*Biology for a Changing World 2e,* Chapter 11 Test Bank

1. A phenotype is

1. an inherited disorder.
2. a physical trait.
3. a genetic trait.
4. an allele descriptor.
5. a karyotype.

Answer: B

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: genotypes and phenotypes

2. If two individuals were heterozygous for freckles, which is a dominant trait, what percentage of their progeny would have freckles?

1. 25%
2. 50%
3. 75%
4. 100%
5. 0%

Answer: C

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:genotypes and phenotypes

3. If a trait is not displayed in the phenotype, it is called

1. recessive.
2. aa.
3. Aa.
4. dominant.
5. homozygous.

Answer: A

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: genotypes and phenotypes

4. What is the significance of gene mutations in terms of protein function and clinical outcome?

1. Changes in gene sequence can alter the shape or function of a protein.
2. Analyzing specific mutations allows researchers to study overall gene function.
3. Gene mutations allow researchers to identify deficient proteins and aid in therapeutic intervention, such as in cystic fibrosis.
4. A and B.
5. All of the above.

Answer: E

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: protein, function, gene

5. What is the most common mutation found in cystic fibrosis?

1. Three nucleotides in the CFTR gene are deleted on chromosome 3.
2. Two nucleotides are deleted in the CFTR gene on chromosome 7.
3. Three nucleotides are deleted in the CFTR gene on chromosome 7.
4. The entire gene is deleted.
5. None of the above.

Answer: C

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: mutation, CFTR, cystic fibrosis

6. What is a phenotype?

1. the genetic makeup of an individual
2. a person’s measurable, or observable, traits
3. the type of alleles present in an individual
4. an individual’s physical appearance
5. B and D

Answer: E

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: genotype, phenotype, allele, trait, gene

7. What is a genotype?

1. the genetic makeup of an individual
2. defined by one’s phenotype
3. the same as the phenotype
4. the measureable or visual traits of an individual
5. A and B.

Answer: A

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: genotype, phenotype

8. In the case of the Schallers, why doesn’t their genotype correlate with their phenotype?

1. Although each carries a copy of a mutated CF gene, they also express a normal copy of the CF gene that renders them phenotypically normal.
2. The Schallers have only normal, nonmutated copies of the CF gene.
3. The Schallers inherited one mutated and one normal CF gene.
4. None of the above.
5. A and C.

Answer: E

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: genotype, phenotype, CF, mutation

9. The appearance of an organism is known as its

1. karyotype.
2. genotype.
3. phenotype.
4. holotype.
5. physiotype.

Answer: C

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: phenotype

10. Which parent contributes the chromosome that determines the gender of a child?

1. Fathers determine the gender of sons, and mothers determine the gender of daughters.
2. Fathers determine the gender of daughters, and mothers determine the gender of sons.
3. Both parents play an equal role in determining gender.
4. A mother’s chromosomes determine the gender of sons and daughters.
5. A father’s chromosomes determine the gender of sons and daughters.

Answer: E

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gender

11. An organism’s \_\_\_\_\_\_\_\_\_ determines its \_\_\_\_\_\_\_\_\_\_.

1. phenotype; holotype
2. genotype; holotype
3. karyotype; genotype
4. genotype; phenotype
5. genotype; karyotype

Answer: D

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: genotype, phenotype

12. Explain the terms dominant and recessive. Use the concepts of phenotype and genotype in your explanation.

*Answer:* A dominant gene is expressed whether a person’s DNA, their genotype, has one copy or two copies of the gene. The expression of the characteristic is known as the phenotype. A recessive characteristic is only expressed in the phenotype of someone who has two copies of the recessive gene.

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: phenotype, genotype, dominant, recessive

13. Define the term phenotype.

*Answer:* the physical appearance or physical characteristics of an individual—the results of gene expression

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: phenotype

14. Define the term genotype.

*Answer:* the genetic make-up of an individual

DQ: How does the organization of chromosomes, genes, and their alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: genotype

15. Explain the relationship between genotype and phenotype.

*Answer:* The genotype is the genetic makeup of an individual. The genotype determines which proteins will be made, thus affecting the physical characteristics (phenotype) of the individual.

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: phenotype, genotype

16. People with the same cystic fibrosis alleles at the CFTR site do not always exhibit the same symptoms—some are sicker than others. Which of the following best explains this?

* 1. the influence of modifier genes
	2. the influence of deletion genes
	3. the presence of other genes that code for normal CFTR protein
	4. the presence of another gene that fixes the deformed protein
	5. worse symptoms in men than in women

Answer: A

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: allele, cystic fibrosis, genetic variation, genotype, modifier, mutation, phenotype

1. What is the difference between genotype and phenotype?

*Answer:* Genotype describes a person’s genetic makeup, while phenotype refers to a person’s outward, or measurable, characteristics.

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: genotype, phenotype

18. The most common CF allele on chromosome 7 is

1. a three-base-pair deletion.
2. a three-codon deletion.
3. a three-amino-acid deletion.
4. a single base pair deletion.
5. a frameshift mutation.

Answer: A

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: DNA mutations and protein functionality

19. The deletion of a codon in the gene for CF causes the CFTR protein to

1. stop being made.
2. become nonfunctional.
3. become more active.
4. become overexpressed.
5. become underexpressed.

Answer: B

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: DNA mutations and protein functionality

20. A mutation in a DNA coding region of a protein can cause

1. a change in primary structure of the protein.
2. a change in secondary structure of the protein.
3. a change in tertiary structure of the protein.
4. a change in quaternary structure of the protein.
5. All of the above.

Answer: E

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: DNA mutations and protein functionality

21. A mutation in a DNA coding region of a protein can cause

1. a different amino acid at that position.
2. altered bonding between amino acids in the protein.
3. a change in the 3D shape of the protein.
4. no change in protein functionality.
5. All of the above.

