

CHAPTER 12 Review Questions:

Gregor Mendel concluded that each pea has two units for each trait, and each gamete contains one unit. Mendel's "units" are now referred to as _____.

- a. genes
- b. characters
- c. alleles
- d. transcription factors
- e. none of the above

What is the ratio of phenotypes in the offspring produced by the cross Aa × Aa? Assume complete dominance for the trait.

- a. 100% dominance
- b. 100% recessive
- c. 75% dominant: 25% recessive
- d. 50% dominant: 50% recessive
- e. 25% dominant: 75% recessive

If the allele for inflated pea pods (I) is dominant to the allele for constricted (i), the cross Ii × Ii is expected to produce:

- a. All with inflated pods
- b. All with constricted pods
- c. Half with inflated and half with constricted pods
- d. 3/4 with inflated and 1/4 with constricted pods
- e. 3/4 with constricted and 1/4 with inflated pods

According to the Law of Segregation:

- a. Each individual carries a single copy of each "factor."
- b. Pairs of factors fuse during the formation of gametes.
- c. Pairs of factors separate during the formation of gametes.
- d. The sex chromosomes of males and females differ.
- e. There is an independent assortment of non-homologous chromosomes during meiosis.

According to the Law of Segregation, in an organism with the genotype Aa:

- a. All the gametes will have gene A
- b. All the gametes will have gene a
- c. Half the gametes will have A and half will have a
- d. 3/4 of the gametes will have A and 1/4 will have a
- e. 1/4 of the gametes will have A and 3/4 will have a

A recessive gene is one:

- a. That is not expressed as strongly as a dominant allele
- b. Whose effect is masked by a dominant allele
- c. That appears only in a heterozygote
- d. That produces no effect when present in the homozygous condition
- e. That must be lethal in the homozygous condition

Which of the following statements is false?

- a. Individuals with the same phenotype might have different genotypes.
- b. Matings between individuals with dominant phenotypes cannot produce offspring with recessive phenotypes.
- c. Matings between individuals with recessive phenotypes usually do not produce offspring with dominant phenotypes.
- d. Individuals with the same genotype might have different phenotypes.
- e. All of the above choices are correct.

If, in a heterozygous individual, only one allele is expressed in the phenotype, that allele is:

- a. Normal
- b. Haploid
- c. Potent
- d. Recessive
- e. Dominant

The physical manifestation of an organism's genes is its:

- a. Environment
- b. Genotype
- c. Phenotype
- d. Genetic code
- e. Number of chromosomes

A cross produced 915 offspring with normal pigment and 310 with albinism. Conclusion?

- a. One of the parents was homozygous for albinism.
- b. Both parents were heterozygous.
- c. One parent was homozygous for normal pigmentation.
- d. Both parents were albinos.
- e. 605 albino zygotes must have failed to develop.

When the two gametes that fuse to form a zygote contain different alleles of a given gene, the offspring is:

- a. Haploid
- b. Heterozygous
- c. Abnormal
- d. Homozygous
- e. A new species

If we cross two pea plants each heterozygous for yellow seed color genes, the expected ratio of yellow : green among the offspring will be:

- a. 25% yellow : 75% green
- b. 50% yellow : 50% green
- c. 75% yellow : 25% green
- d. 100% yellow
- e. 100% green

What type of allele produces its effects only in homozygous individuals?

- a. Recessive
- b. Dominant
- c. Incompletely dominant
- d. Diploid
- e. Haploid

When alleles move into different gametes, this demonstrates:

- a. Dominance
- b. Independent assortment
- c. Fertilization
- d. Crossing-over
- e. Segregation

If a round pea has a wrinkled parent, the round pea is:

- a. RR
- b. Rr
- c. rr
- d. Haploid
- e. Recessive

Mendel's Law of Segregation states that:

- a. Members of a pair of alleles move away from each other during gamete formation
- b. Each gamete receives a full complement of chromosomes
- c. There may be alternative forms of the same gene
- d. Genes end up in respective gametes by chance
- e. Genes in the same chromosome must stay together

When Mendel used true-breeding white flowers and true-breeding purple flowers as the parental generation, he obtained the following results:

- a. All the offspring had white flowers
- b. All the offspring had purple flowers
- c. 3/4 of the flowers produced were purple and 1/4 were white
- d. 3/4 of the flowers produced were white and 1/4 were purple
- e. 1/2 of the flowers produced were white and 1/2 were purple

The genetic makeup of an individual is its:

- a. Phenotype
- b. Sex cells
- c. Mutation
- d. Gene pool
- e. Genotype

The results of a testcross reveal that all the offspring resemble the parent being tested. This parent must be:

