Genetics - From Genes to Genomes 8th edition Goldberg Test Bank

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Chapter 01 Test Bank

CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

1) Why did Mendel perform reciprocal crosses?
   A) To obtain enough plants to perform the experiments that Mendel wanted.
   B) To test a hypothesis that stated the ovum carries all the information for progeny.
   C) To be able to breed plants year round.
   D) To determine whether the inheritance of a trait depends on which parent carries the trait.

2) What is the difference between cross- and self-fertilization?
   A) In cross-fertilization, the pollen from one plant is used to fertilize the egg from the same plant.
   B) In cross-fertilization, the pollen from one plant is used to fertilize the egg of another plant.
   C) In self-fertilization, the pollen from one plant is used to fertilize the egg from another plant.
   D) In cross-fertilization, insects are used to pollinate the plants, whereas in self-fertilization, the investigator pollinates the plants.

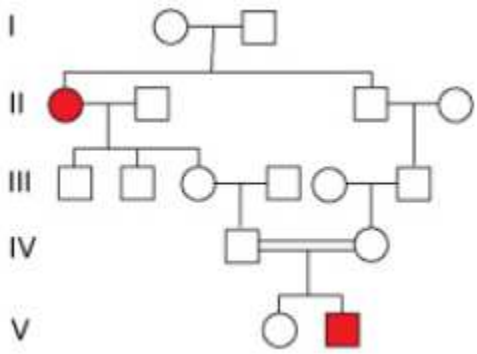
3) What is the outcome of crossing two pure-breeding plants with antagonistic characters of traits?
   A) Only one of the characteristics will be seen in the progeny.
   B) Both characteristics will be seen in the progeny.
   C) Both characteristics will be seen in the progeny in a 3:1 ratio.
   D) Only one characteristic will be seen, and it will be that of the female.

4) According to Mendel's law of independent assortment,
   A) alleles of genes assort into gametes grouped according to how they were inherited originally.
   B) dominant alleles for one gene must assort into the same gamete as the dominant alleles for another gene.
   C) alleles of genes on different chromosomes assort randomly into different gametes.
   D) dominant alleles for one gene must assort into the same gamete as the recessive alleles for another gene.

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5) AnS^1S^2 × S^1S^2mating is performed. If the phenotypic ratio of the progeny is 3:1, then
   A) one allele is dominant and the other is recessive.
   B) neither allele is dominant.
   C) the S^1 allele is dominant to the S^2 allele.
   D) the S^2 allele is dominant to the S^1 allele.
   E) the relationship between the alleles cannot be determined.

6) Which of the following probabilities is correct (according to Mendel's law of independent assortment) regarding a mating of an *Ss RR* individual to an individual who is *Ss Rr*? (A – indicates the second allele is either dominant or recessive.)
   A) Homozygous recessive: 10%
   B) Heterozygous both alleles: 50%
   C) *ss R–* : 15.5%
   D) *S– RR*: 37.5%

7) 

What does the pattern of inheritance in this pedigree indicate about the rare disease allele?
   A) The disease allele is dominant.
   B) The disease allele is recessive.
   C) There is no indication that the disease allele is either dominant or recessive.
   D) The disease allele is not inherited but arises only by a new mutation in affected individuals.

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8) The mutant alleles of the *CF* gene that result in cystic fibrosis are recessive to normal alleles because
   A) the protein produced by the normal allele in heterozygotes is sufficient for normal cellular function.
   B) the *CF* mutations that cause cystic fibrosis always result in no protein being produced.
   C) *CF* mutations result in a protein that has normal function only if normal CFTR protein also exists in the cell.
   D) dominant alleles that cause a fatal disorder, such as cystic fibrosis, cannot be inherited.

9) The reason that the *HD* allele that causes Huntington disease is dominant to HD^+ alleles is that</p>
   A) the normal *HD* allele does not normally produce a protein but the mutant *HD* allele does.
   B) the mutant *HD* allele suppresses protein production from the normal *HD* allele.
   C) the *HD* mutation results in a protein that can damage nerve cells even in the presence of the normal protein.
   D) the protein produced from the mutant *HD* allele is nonfunctional.

10) If an individual is heterozygous for only 7 of his gene pairs (he is homozygous for all of his other genes), how many different gamete types can he produce?
   A) 49
   B) 100
   C) 128
   D) 1024
   E) 131,072

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11) In some genetically engineered corn plants, a *Bt* gene was inserted into a chromosome. The *Bt* gene specifies a protein called Bt that is lethal to certain flying insect pests that eat the corn plants.
If the corn plant is heterozygous for the *Bt* gene (one homolog has the introduced *Bt* gene and the other does not), what proportion of the sperm would carry the *Bt* gene? Is the presence of the *Bt* gene (a mutation) dominant or recessive to its absence (the wild type)?