Answer: E

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts:DNA mutations and protein functionality

22. How is the sequence of amino acids in a protein determined?

1. The sequence of amino acids is determined by each individual base in DNA that codes for an amino acid.
2. The sequence of amino acids is not dependent on the order of bases in the DNA.
3. The amino acids are determined by codons in the DNA, which are read in 3-base increments.
4. The sequence of amino acids depends on the protein’s function.
5. The sequence of amino acids is determined by the properties of each amino acid.

Answer: C

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: DNA, mutation, protein function

23. Would a change in the nucleotide sequence of DNA change the structure of a protein?

1. One base equals one amino acid, so if there is a change in a base, it changes the amino acid, too.
2. A change in the DNA could lead to a change in the protein’s amino acid sequence. This could lead to improper folding of the protein.
3. It wouldn’t affect the protein; a change in the DNA sequence doesn’t change the protein sequence.
4. A change in the DNA would only be caused by a change in the protein first.
5. None of the above.

Answer: B

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: DNA, mutation, protein function, structure

24. What is the possible outcome of a mutation in terms of protein function?

1. It’s beneficial.
2. It’s detrimental.
3. It has no effect.
4. All of the above.
5. None of the above.

Answer: D

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: DNA, mutation, protein function

25. Is a change in nucleotide sequence always detrimental?

1. Yes, it always leads to a loss of protein function.
2. It can also be beneficial.
3. It can also have no effect at all.
4. Both B and C

Answer: D

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts:DNA, mutation, protein function

26. A mutation in DNA can

1. lead to a change in protein shape.
2. lead to a change in protein function.
3. lead to a shorter protein.
4. lead to a protein that is missing critical amino acids.
5. All of the above.

Answer: E

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: mutation, protein shape and function

27. If a mutation in DNA caused a 400-amino-acid-long enzyme to only be 200 amino acids long, would this affect the function of the enzyme?

*Answer:* In all likelihood, this would cause the enzyme to be nonfunctional since it would not achieve the exact shape of the complete enzyme. Enzymes typically have a rigid lock-and-key relationship between the enzyme and the substrate molecules. A change in shape would prevent it from interacting with the substrate molecules.

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: enzymes, protein shape

28. All of the following are true of mutations, EXCEPT

1. they lead to new alleles.
2. they are a source of genetic variation.
3. they are sometimes harmful.
4. they are sometimes helpful.
5. mutations always lead to the organism’s death.

Answer: E

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: allele, genetic variation, mutation

1. One of the mutations of the CFTR gene is the result of the deletion of three consecutive nucleotides. This leads to all of the following, EXCEPT
2. one missing amino acid.
3. incorrect base pairing.
4. one missing codon.
5. a deformed protein.
6. incorrect mRNA.

Answer: B

DQ: How does the organization of chromosomes, genes, and alleles contribute to human traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: allele, amino acid, codon, cystic fibrosis, genetic variation, mRNA, mutation, nucleotide

30. A human male has how many pairs of homologous chromosomes?

1. 46
2. 23
3. 22
4. 44
5. 48

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: two alleles per gene

31. A human female has how many pairs of homologous chromosomes?

1. 46
2. 44
3. 22
4. 23
5. 48

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: two alleles per gene

32. In humans, a homologous chromosome pair consists of

1. one chromosome from mom and one from dad.
2. two chromosomes from mom and two from dad.
3. one chromosome from mom and two from dad.
4. 22 chromosomes from mom and 22 from dad.
5. 23 chromosomes from mom and 23 from dad.

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts:two alleles per gene

33. You have cystic fibrosis (CF) if you have inherited

1. two normal CF alleles.
2. two normal and two defective CF alleles.
3. two normal and one defective CF alleles.
4. one normal and one defective CF allele.
5. two defective CF alleles.

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: two alleles per gene

34. What are homologous chromosomes?

1. paired chromosomes that are inherited from either mother or father
2. two copies of each chromosome within a cell that are inherited from both mother and father
3. two chromosomes located within a haploid cell
4. two copies of identical chromosomes within a diploid cell
5. None of the above.

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, alleles, homologous, chromosomes

35. How are the X and Y chromosomes in males different from other diploid cells?

1. Genes on the X and Y chromosome do not have a second copy.
2. Genes on the X and Y chromosome express an extra copy of each gene.
3. The X and Y chromosome in males preferentially express specific genes while silencing others.
4. A and C.
5. None of the above.

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: inheritance, alleles, male, female, X, Y

36. Explain how someone’s parents are healthy despite carrying a copy of a defective CF-associated gene?

*Answer:* The CF mutation is recessive. As long as a child’s parents have one good copy of the gene, they will be healthy. Emily inherited two defective copies of the gene and so she has the disease.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: inheritance, alleles, recessive, dominant

37. How can someone get two different alleles of the same gene?

1. A mutation can cause a second form of a gene to be created.
2. One allele can be inherited from mom and a different allele inherited from dad.
3. They can inherit two different alleles from mom.
4. They can inherit two different alleles from dad.
5. A and B

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Medium

Important Words/Concepts: inheritance, alleles, gene, mutation

38. Which of the following statements is FALSE?

1. Homologous chromosomes have the same types of genes as each other.
2. Homologous chromosomes might have the exact same alleles as each other.
3. Homologous chromosomes are assigned the same chromosome number.
4. The sizes of homologous chromosomes are very similar or identical.
5. Homologous chromosomes must have the exact same alleles as each other.

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: homologous chromosomes

1. Why is having two copies of every gene an advantage to only having one copy of a gene?

*Answer:* Having two copies of every gene is an advantage to only having one copy because in the event of a deleterious mutation, a diploid organism has the chance of having at least one functioning allele and surviving.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: allele, diploid, genetic variation, mutation

1. In a diploid organism
2. there are two copies of every gene, both inherited from the mother.
3. there are two copies of every gene, both inherited from the father.
4. there are two copies of every gene, one inherited from the mother and the other from the father.
5. there is one copy of every gene, randomly inherited from either mother or father.
6. there are only two alleles present in the entire population.