- a. Heterozygous
- b. Recessive
- c. Self-pollinated
- d. Homozygous
- e. Haploid

A Mendelian testcross is used to determine whether:

- a. An allele is dominant or recessive
- b. Flowers are purple or white
- c. The genotype or phenotype is more important
- d. An individual is homozygous or heterozygous
- e. Segregation or independent assortment is occurring

Yellow-seeded pea plants may be homozygous or heterozygous. To find out which, we can cross the plants with:

- a. True-breeding yellow-seeded plants
- b. True-breeding green-seeded plants
- c. Heterozygous green-seeded plants
- d. Heterozygous yellow-seeded plants
- e. The same genotype

In a testcross, what percentage of the offspring will have the same genotype as the tested parent if the parent is homozygous?

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

What is the genotype of a dominant individual if some of its offspring show the recessive phenotype?

- a. DD
- b. Dd
- c. dd
- d. Cannot tell without more information.
- e. Either DD or Dd

A particular genetic cross in which the individual in question is crossed with an individual known to be homozygous for a recessive trait is referred to as a

- a. parental cross.
- b. F1 cross.
- c. F2 cross.
- d. reciprocal cross.
- e. test cross.

Crossing spherical-seeded pea plants with dented seeded pea plants resulted in progeny that all had spherical seeds. This indicates that the dented seed trait is

- a. codominant.
- b. dominant.
- c. recessive.
- d. a and b.
- e. a and c.

Cleft chin is an autosomal dominant trait. A man with a cleft chin marries a woman with a round chin. What proportion of their female progeny will show the trait?

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

A pea plant with red flowers is test crossed and one half of the resulting progeny have red flowers, while the other half have white flowers. You know that the genotype of the test crossed parent was

- a. RR.
- b. Rr.
- c. rr.
- d. either RR or Rr.
- e. Cannot tell unless the genotypes of both parents are known.

Classical albinism results from a recessive allele. Which of the following is the expected offspring from a normally pigmented male with an albino father and an albino wife?

- a. 75% normal; 25% albino
- b. 75% albino; 25% normal
- c. 50% normal; 50% albino
- d. All normal
- e. All albino

In garden peas, the allele for tall plants is dominant over the allele for short plants. A true-breeding tall plant is crossed with a short plant and one of their offspring is test crossed. Out of 20 offspring resulting from the test cross, about _____ should be tall.

- a. 0
- b. 5
- c. 10
- d. 15
- e. 20

In crossing a homozygous recessive with a heterozygote, what is the chance of getting a homozygous recessive phenotype in the F1 generation?

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

If two parents are carriers of albinism (an autosomal recessive trait), what is the chance that their fourth child will have a homozygous genotype?

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

All of the following combinations are possible in the gametes of an organism that is AaBb **except**:

- a. AB
- b. aB
- c. aa
- d. ab
- e. Ab

Humans possess:

- a. 2 pairs of sex chromosomes and 46 pairs of autosomes
- b. 2 pairs of sex chromosomes and 23 pairs of autosomes
- c. 1 pair of sex chromosomes and 46 pairs of autosomes
- d. 1 pair of sex chromosomes and 23 pairs of autosomes
- e. 1 pair of sex chromosomes and 22 pairs of autosomes

A human sperm cell receives autosomes and:

- a. Exactly the same genetic information as a body cell
- b. An X chromosome always
- c. Either an X or a Y chromosome
- d. A Y chromosome always
- e. Both an X and a Y chromosome

In humans, the sex of the offspring is determined by the:

- a. Autosomes carried by the egg cell
- b. Autosomes carried by the sperm cell
- c. Sex chromosome carried by the egg cell
- d. Sex chromosome carried by the sperm cell
- e. Cytoplasm carried by the egg cell

White eyes in male fruit flies is determined by a:

- a. Dominant gene on the Y
- b. Recessive gene on the Y
- c. Dominant gene on the X
- d. Recessive gene on the X
- e. A gene in the autosomes

A female fruit fly whose male parent has white eyes:

- a. Must have red eyes
- b. Must have white eyes
- c. Must have a gene for white eyes
- d. Can have only white-eyed offspring
- e. Must be heterozygous for eye-color genes

In humans, the sex of the offspring is determined by the:

- a. Autosomes carried by the egg cell
- b. Autosomes carried by the sperm cell
- c. Sex chromosome carried by the egg cell
- d. Sex chromosome carried by the sperm cell
- e. The environment of the mother's uterus

Each normal human possesses in his or her body cells:

- a. 2 pairs of sex chromosomes and 46 pairs of autosomes
- b. 2 pairs of sex chromosomes and 22 pairs of autosomes
- c. 1 pair of sex chromosomes and 46 pairs of autosomes
- d. 1 pair of sex chromosomes and 22 pairs of autosomes
- e. 1 pair of sex chromosomes and 23 pairs of autosomes

A normal human sperm cell receives:

- a. X chromosomes only
- b. Either an X or a Y chromosome
- c. Exactly the same genetic information as body cells
- d. Y chromosomes only
- e. Cytoplasm only from the male

A colorblind woman marries a normal man. Which of the following is true of their children?