A) all pollen; dominant
B) 1/2; dominant
C) 1/3; recessive
D) 1/4; dominant
E) 1/8; recessive

12) Suppose that in plants, smooth seeds (*S*) is dominant to wrinkled seeds (*s*), and tall plants (*T*) is dominant to short plants (*t*). An F_1 plant from a mating between homozygous plants that were tall/smooth and short/wrinkled was crossed to the short/wrinkled parent.
What proportion of the progeny are expected (according to the Mendel's law of independent assortment) to be homozygous for short and wrinkled alleles?

A) 1/2
B) 1/4
C) 1/8
D) 1/16
E) 0

13) Sickle-cell disease is a recessive trait in humans.
In a cross between a male who has sickle-cell disease and a female who is heterozygous for the sickle-cell allele, what is the probability that all of their first three children will be unaffected?

A) 1/4
B) 1/2
C) none
D) 1/8
E) 1/16

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14) Starting with the parental cross *AA* × *aa*, what proportion of the F_2 offspring is expected to be homozygous?</p>

A) 1/4
B) 1/2
C) 3/4
D) All are homozygotes.
E) None are homozygotes.

15) Starting with the parental cross *AA bb* × *aa BB*, what proportion of the F_2 offspring is expected to be homozygous at least one of the two genes?</p>

A) 1/4
B) 1/2
C) 3/4
D) All are homozygotes.
E) None are homozygotes.

16) In the testcross *Aa Bb* × *aa bb*, what proportion of individuals are expected (according to Mendel's law of independent assortment) to be homozygous for both genes in the F_1 generation?</p>

A) 1/4
B) 1/2
C) 3/4
D) All are homozygotes.
E) None are homozygotes.

17) Among the crosses shown below, which will produce a 1:1 phenotypic ratio according to Mendel's law of independent assortment?

A) *AA BB* × *aa bb*
B) *Aa Bb* × *Aa Bb*
C) *Aa Bb* × *aa bb*
D) *Aa BB* × *aa BB*
E) *AA bb* × *aa BB*

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18) Assume that in guinea pigs, dark brown fur (*B*) is dominant to black fur (*b*). If you mate a homozygous black guinea pig with a heterozygous brown guinea pig, what proportion of the progeny will be black?

A) 1/4
B) 1/2
C) 3/4
D) All of these choices are correct.
E) None of these choices are correct.

19) Assume that in guinea pigs, dark brown fur (*B*) is dominant to black fur (*b*). If you mate a black guinea pig with a homozygous brown guinea pig, what proportion of the progeny will be homozygous for alleles of the *B* gene?

A) 1/4
B) 1/2
C) 3/4
D) All of these choices are correct.
E) None of these choices are correct.

20) An allele that expresses its phenotype even when heterozygous with a recessive allele is called

A) recessive.
B) recombinant.
C) dominant.
D) parental.
E) independent.

21) The diploid cell formed by the fertilization of the egg by the sperm during sexual reproduction is a

A) reciprocal.
B) zygote.
C) dihybrid.
D) gamete.
E) monohybrid.

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22) The alleles present in an individual make up the individual's
A) recombinant types.
B) recessiveness.
C) dominance.
D) phenotype.
E) genotype.

23) The first offspring from the parents are called
A) P.
B) F_1.
C) F_2.
D) a testcross.
E) P_2.

24) What type of cross is performed to determine the genotype of an individual with the dominant character of a trait?
A) A testcross
B) A dihybrid cross
C) A monohybrid cross
D) A genotyping cross
E) A controlled cross

25) If the parents of a family already have two male children, what is the probability that the next two offspring will both be females?
A) 1
B) 1/2
C) 1/3
D) 1/4
E) 1/8

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26) Suppose that in plants, smooth seeds (*S*) is dominant to wrinkled seeds (*s*) and tall plants (*T*) is dominant to short plants (*t*). A dihybrid tall plant with smooth seeds was crossed to a short plant with wrinkled seeds.
According to Mendel's law of independent assortment, what proportion of the progeny is expected to be tall and smooth?
A) 1/2
B) 1/4
C) 1/8
D) 1/16
E) 0

27) A rare recessive characteristic in a pedigree is indicated by which pattern of inheritance?
A) Vertical
B) Horizontal
C) Diagonal
D) Both vertical and horizontal
E) Pure-breeding

28) The dominant Huntington disease allele causes severe neural/brain damage at approximately age 40. A female who has one parent with Huntington disease wants to have a child with a male whose parents do not have Huntington disease. It is not known if the female has the disease.
Keeping in mind that the disease allele is rare in the population, what is the probability that their firstborn will inherit the allele that causes Huntington disease?
A) 25%
B) 50%
C) 75%
D) 100%
E) 0%

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29) Starting with the parental cross *AA* × *aa*, what proportion of the F_2 offspring is expected to be heterozygous?
A) 1/4
B) 1/2
C) 3/4
D) All are heterozygotes.
E) None are heterozygotes.