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts**:** allele, diploid, gene

1. All of the following are true of alleles, EXCEPT
2. they vary in nucleotide sequence.
3. when alleles of a gene differ, the organism is said to be homozygous.
4. for some diseases, if a person has only one disease allele, they may be healthy.
5. there may be many different alleles in the population.
6. pairs of alleles reside on homologous chromosomes.

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: allele, gene, homologous, homozygous, nucleotide

42. Humans have

1. 23 pairs of chromosomes, which include the sex chromosomes.
2. 46 pairs of chromosomes, which include the sex chromosomes.
3. 23 pairs of chromosomes, plus the sex chromosomes.
4. 46 pairs of chromosomes, plus the sex chromosomes.
5. 23 chromosomes.

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** chromosome, homologous, inheritance

43. When a woman becomes pregnant for the first time, obstetricians sometimes run a blood test to see if the mother carries an allele for cystic fibrosis (CF). If the mother does not carry an allele, the doctor does not bother to test the father, nor does he worry about the baby. Explain the reasoning behind such an approach.

*Answer:* For a person to have CF, they must have two alleles for the disease. Thus, each of the parents would have to contribute a CF allele. If the mother does not carry a CF allele, then the baby cannot possibly have CF, even if the father passes on a CF allele. Therefore, testing the father is unnecessary.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts**:** cystic fibrosis, disease, inheritance

44. Write 1 for meiosis and 2 for mitosis.

1. 46→23 \_\_
2. 46→46 \_\_
3. 2n→n \_\_
4. n→n \_\_
5. germ cell→gamete \_\_

*Answer:* A. 1, B. 2, C. 1, D. 2, E. 1

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and mitosis, diploid and haploid

45. Write 1 for haploid and 2 for diploid.

1. zygote \_\_
2. sperm \_\_
3. egg \_\_
4. baby \_\_
5. gamete \_\_
6. human \_\_
7. 2n \_\_
8. n \_\_

*Answer:* A. 2, B. 1, C. 1, D. 2, E. 1, F. 2, G. 2, H. 1

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and mitosis, diploid and haploid

46. Fill in the blank with *mitosis* or *meiosis*.

1. Humans produce gametes by the process of \_\_\_\_\_\_\_\_.
2. A zygote becomes a fetus by the process of\_\_\_\_\_\_\_\_\_.
3. A baby develops into an adult by the process of \_\_\_\_\_\_\_\_\_\_.
4. A cut in your skin is repaired by the process of \_\_\_\_\_\_\_\_\_.
5. Sperm and egg cell are produced by the process of \_\_\_\_\_\_\_.
6. Repair of our cells is accomplished by the process of \_\_\_\_\_\_\_\_\_.

*Answer:* A. meiosis, B. mitosis, C. mitosis, D. mitosis, E. meiosis, F. mitosis

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and mitosis, diploid and haploid

47. How many chromosomes do human sperm and egg cells have?

1. 22
2. 23
3. 46
4. 48
5. 24

Answer: B

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and mitosis, diploid and haploid

48. What are gametes?

1. in humans, the egg and sperm
2. reproductive cells that carry only one copy of each chromosome
3. haploid cells
4. gametes are diploid cells with chromosomes from the mother and father
5. A, B, and C

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, gamete, egg, sperm

49. How are gametes different from the rest of the body’s cells?

1. Gametes are diploid, whereas other cells are haploid.
2. Gametes are sex cells.
3. Gametes are haploid, containing only one copy of each chromosome.
4. Gametes are generated from a specialized form of cell division called meiosis.
5. B, C, and D

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, gamete, haploid

50. Explain how a child inherits exactly half of his or her chromosomes from each parent.

*Answer:* Gametes are haploid, containing one copy of each chromosome. Two gametes come together (during fertilization), one from the mother and one from the father, resulting in offspring that have two copies of each chromosome, one from each parent.

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, gamete, haploid, chromosome

51. How many chromosomes are in a gamete?

1. 46
2. 23
3. 12
4. 1
5. 92

Answer: B

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: inheritance, chromosome, haploid, diploid

51. Which of the following statements is TRUE?

1. Males get all of their chromosomes from their fathers.
2. Females get all of their chromosomes from their mothers.
3. Females get half of their chromosomes from each parent.
4. Females get 75% of their chromosomes from their mothers.
5. Males get 75% of their chromosomes from their fathers.

Answer: C

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance

52. Explain how males inherit more DNA from their mothers than from their fathers.

*Answer:* Males inherit a Y chromosome from their fathers and an X chromosome from their mothers. The X chromosome is quite a bit larger than the Y chromosome and carries many genes not found on Y.

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: XY inheritance

1. Gametes differ from other cells in the body because gametes
	1. are only inherited from the mother.
	2. do not carry a gene to determine gender.
	3. have three copies of every gene.
	4. live forever.
	5. are haploid.

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts:gamete, haploid, inheritance

1. A woman has a child with cystic fibrosis, but she is unsure who the father is. One possible father has cystic fibrosis and the other does not. Is paternity certain? Why or why not?

*Answer:* Although there is a higher likelihood that the man with cystic fibrosis is the father, paternity is not certain. The other man could be healthy but carry the allele and may have passed it on to the child.

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: allele, cystic fibrosis, inheritance

1. During meiosis,
	1. cells do not divide.
	2. cells divide once.
	3. cells divide twice.
	4. cells double in size but do not divide.
	5. cells do not divide but lose half their chromosomes.

Answer: C

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts:cell division, haploid, meiosis

1. Explain why sperm and egg must be haploid and not diploid.

*Answer:* Sperm and egg must be haploid and not diploid because when a haploid sperm and a haploid egg unite, the resulting baby will be diploid. If sperm and egg were diploid, the baby would have too many chromosomes.

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division, diploid, haploid, inheritance, meiosis

57. In humans, after meiosis, one diploid cell produces

1. two identical diploid daughter cells.
2. two unique haploid daughter cells.
3. four unique haploid daughter cells.
4. four identical diploid daughter cells.
5. four unique diploid daughter cell.

