype is Pp

and the genotype is purple flowers

D. it is homozygous for the gene that encodes flower color; the phenotype is Pp

and the genotype is purple flowers

14. In a testcross, an individual that has an unknown genotype and expresses the\_\_\_:

A. recessive trait is crossed with an individual know to be homozygous for the

recessive allele

B. dominant trait is crossed with an individual known to be homozygous for the

dominant allele

**C. dominant trait is crossed with an imdividual known to be homozygous for**

**the recessive allele**

D. recessive trait is crossed with an individual known to be homozygous for the

dominant allele

15. Heterozygous pea plant that have a purple flower phenotype are corossed: Pp x Pp (P

specifies purple flowers and p specifies white flowers). The probability that a

particular offspring of this cross will have purple or white flowers is:

A. 1 purple to 3 white

**B. 3 purple to 1 white**

C. 0 purple to 4 white

D. 4 purple to 0 white

16. What law states that during meiosis, the members of a pair of genes on homologous

chromosome tend to be distributed into gametes independently of other gene pairs:

A. law of segregation

B. law of isolation

C. law of randomization

**D. law of independent assortment**

17. Which genes are least likely to be separated by crossovers:

**A. genes that are close in proximity**

B. genes without linkage groups

C. genes that have few alleles

D. genes with similar functions

18. The snap dragon plant exhibits incomplete dominance for flower color. RR plants produce red

flowers; rr plants produce white flowers; Rr plants produce pink flowers. If two pink-flowered

snapdragons are crossed, the phenotypes of their offspring will likely occur in what ratio:

A. 1 red : 1 pink : 2 white

B. 2 red : 1 pink : 1 white

**C. 1 red : 2 pink : 1 white**

D. 0 red : 2 pink : 2 white

19. Consider fur color in dogs, which depends on pigments called melanins. The product of one gene

(TYRP1) helps make the brown melanin; a different gene (MC1R) affects which type of melanin is

produced. Therefore both genes, TYRP1 and MC1R, contribute to the fur color. This process in

known as:

A. a multiple allele system

B. codominance

C. incomplete dominance

**D. pleiotropy**

20. The continuous variation of a trait refers to the:

A. frequency of a trait in a population

B. likelihood of crossover of an allele

**C. range of small differences in a shared trait**

D. likelihood of allelic mutations

21. In Mendel’s time, most people believed that:

A. all genetic traits bred true

**B. the characteristics of parents were blended in the offspring**

C. acquired characteristics were inherited

D. only certain forms of domesticated plants and animals bred true

22. If tall (D) is dominant to dwarf (d) in plants and two homozygous varieties DD and dd are

crossed, then what kind of offspring will be produced:

A. ½ DD, ½ Dd

B. all DD

**C. all Dd**

D. all dd

23. If all the offspring of a testcross are alike and resemble the organism being tested, then that

parent is:

**A. homozygous dominant**

B. incomplete dominant

C. homozygous recessive

D. heterozygous

24. If two genes are on the same chromosome:

A. they are segregated during meiosis

B. crossing over occurs frequently

**C. they are in the same linkage group**

D. an inversion will occur

25. If a pure-breeding long-tail cat (LL) is crossed with a pure-breeding cat with no tail (ll) and a cat

with a short tail is produced, the simplest explanation is:

A. a mutation

B. a lethal gene

**C. an incompletely dominant gene**

D. chromosomal aberration

26. The roll of meiosis in the law of segregation is that:

**A. it separates homologous chromosomes and therefore gene alleles into separate**

**gametes**

B. it allows gene to be duplicated

C. it allows crossing over to occur

D. it ensures that both alleles of a gene end up in the same gamete

27. What percent of the progeny from the cross of a homozygous Tall (TT) plant with a heterozygous

Tall (Tt) plant will be heterozygous:

A. 0

B. 25

**C. 50**

D. 75

28. If short hair (L) is dominant to long hair (l), then what fraction of the offspring produced by a

cross of Ll x ll will be homozygous dominant:

A. 1/2

B. 1/3

C. all

**D. none**

29. Mendel’s law of independent assortment states that:

A. the two hereditary units that influences a certain trait segregate during gamete formation

**B. each hereditary unit is inherited separately from other hereditary units**

C. hereditary units from the male and female parents are blended in the offspring

D. each hereditary unit has a specific locus

30. In cocker spaniels, black coat color (B) is dominant over red (b), and solid color (S) is dominant

over spotted (s). If a solid red male was crossed with a solid black female to produce a spotted

red puppy, the genotypes of the parents (with male genotype first would be:

A. Bb Ss x Bb Ss

B. Bb ss x Bb ss

**C. bbSs x Bb Ss**

D. bb Ss x Bb ss

31. 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:

A. Bb SS

B. BB Ss

**C. BB SS**

D. Bb Ss

32. Assume short hair (L) is dominant to long hair (l) and black hair (B) is dominant to brown (b). If

you found a black short-haired animal, you could determine its genotype by crossing it to an

animal with a genotype of:

A. ll Bb

**B. ll bb**

C. LL bb

D. LL BB

33. In radishes, red is dominant (RR), white is recessive (rr) and purple color results in heterozygotes

(Rr). This is an example of:

A. pleiotropy

**B. Mendelian inheritance pattern**

C. incomplete dominance

D. codominance

34. Mendel’s dihybrid crosses, but not his monohybrid crosses, showed that:

**A. gene pairs are sorted into gametes independently of other gene pairs**

B. some genes were linked toether

C. one of the pair of alleles is dominant to the other

D. the two alleles controlling a trait were divided equally among the gametes

35. Susan, a mother with type B blood, has a child with type O blood. She claims that Craig, who has

type A blood, is the father. He claims that he cannot possibly be the father. Further blood test

ordered by the judge reveal that Craig is AA. What can we predict about the judge’s ruling:

A. Susan is right and Craig will be ordered to pay child support

B. The judge will not be able to reach a decision based on the limited data available

C. Craig is likely to be the father but the blood tests are inadequate proof

**D. Craig is right and will not be ordered to pay child support**

36. Pleiotropic genes:

A. act on secondary sexual characteristics

B. produce lethal effects when homozygous

C. are additive

**D. influence more than one aspect of phenotype**

37. A locus is:

A. a sex chromosome

**B. the location of an allele on a chromosome**

C. a recessive gene

D. a dominant gene

38. Which genotype shows dominant phenotypes:

**A. Aa and AA**

B. AA and aa

C. aa

D. AA

39. If R is dominant to r, the offspring of the cross of RR with rr will:

A. display the same phenotype as the rr parent

B. be homozygous

**C. display the same phenotype as the RR parent**

D. have the same genotype as the RR parent

40. A homozygous Tall (TT) plant is mated to a heterozygous Tall (Tt) plant. What percent of the

progeny will be short:

A. 0

B. 25

**C. 50**

D 100