30) Starting with the parental cross *AA BB* × *aa bb*, what proportion of the F_2 offspring is expected to be heterozygous for both gene pairs?
A) 1/4
B) 1/2
C) 3/4
D) All are heterozygotes.
E) None are heterozygotes.

31) What proportion of the F_1 offspring resulting from the cross *Aa Bb* × *aa bb* is expected to be heterozygous for both gene pairs?
A) 1/4
B) 1/2
C) 3/4
D) All are heterozygotes.
E) None are heterozygotes.

32) Among the crosses shown below, which will produce offspring with a 1:1:1:1 genotypic ratio?
A) *AA BB* × *aa bb*
B) *Aa Bb* × *Aa Bb*
C) *Aa Bb* × *aa bb*
D) *Aa BB* × *aa BB*
E) *AA bb* × *aa BB*

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33) What is the term for crosses between parents that are heterozygous at a single locus?

A) Testcrosses
B) Cross fertilize
C) Monohybrid crosses
D) Dihybrid crosses
E) Reciprocal crosses

34) A particular form of a single gene is known as

A) a parental.
B) a dihybrid.
C) a reciprocal.
D) an allele.
E) a recessive.

35) A phenotype reflecting a new combination of alleles occurring during gamete formation is called

A) a recombinant type.
B) an independent assortment.
C) heterozygous.
D) homozygous.
E) a multihybrid cross.

36) How was the approach taken by Mendel similar to the approaches taken by modern scientific inquiry?

A) Mendel repeated his experiments.
B) Mendel examined both continuous and discrete traits.
C) Mendel used the same technical methods that are used today.
D) Mendel's experiments challenged no hypotheses that were favored at the time.

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37) Pea shape is controlled by a gene that specifies an enzyme known as Sbe1 (for Starch-branching enzyme 1). Two alleles of *Sbe I* exist, where is one allele is dominant and the other is recessive. The recessive allele most like specifies

A) an Sbe1 enzyme with reduced function.
B) an Sbe1 enzyme with a new function.
C) a different type of enzyme.
D) an Sbe1 enzyme with enhanced catalytic activity.

38) The normal allele of the pea color gene specifies the enzyme Sgr, which functions in a pathway to break down chlorophyll during pea maturation, resulting in yellow mature peas. A second allele of the *Sgr* gene produces no enzyme and is _____ to the normal allele.

A) dominant
B) recessive
C) wild-type
D) functioning

39) Mendel's law of independent assortment dictates that an *Aa Bb* dihybrid would make equal numbers of four gamete types.
What are these four gamete types?

A) *A; a; B; b*
B) *AA; BB; aa; bb*
C) *A B; A b; a B; a b*
D) *AA BB; AA bb; Aa Bb; aa BB*

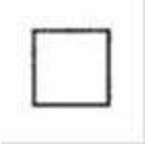
40) According to Mendel's law of equal segregation, an *Aa* monohybrid makes two types of gametes with equal frequency. These two gamete types are:

A) *AA* and *aa.*
B) *A* and *a.*
C) *Aa* and *aa.*
D) *AA* and *Aa.*

SECTION BREAK. Answer all the part questions.

41) For each of the following pedigree symbols, select the correct meaning.

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41.1) 

A) Unaffected male
B) Unaffected female
C) Mating
D) Affected male
E) Affected female

41.2) 

A) Unaffected male
B) Unaffected female
C) Mating
D) Affected male
E) Affected female

41.3) 

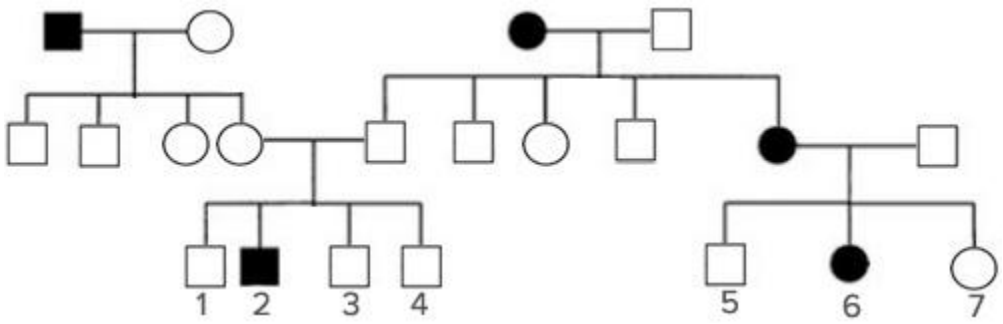
A) Unaffected male
B) Unaffected female
C) Mating
D) Affected male
E) Affected female

41.4) 

A) Unaffected male
B) Unaffected female
C) Mating
D) Affected male
E) Affected female

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42) A pedigree for a common human characteristic (not a disease) controlled by a single gene is shown. Shaded symbols indicate individuals exhibiting the characteristic.