Answer: C

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and haploid gametes

58. Sister chromatids are held together at the

1. kinetochore.
2. centrioles.
3. chromosome.
4. centromere.
5. centrosome.

Answer: D

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis and haploid gametes

59. A duplicated homologous chromosome pair contains how many possible alleles?

1. 2
2. 4
3. 8
4. 16
5. 32

Answer: B

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: meiosis and haploid gametes

60. Sister chromatids are separated during

1. meiosis II.
2. meiosis I.
3. mitosis I.
4. mitosis II.
5. meiosis I and II.

Answer: A

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: meiosis and haploid gametes

61. What is meiosis?

1. the specialized type of cellular division that generates haploid gametes
2. a type of cellular division that contains two separate divisions, ultimately leading to the separation of sister chromatids
3. a type of cellular division that aides in genetic diversity by containing both recombination and independent assortment
4. A and B
5. A and C

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis, haploid, cellular division

62. Briefly list the steps involved in both meiosis I and II.

*Answer:* Meiosis I: Homologous chromosome pairs line up in the center of the cell and divide into separate cells. Meiosis II: Sister chromatids line up in the center of the cell and the cell divides, creating four haploid daughter cells.

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: meiosis, haploid, cellular division, sister chromatids, homologous chromosomes

63. What is the difference between meiosis I and II?

1. During meiosis I, sister chromatids separate.
2. Meiosis II produces haploid daughter cells.
3. Meiosis I begins with a haploid cell containing 23 pairs of chromosomes.
4. Meiosis II produces daughter cells that will each develop into egg or sperm.
5. B and D

Answer: E

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: meiosis, haploid, cellular division

64. How is genetic diversity created in meiosis I?

1. The sister chromatids line up in the middle of the cell.
2. Meiosis I results in a mixture of 46 chromosomes that are different from one another.
3. Recombination of sister chromatids occurs in meiosis I.
4. Each cell gets only one copy of each chromosome at the end of meiosis I.
5. None of the above.

Answer: C

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: meiosis, haploid, cellular division, chromatids, chromosome

65. Sexual reproductive cells are called

1. sporozoites.
2. lymphocytes.
3. zygotes.
4. gametes.
5. conidia.

Answer: D

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gametes

66. What percentage of man’s chromosomes are found in a single sperm cell?

1. 25%
2. 75%
3. 100%
4. 33.3%
5. 50%

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** sperm cell

67. What is meant by the terms diploid and haploid? Give an example of a diploid human cell and a haploid human cell.

*Answer:* Diploid means that a cell has two copies of each of the 23 human chromosomes. Haploid means that a cell has only one copy of each of the 23 human chromosomes. In humans, the egg cells and sperm cells are the only haploid cells. All other cells in our bodies are diploid.

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Easy

Important Words/Concepts: diploid, haploid

68. All of the following are TRUE of meiosis, EXCEPT

1. recombination occurs during meiosis II.
2. the resulting cells contain 23 chromosomes.
3. there are two cell divisions.
4. one cell produces four cells.
5. homologous pairs separate during meiosis I.

Answer: A

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell division, diploid, haploid, meiosis

69. Meiosis differs from mitosis in all of the following ways, EXCEPT

1. in meiosis there are two cell divisions, in mitosis there is only one.
2. meiosis only occurs in ovaries and testes.
3. meiosis results in haploid cells while mitosis results in diploid cells.
4. mitosis results in four cells while meiosis results in two.
5. meiosis results in genetically unique daughter cells while mitosis results in genetically identical daughter cells.

Answer: D

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell division, diploid, haploid, meiosis, mitosis

70. Name at least three ways in which meiosis differs from mitosis.

*Answer:*

In meiosis, there are two cell divisions; in mitosis, there is only one.

Meiosis only occurs in ovaries and testes.

Meiosis results in haploid cells while mitosis results in diploid cells.

Meiosis results in four cells while mitosis results in two.

Recombination by crossing over occurs in meiosis but not mitosis.

Meiosis results in genetically unique daughter cells while mitosis results in genetically identical daughter cells.

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell division, diploid, haploid, inheritance, meiosis, mitosis

71. Which of the following puts the events of meiosis in the correct order?

1. chromosomes duplicate, crossing over, homologous chromosomes separate, sister chromatids separate
2. chromosomes duplicate, crossing over, sister chromatids separate, homologous chromosomes separate
3. homologous chromosomes separate, chromosomes duplicate, crossing over, sister chromatids separate
4. crossing over, chromosomes duplicate, homologous chromosomes separate, sister chromatids separate
5. crossing over, chromosomes duplicate, sister chromatids separate, homologous chromosomes separate

Answer: A

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: cell division, crossing over, homologous chromosomes, meiosis, sister chromatids

72. Many genetic disorders are the result of having either more than two or less than two chromosomes. Down syndrome, for example, results when a child has three copies of chromosome 23. How do you think such a situation could occur?

*Answer:* Having too many or two few copies of a chromosome could be the result of either a failure of homologous chromosomes to separate properly during meiosis I, or a failure of sister chromatids to separate during meiosis II.

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts:cell division, Down syndrome, homologous chromosomes, inheritance, meiosis, sister chromatids, trisomy 23

73. What is the process where maternal and paternal chromosomes exchange genetic material?

1. gamete fusion
2. recombination
3. independent assortment
4. meiosis
5. mitosis

Answer: B

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Meiosis creates diversity.

74. Crossing over occurs between

1. maternal chromosomes.
2. sister chromatids.
3. nonsister chromatids.
4. paternal chromosomes.
5. homologous chromosomes.

Answer: C

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Meiosis creates diversity.

74. In humans, which process increases genetic diversity the most?

1. mutations
2. linkage
3. recombination
4. independent assortment
5. gamete fusion

Answer: D

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts:Meiosis creates diversity.