- a. All will be colorblind.
- b. All daughters will be normal and all sons will be carriers.
- c. All daughters will be colorblind and all sons will be normal.
- d. All daughters will be heterozygous and all sons will be colorblind.
- e. It is impossible to predict with any reasonable degree of certainty.

Traits controlled by sex-linked recessive genes are expressed more often in males because:

- a. Males inherit these genes from their fathers
- b. Males are always homozygous for these genes
- c. All male offspring of a female carrier get the gene
- d. The male has only one gene for the trait
- e. Males get more doses of the recessive gene than do females

A recessive allele on the X chromosome causes colorblindness. A non-colorblind woman (whose father is colorblind) marries a colorblind man. What is the chance their son will be colorblind?

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

Hemophilia is a sex-linked recessive gene causing a blood disorder. What are the chances that the daughter of a normal man and a heterozygous woman will have hemophilia?

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

A colorblind boy has a normal mother and a colorblind father. From which parent did he get the colorblind gene?

- a. Father
- b. Mother
- c. Either parent could have given him the gene

A man who carries a harmful sex-linked (on the X chromosome) gene will pass the gene on to:

- a. All of his daughters
- b. Half of his daughters
- c. Half of his sons
- d. All of his sons
- e. All of his children

Colorblindness is more common in men than in women because:

- a. Men have only one X chromosome
- b. The gene is located on the Y chromosome
- c. Women cannot inherit the gene from their fathers
- d. Crossing-over occurs only in women
- e. Men get more copies of the gene than do women

Why would you predict that half of the human babies born will be males and half will be females?

- a. Because of the segregation of the X and Y chromosomes during male meiosis.
- b. Because of the segregation of the X chromosomes during female meiosis.
- c. Because all eggs contain an X chromosome.
- d. a and b.
- e. a and c.

Y-linked genes include a gene that produces hairy pinna (the external ear). A male with hairy pinna should pass this trait

- a. usually to his sons, but rarely also to a daughter.
- b. only to his sons.
- c. only to his daughters.
- d. only to his grandsons.
- e. to all his children if the mother is a carrier.

An individual who is a "carrier" for a sex-linked trait like hemophilia:

- a. Is always female
- b. Is heterozygous for recessive condition
- c. Shows the dominant phenotype
- d. Can pass the gene on to his/her daughters
- e. All the above choices are correct

In humans, red-green color blindness is sex-linked and recessive (e). A man with normal color vision marries a colorblind woman who gives birth to a colorblind daughter. From this we can tell that:

- The woman is e e
- The daughter is e Y
- The man probably is not the father of the child
- Colorblindness is not a genetic trait
- None of these choices is correct

Hemophilia is a genetic disease that has plagued the royal houses of Europe since the time of Queen Victoria, who was a carrier. Her granddaughter Alexandria married Nicholas II, the last czar of imperial Russia. Alexandria was a carrier for hemophilia; Nicholas was normal. Their son, Alexis, was afflicted with the disease. Alexis and his four sisters were all killed in 1917. It is most likely that:

- None of the four sisters carried the hemophilia gene
- At least one of the sisters was a carrier of the gene
- All four sisters were carriers of the hemophilia gene
- At least one of the sisters had hemophilia like Alexis
- Alexis inherited the hemophilia gene from Nicholas II

A type of muscular dystrophy shows sex-linked recessive inheritance. Affected persons usually die by the age of 15-20. Suppose that a boy with the disease lives long enough to marry a woman heterozygous for the trait. If they have a son, what is the probability that he will have the disease?

- 25%
- 50%
- 75%
- 100%
- 0%

Two people with normal vision have two sons, one colorblind and one normal. If this couple then has six daughters, what percentage of the daughters should have normal color vision?