42.1) Identify the most likely mode of inheritance of the trait.

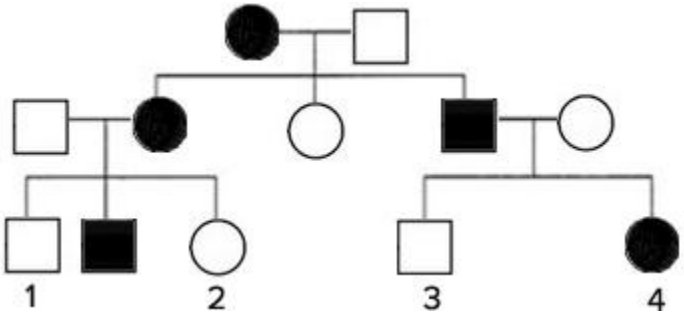
A) Dominant
B) Recessive
C) Either dominant or recessive
D) Cannot be determined

42.2) If individuals 4 and 7 have a child, what is the probability that the child will exhibit the characteristic?

A) 1/4
B) 1/2
C) 1/6
D) 2/3
E) 0

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43) Below is a pedigree of a rare human genetic disease. The filled in symbols indicate affected individuals. Assume that the disease is caused by a mutant allele of gene *A*.



43.1) Based on this pedigree, what is the most likely mode of inheritance?

A) Dominant
B) Recessive
C) Either dominant or recessive
D) Cannot be determined

43.2) What is/are the possible genotype(s) of person 1?

A) *AA*
B) *Aa*
C) Either *AA* or *Aa*
D) *aa*
E) Cannot be determined

43.3) What is/are the possible genotype(s) of person 2?

A) *AA*
B) *Aa*
C) Either *AA* or *Aa*
D) *aa*
E) Cannot be determined

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43.4) What is/are the possible genotype(s) of person 3?

A) *AA*
B) *Aa*
C) Either *AA* or *Aa*
D) *aa*
E) Cannot be determined

43.5) What is/are the possible genotype(s) of person 4?

A) *AA*
B) *Aa*
C) Either *AA* or *Aa*
D) *aa*
E) Cannot be determined

43.6) If individuals 1 and 4 have a child together, what is the probability that the child will exhibit the disease?

A) 0%
B) 25%
C) 50%
D) 75%
E) 100%

43.7) If individuals 2 and 3 have a child together, what is the probability that the child will exhibit the disease?

A) 0%
B) 25%
C) 50%
D) 75%
E) 100%

44) In corn, having ligules (*L*) is dominant to liguleless (*l*), and green leaves (*G*) is dominant to white leaves (*g*).

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44.1) If a testcross is performed with a dihybrid plant with ligules and green leaves, what proportion of the progeny would be green and liguleless?

A) 1/16
B) 1/8
C) 1/4
D) 1/2
E) Cannot be determined

44.2) If a pure-breeding liguleless plant with green leaves is crossed to pure-breeding plant with ligules and white leaves, predict the proportion of F_2 progeny with the genotype *Ll gg*.

A) 1/16
B) 1/8
C) 1/4
D) 1/2
E) Cannot be determined

44.3) If a pure-breeding plant that is liguleless and has green leaves is crossed to a pure-breeding plant with white leaves and ligules, predict the genotypes and phenotypes of the F_1 .

A) *LL GG*, green and ligules
B) *Ll GG*, green and ligules
C) *Ll Gg*, green and ligules
D) *ll gg*, white and liguleless
E) *Ll gg*, green and liguleless

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Chapter 01 Test Bank

Answer Key

Test name: Chapter 01 Test Bank

1) D
2) B
3) A
4) C
5) A
6) D
7) B
8) A
9) C
10) C
11) B
12) B
13) D
14) B
15) C
16) A
17) D
18) B
19) E
20) C
21) B
22) E
23) B
24) A
25) D
26) B
27) B
28) A
29) B
30) A
31) A
32) C
33) C
34) D
35) A
36) A
37) A

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38) B
39) C
40) B
41) Section Break
41.1) A
41.2) C
41.3) B
41.4) D
42) Section Break
42.1) B
42.2) C
43) Section Break
43.1) A
43.2) D
43.3) D
43.4) D
43.5) B
43.6) C
43.7) A
44) Section Break
44.1) C
44.2) B
44.3) C

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