75. In human gametes, how many possible allele combinations exist?

1. 2323
2. 462
3. 232
4. 4623
5. 223

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: Meiosis creates diversity.

76. What two processes occur during meiosis to aide in genetic diversity?

1. recombination and dependent assortment
2. independent assortment and recombination
3. meiosis I and II
4. All of the above.
5. None of the above.

Answer: B

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: meiosis, haploid, cellular division, genetic diversity

77. During the process of genetic recombination,

1. maternal and paternal chromosomes pair and physically exchange DNA segments.
2. crossing over occurs between two nonsister chromatids.
3. DNA segments are exchanged between two nonsister chromatids during meiosis I.
4. None of the above.
5. All of the above.

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: meiosis, haploid, cellular division, genetic diversity, recombination

78. What is the principle of independent assortment?

1. the principle that alleles of different genes are distributed together, as a package
2. the principle wherein alleles of maternal and paternal genes are aligned in the cell during meiosis and separated independently of one another
3. the principle that occurs only during meiosis II
4. a process that only occurs if chromosome pairs are aligned in the center of the cell
5. None of the above.

Answer: B

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts: meiosis, haploid, cellular division, genetic diversity, meiosis

79. The process responsible for making chromosomes that have pieces taken from two different chromosomes is called

1. random alignment.
2. independent assortment.
3. recombination.
4. DNA duplication.
5. random realignment.

Answer: C

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: recombination

80. Humans have 23 pairs of chromosomes. How many possible ways can these be sorted out during independent assortment?

1. more than 8 million ways
2. 46 ways
3. 23 ways
4. about 100 million ways
5. 529 ways (23 × 23 ways)

Answer: A

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: independent assortment

81. Explain how a chromosome you inherited from your father could have information (alleles) from both his father and his mother.

*Answer:* This is the result of recombination during meiosis. In the beginning of meiosis, the chromosomes he inherited from his father and his mother line up next to each other, wrapping around each other. Later, when they pull apart, they exchange pieces of chromosomes, resulting in chromosomes that have information from both of his parents packaged together in one chromosome.

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosome

82. You have inherited the following alleles on three separate chromosome pairs:

|  |  |  |
| --- | --- | --- |
| Chromosome # | Maternal chromosomes | Paternal chromosomes |
| 1 | T | T |
| 2 | A | A |
| 3 | B | B |

Show the possible gametes you could produce as a result of independent assortment.

*Answer:* TAB, TAb, TaB, Tab, tAB, tAb, taB, tab

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: independent assortment

83. Show the possible gametes you could produce as a result of independent assortment.

*Answer:* TABD, TABd, TAbD, TAbd, TaBD, TaBd, TabD, Tabd,

tABD, tABd, tAbD, tAbd, taBD, taBd, tabD, tabd

DQ: How does meiosis produce gametes?

Type: Use It

Difficulty: Hard

Important Words/Concepts: independent assortment

84. During meiosis, two processes occur that, together, create diverse combinations of genes in eggs and sperm. What are these two processes called?

*Answer:* Crossing over and independent assortment

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts:cell division, crossing over, independent assortment, meiosis

85. All of the following are true of crossing over, EXCEPT

1. homologous chromosomes exchange genetic material.
2. crossing over occurs during meiosis I.
3. crossing over occurs immediately after an egg is fertilized.
4. crossing over results in unique combinations of alleles.
5. crossing over occurs only in cells destined to become sperm or egg.

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cell division, crossing over, meiosis

86. Which of the following is TRUE of crossing over?

1. Sister chromatids exchange genetic material.
2. Crossing over occurs during meiosis II.
3. Crossing over occurs immediately after an egg is fertilized.
4. Crossing over results in unique combinations of alleles.
5. Crossing over occurs in mitosis and meiosis.

Answer: D

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Easy

Important Words/Concepts:cell division, crossing over, meiosis

87. Independent assortment means

1. only one allele actually makes protein while the other is inactive, and the one that’s active is random and independent of other allele pairs.
2. the segments of homologous chromosomes that are exchanged are random and independent of other segments.
3. only some chromosomes are duplicated, and which chromosomes are duplicated is random and independent of other chromosomes.
4. which sperm cell carries an X chromosome and which carries a Y chromosome is random and independent of the other sperm.
5. homologous chromosomes segregate into daughter cells randomly and independently of one another.

Answer: E

DQ: How does meiosis produce gametes?

Type: Know It

Difficulty: Hard

Important Words/Concepts:cell division, crossing over, independent assortment, meiosis

88. Where is the CFTR protein found?

1. in cells lining the lungs
2. in skeletal cells
3. in every cell in the body
4. in muscle cells
5. in heart cells

Answer: A

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts: One nonfunctional protein can cause disease.

89. What does activation of the CFTR protein cause?

1. a buildup of mucus in the lungs
2. disruption of ion flow and water balance
3. increased susceptibility to infection
4. lung inflammation
5. All of the above.

Answer: E

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts:One nonfunctional protein can cause disease.

90. Medical treatment for patient with cystic fibrosis involves

1. a vibrating vest.
2. inhalation of a salt solution.
3. early diagnosis.
4. antibiotics.
5. All of the above.

Answer: E

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts: One nonfunctional protein can cause disease.

91 The CFTR protein controls

1. a potassium and chloride ion channel.
2. a sodium and potassium channel.
3. a sodium and chloride ion channel.
4. the phosphorus balance of the cell.
5. the regulation of pH in the cell.

Answer: C

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Hard

Important words/concepts: the CFTR channel

92. What impact can protein misfolding have on its normal function?

*Answer:* A misfolded protein will not have the same shape and therefore may not function as it would normally. Depending on the function of the protein, this may lead to the development of a disease.

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts: protein, folding, mutation

93. Protein X is normally used to transport sugar into cells, so the cell can break down the sugar and use it for energy. If protein X is not folded properly, what might happen to the cell?