- 25%
- 50%
- 75%
- 100%
- 0%

Since colorblindness is a sex-linked recessive trait:

- Fathers of all colorblind sons must be colorblind
- Fathers of all colorblind daughters must be colorblind
- Mothers of all colorblind daughters must be colorblind
- Mothers of all colorblind sons must be colorblind
- All the sons of carrier females will be colorblind

Hemophiliacs have blood that does not coagulate well and often die at a young age. The gene for the disease is recessive and sex-linked. Which of the following is the best prediction about the offspring of a hemophiliac male and a nonhemophiliac female who is a carrier for the disease?

- All children would be hemophiliac.
- All females would be hemophiliac.
- All males would be hemophiliac.
- Hemophiliac children would occur in a 3:1 ratio, normal to hemophiliac.
- Some males and females could be hemophiliac.

Blood typing is often used as evidence in paternity cases in court. In one case, the mother had blood type B and the child had blood type O. Which of the following blood types could the father not have?

- a. A
- b. B
- c. AB
- d. O
- e. Both choices c and d are correct

In snapdragons, red \times white \rightarrow pink. What is expected for the cross pink \times red?

- a. 1/2 red and 1/2 pink
- b. All pink
- c. 1/2 red and 1/2 white
- d. All red
- e. 3/4 red and 1/4 pink

In snapdragons, red \times white \rightarrow pink. What proportion of pink flowers are expected from the cross pink \times pink?

- a. No pink
- b. 1/4 pink
- c. 2/4 pink
- d. 3/4 pink
- e. All pink

In snapdragons, red \times white \rightarrow pink. This pattern of inheritance is explained by:

- a. Complete dominance
- b. Incomplete dominance
- c. Hybridization
- d. Multiple alleles
- e. Genetic interaction

Codominance occurs when:

- a. Both of the alleles in a heterozygote are expressed phenotypically in an individual
- b. Expression of 2 different alleles alternates from one generation to the next
- c. A heterozygote expresses an intermediate phenotype
- d. Offspring exhibit several different phenotypic expressions of a single trait
- e. None of the above choices is correct

When the expression of a trait is influenced by the action of many genes, the pattern of inheritance is called:

- a. Complete dominance
- b. Incomplete dominance
- c. Multiple alleles
- d. Discontinuous variation
- e. Polygenic inheritance

Human eye color is the result of:

- a. Polygenic inheritance
- b. Codominance
- c. Simple dominance
- d. Sex-linked recessive inheritance
- e. Genes and environmental effects

Smurfs live in widely separated groups and rarely interbreed, so geneticists know very little about them. On one occasion, two smurfs from different groups did mate. A big-footed white schmurf mated with a small-footed blue smurf. Three offspring resulted: one big-footed and blue and two small-footed and blue.

Which statement about the inheritance of color in smurfs is most likely to be correct?

- a. Blue is dominant to white.
- b. White is dominant to blue.
- c. White and blue are codominant.
- d. a and c.
- e. You cannot reach any conclusions.

Which statement about the inheritance of footedness in smurfs is most likely to be correct?

- a. Big is dominant to small.
- b. Small is dominant to big.
- c. Big and small are codominant.
- d. a and c.
- e. You cannot reach any conclusions.

If big feet (B) in smurfs are dominant to small feet (b), what is the genotype of the big-footed white parent smurf with respect to the foot gene?

- a. bb
- b. BB
- c. Bb
- d. a and b
- e. a and c

In Mendel's experiments, if the gene for tall (T) plants was incompletely dominant over the gene for short (t) plants, what would be the result of crossing two Tt plants?

- a. 25% tall; 50% intermediate; 25% short
- b. 50% tall; 25% intermediate; 25% short
- c. 25% tall; 25% intermediate; 50% short
- d. All the offspring would be tall
- e. All the offspring would be intermediate

Human skin color is the result of:

- a. One pair of genes showing incomplete dominance
- b. Codominance
- c. Simple dominance
- d. Sex-linked recessive inheritance
- e. Polygenic inheritance

If an individual is homozygous for type B blood and they marry a heterozygous type A individual, what is the chance that their first child will have type AB blood?

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

Sickle-cell anemia is caused by a:

- a. Recessive sex-linked gene
- b. Dominant autosomal gene
- c. Simple dominant gene
- d. Combined interaction of several genes
- e. Recessive autosomal gene

Which of the following causes sterility in a human?

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

Studies show the greatest similarity on IQ test scores is between:

- a. Parents and children
- b. Brothers and sisters
- c. Identical twins raised in the same environment
- d. Fraternal twins raised in different environments
- e. All children attending the same school

Pedigree analysis

- a. documents transmission of a genetic characteristic over two or more generations.
- b. reveals whether a trait is dominant or recessive.
- c. involves procedures of molecular biology.
- d. a and b.
- e. a, b and c.