1. The cell would be unaffected. There are a lot of proteins; just one bad one is probably not that important.
2. The cell would have an impaired ability to generate energy.
3. The cell would make more of other proteins to make up for the misfolded protein.
4. All of the above.
5. None of the above.

Answer: B

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** protein, folding, mutation

94. Cystic fibrosis is the result of a nonfunctional protein that regulates

1. mucus production.
2. sodium and chloride transfer across cell membranes.
3. immune responses to bacterial infections.
4. blood pressure.
5. accumulation of particulate matter in the lungs.

Answer: B

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts: cystic fibrosis

95. The primary medical problem with cystic fibrosis is that

1. sodium enters lung cells.
2. mucus accumulates outside of lung cells.
3. mucus accumulates outside of lung cells and also blocks other organ function.
4. chloride is trapped in lung cells.
5. the disease is a recessive condition.

Answer: C

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Hard

Important Words/Concepts**:** cystic fibrosis

96. All of the following are true of recessive alleles, EXCEPT

1. they are never transcribed and therefore never produce protein.
2. they are designated by lowercase letters.
3. the phenotype encoded by the recessive allele will only be noticeable when in the homozygous state.
4. a person heterozygous for a recessively inherited disease has one normal allele and one disease allele and is called a “carrier.”
5. not all recessive alleles cause disease.

Answer: A

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Hard

Important Words/Concepts: allele, dominant, inheritance, recessive

97. If someone is said to be “heterozygous” for a trait, it means that

1. both alleles for that trait are the same.
2. both alleles for that trait are different.
3. the alleles for that trait reside at different places on the same chromosome.
4. the alleles for that trait reside on different chromosomes.
5. the person only carries one, not two, alleles.

Answer: B

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Know It

Difficulty: Easy

Important Words/Concepts: allele, heterozygous, homozygous

98. Red-green color blindness is a recessively inherited disorder that affects 7% of the male population but only 0.4% of the female population. Given what you know about disease inheritance and gender determination, why do you think color blindness is so much more common in men than women?

*Answer:* Women possess two X chromosomes, while men possess only one X chromosome. If the allele for color blindness resides on the X chromosome, then men would only need one copy to show the disorder. Women, however, would need two copies to show the disorder.

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Use It

Difficulty: Hard

Important Words/Concepts: allele, heterozygous, homozygous, sex-linked

99. Many genetically inherited disorders are lethal, causing death in either childhood or early adulthood. Imagine two genetically inherited diseases, both of which cause death at an average age of 25, but one disease is recessively inherited and the other disease is dominantly inherited. An examination of the entire population will likely indicate that the allele for the recessively inherited disease is much more common than the allele for the dominantly inherited disease. Why do you think this is?

*Answer:* With a dominantly inherited disease, there are no carriers, just diseased individuals and healthy individuals. Many diseased individuals will die before they have children. In these cases, the dominant disease allele will not be passed on to the next generation, and the allele will decrease in frequency. Individuals with the recessive disease also may die before having children and they, too, will not pass on their disease alleles. However, because recessive alleles can be carried in healthy heterozygous individuals who can and will pass the allele on to their children, the allele may remain relatively common in the population.

DQ: What are some practical applications of understanding the genetic basis of human disease?

Type: Use It

Difficulty: Hard

Important Words/Concepts: allele, carrier, heterozygous, homozygous

100. Which term would represent the trait cystic fibrosis?

1. heterozygous recessive
2. homozygous recessive
3. homozygous dominant
4. heterozygous.
5. heterozygous dominant

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: the Punnett square and dominant and recessive traits

101. Which represents a cross between 2 individuals heterozygous for a single trait?

1. aa × aa
2. aa × AA
3. AA × aa
4. Aa × AA
5. Aa × Aa

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** the Punnett square and dominant and recessive traits

102. Which describes a genotype heterozygous for a single trait?

1. AaBb
2. AABB
3. AA
4. Aa
5. aa

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: the Punnett square and dominant and recessive traits

103. Which describes a genotype homozygous dominant for a single trait?

1. AAaa
2. AABB
3. AA
4. Aa
5. aa

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts:the Punnett square and dominant and recessive traits

104. In a cross between an individual with Huntington disease and an unaffected individual, what are the chances their progeny will have the disease, considering that it is a dominant trait?

1. 50%
2. 75%
3. 100%
4. 25%
5. 0%

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts:the Punnett square and dominant and recessive traits

105. A phenotypically normal woman marries a man with Wilson disease, a autosomal recessive disorder. They have a son who has Wilson disease. If you need two copies of the recessive allele to be affected and the mother doesn’t have the disease, how did the son get it?

1. The woman had two recessive alleles.
2. The woman must have been a carrier of one recessive allele and one normal allele.
3. The woman had two dominant alleles.
4. The man had two dominant alleles.
5. The man had one dominant and one recessive allele.

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: Punnett square, recessive, dominant, autosomal

106. Two normal individuals have a child who has cystic fibrosis, an autosomal recessive disease. How did this happen?

1. The mother had two recessive alleles.
2. The mother had one recessive allele and one normal allele, and the father had two normal alleles.
3. The mother had two normal alleles, and the father had one recessive and one normal allele.
4. Each parent had one normal and one recessive allele.
5. Both parents had two normal alleles.

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:Punnett square, recessive, dominant, autosomal

107. Two normal individuals have a child who has cystic fibrosis, an autosomal recessive disease. What were the chances of this happening? (Draw a Punnett square to help you determine the answer.)

1. 1:4 chance
2. 2:4chance
3. 3:4 chance
4. 4:4 chance
5. less than 1:4 chance

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: Punnett square, recessive, dominant, autosomal

108. A phenotypically normal woman marries a man with CMT disease, an autosomal dominant disorder. They have a son who has CMT disease. How did the son get it?

1. The mother had at least one dominant allele, which she passed on to her son.
2. The father had at least one dominant allele, which he passed on to his son.
3. The mother had one recessive and one dominant allele, one of which she passed on to his son.
4. The father had two recessive alleles, one of which he passed on to his son.
5. None of the above.

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: Punnett square, recessive, dominant, autosomal

109. A phenotypically normal woman marries a man with CMT disease, a autosomal dominant disorder. They have a son who has CMT disease. What were the chances he would get the disease? (Draw a Punnett square to help you determine the answer.)

1. 1:4 chance
2. 2:4chance
3. 3:4 chance
4. 4:4 chance
5. less than 1:4 chance

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** Punnett square, recessive, dominant, autosomal

110. Two people with Huntington disease, an autosomal dominant disorder, have a son. What are the chances he will get the disease? (Draw a Punnett square to help you determine the answer.)

1. 1:4 chance
2. 2:4chance
3. 3:4 chance
4. 4:4 chance
5. less than 1:4

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: Punnett square, recessive, dominant, autosomal

111. Two healthy individuals have a child who has Huntington disease, an autosomal dominant disease. How did this happen?

1. The mother had two recessive alleles.
2. The mother had one recessive allele and one normal allele, and the father had two normal alleles.
3. The mother had two normal alleles, and the father had one recessive and one normal allele.
4. Each parent had one normal and one recessive allele.
5. The condition could not have been inherited from these two parents.

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: Punnett square, recessive, dominant, autosomal

112. One parent has one copy of a dominant allele for gene 87 and one recessive allele for Gene 87. The other parent has two copies of the dominant allele for Gene 87. What is the chance that their children will inherit the recessive condition (two copies of Gene 87)? You may need to draw a Punnett square to figure this out.

1. 0%
2. 25%
3. 50%
4. 75%
5. 100%

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: recessive/dominant

113. Both parents have one copy of a dominant allele for gene 87 and one recessive allele for Gene 87. What is the chance that their children will inherit the recessive condition (two copies of Gene 87)? You may need to draw a Punnett square to figure this out.

1. 0%
2. 25%
3. 50%
4. 75%
5. 100%

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: recessive/dominant

114. One parent has one copy of a dominant allele for gene 87 and one recessive allele for Gene 87. The other parent has two copies of the recessive allele for Gene 87. What is the chance that their children will inherit the recessive condition (two copies of Gene 87)? You may need to draw a Punnett square to figure this out.

1. 0%
2. 25%
3. 50%
4. 75%
5. 100%

Answer: D

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** recessive/dominant

115. One parent has one copy of a dominant allele for gene 87 and one recessive allele for Gene 87. The other parent has two copies of the recessive allele for Gene 87. What is the chance that their children will inherit the dominant condition (two copies of Gene 87)? You may need to draw a Punnett square to figure this out.

1. 0%
2. 25%
3. 50%
4. 75%
5. 100%

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: recessive/dominant

116. Achondroplasic dwarfism is a dominant characteristic. “D” represents the allele for achondroplasic dwarfism, and “d” represents the allele for normal height. A couple who both exhibit achondroplasic dwarfism marry and have three children. All of the children are dwarves. What is the genotype of their children? Show possible Punnett squares.

*Answer:* It is impossible to say. Both parents could have one dominant and one recessive allele for dwarfism, and the same is true of their children.

 Both parents Dd

|  |  |  |
| --- | --- | --- |
|   | D | d |
|  D | DD | Dd |
|  d | Dd | dd |

 One parent DD, one parent Dd

|  |  |  |
| --- | --- | --- |
|  | D | d |
| D | DD | Dd |
| D | DD | DD |

 Both parents DD

|  |  |  |
| --- | --- | --- |
|  | D | D |
| D | DD | DD |
| D | DD | DD |

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: dominant/recessive

117. A woman who is blood type A gave birth to a child who is blood type O. The child’s father is blood type O. Which of these three—mother, father, or child—is heterozygous for blood type? Use a Punnett square to explain.

*Answer:* Blood type is an example of codominance, where all alleles are expressed. A and B represent chemicals on the surface of the blood cells; so a person who is blood type A can have two A alleles or an A and an O allele. A person who is blood type O, however, must be OO. Therefore, the mother is heterozygous.

|  |  |  |
| --- | --- | --- |
|  | A | O |
|  O | AO | OO |
|  O | AO | OO |

**DQ: Why do different traits have different inheritance patterns?**

**Type: Use It**

**Difficulty: Easy**

**Important Words/Concepts: blood types**

118. Achondroplasic dwarfism is a dominant characteristic. “D” represents the allele for achondroplasic dwarfism, and “d” represents the allele for normal height. A couple who both exhibit achondroplasic dwarfism marry and have four children. Three of the children are dwarves and one is of normal height. What is the genotype of the child with normal height? What is the genotype of the parents?

*Answer:* Since achondroplasia is dominant, for a child to be of normal height, they could have no copies of the dominant gene—they must be dd. That means that both parents had a recessive, normal height, d gene to contribute to the normal height child. Thus, both parents have a Dd genotype.

|  |  |  |
| --- | --- | --- |
|   | D | d |
|  D | DD | Dd |
|  d | Dd | dd |

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dominant, recessive

119. Sickle-cell anemia is a recessively inherited disease that causes red blood cells to become rigid and deformed. What is the probability that a child will have sickle-cell anemia if the father has the disease and the mother is heterozygous for the disease? What is the probability that a child will be a carrier? Use a Punnett square to show your work and use the letters “A” and “a” to designate dominant and recessive alleles, respectively.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | **Father** |
|  |  | **a** | **a** |
| **Mother** | **A** | Aa | Aa |
|  | **a** | aa | aa |

The child has a 2 in 4, or 50%, chance of having sickle-cell anemia, and a 2 in 4, or 50%, chance of being a carrier.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: dominant, inheritance, Punnett square, recessive

120. Having free earlobes is dominant to having attached earlobes. If the father and mother are both heterozygous for the trait, what is the probability that a child will be born with attached earlobes? Use a Punnett square to show your work and use the letters “E” and “e” to designate dominant and recessive alleles, respectively.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | **Father** |
|  |  | **E** | **e** |
| **Mother** | **E** | EE | Ee |
|  | **e** | Ee | ee |

A child will have a 1 in 4, or 25%, chance of having attached earlobes.

**DQ: Why do different traits have different inheritance patterns?**

**Type:** Use It

**Difficulty:** Hard

**Important Words/Concepts:** dominant, inheritance, Punnett square, recessive

121. Albinism is a recessively inherited condition. What is the probability that a child will be born with albinism if the child’s mother is albino, the child’s father has normal pigmentation, and the child’s paternal grandmother was albino? Use a Punnett square to show your work and use the letters “A” and “a” to designate dominant and recessive alleles, respectively.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | **Father** |
|  |  | **A** | **a** |
| **Mother** | **a** | Aa | aa |
|  | **a** | Aa | aa |

A child will have a 2 in 4, or 50%, chance of having albinism.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dominant, inheritance, Punnett square, recessive

122. Achondroplasia is a type of dwarfism caused by a dominant allele. What is the probability that a child will have this type of dwarfism if the father is homozygous normal and the mother is homozygous for achondroplasia? Use a Punnett square to show your work and use the letters “D” and “d” to designate dominant and recessive alleles, respectively.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | **Father** |
|  |  | **d** | **d** |
| **Mother** | **D** | Dd | Dd |
|  | **D** | Dd | Dd |

The child will have a 100% chance of having achondroplasia.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:dominant, inheritance, Punnett square, recessive

123. Huntington disease is a dominantly inherited disorder. What is the probability that a child will have Huntington disease if the father and the mother are both heterozygous? Use a Punnett square to show your work and use the letters “D” and “d” to designate dominant and recessive alleles, respectively.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | **Father** |
|  |  | **D** | **d** |
| **Mother** | **D** | DD | Dd |
|  | **d** | Dd | dd |

The child will have a 3 in 4, or 75%, chance of having Huntington disease.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dominant, inheritance, Punnett square, recessive

124. The ability to roll your tongue into a U-shape is a recessively inherited trait. What are all the possible parental combinations that would produce a child heterozygous for this trait? List the parental combinations as [Parent 1 genotype] × [Parent 2 genotype]. Use the letters “R” and “r” to designate dominant and recessive alleles, respectively. As an example, note that “RR × rr” is equivalent to “rr × RR”; thus, you only need to list one, not both.

*Answer:*

1. RR × Rr
2. RR × rr
3. Rr × Rr
4. Rr × rr

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dominant, inheritance, Punnett square, recessive

125. Having brown eyes is dominant to having blue eyes. What are all the possible parental combinations that would produce a child with blue eyes? List the parental combinations as [Parent 1 genotype] × [Parent 2 genotype]. Use the letters “B” and “b” to designate dominant and recessive alleles, respectively. As an example, note that “BB × bb” is equivalent to “bb × BB”; thus, you only need to list one, not both.

*Answer:*

1. Bb × Bb
2. Bb × bb
3. bb × bb

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dominant, inheritance, Punnett square, recessive

126. What potential gametes can result from an individual heterozygous for two traits, AaBb?

*Answer:* The heterozygous individual AaBb would result in four possible gametes: AB, Ab, aB and ab.

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:the Punnett square and two traits

127. In a cross between two heterozygous parents for two genes, what is the chance that any progeny will be homozygous recessive for both traits?

1. 9:16
2. 1:16
3. 1:4
4. 1:1
5. 1:32

Answer: B

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: the Punnett square and two traits

128. What phenotypic ratio of the progeny results from independent assortment of two traits when parents are heterozygous for both traits?

1. 4:1
2. 3:1
3. 9:3:3:1
4. 3:6:6:1
5. 12:3:1

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: the Punnett square and two traits

129. A disease caused by gene X is an autosomal recessive disease but is modified by expression of a gene on another chromosome gene Y. If gene Y has at least one dominant allele, then the disease is aggressive and becomes evident at age 2. If gene Y has two recessive alleles, then the disease is mild and dormant until the age of 50. Two people who are heterozygous for both gene X and Y have a child. What are the chances the child will have the aggressive form of the disease?

1. 9:16 chance
2. 4:16chance
3. 3:16 chance
4. 1:16 chance
5. 16:16 chance

Answer: C

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:punnett square, recessive, dominant, autosomal

130. A disease caused by gene X is an autosomal dominant disease but is modified by expression of a gene on another chromosome gene Y. If gene Y has two recessive alleles, then the disease is mild. If there is a dominant allele present for gene Y, then the disease is aggressive. What are the chances the child will have the aggressive form of the disease?

1. 9:16 chance
2. 4:16 chance
3. 3:16 chance
4. 1:16 chance
5. 16:16 chance

Answer: A

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: punnett square, recessive, dominant, autosomal

131. You have two parental varieties of peas: tall plants with axial flowers and short plants with terminal flowers. When the short plants with terminal flowers variety were crossed with the tall plants with axial flowers variety, all of the offspring were tall plants and axial flowers. What characteristics are recessive?

1. None. This is an example of incomplete dominance.
2. None. This is an example of codominance.
3. tall and short
4. tall and terminal
5. short and terminal

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:punnett square, recessive

132. You have two parental varieties of peas: tall plants with axial flowers and short plants with terminal flowers. When the short plants with terminal flowers variety were crossed with the tall plants with axial flowers variety, all of the offspring were tall plants and axial flowers. Show your Punnett square for this cross.

*Answer:*

T = tall, t = short; A = axial, a = terminal

|  |  |
| --- | --- |
|  | TA |
| ta | TtAa |

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: dihybrid cross

133. A man who is a carrier for cystic fibrosis and for the *TGFB1* modifier gene has a child with a woman who is also a carrier for cystic fibrosis but has two copies of the recessive allele for the *TGFB1* modifier. What percentage of their children will have cystic fibrosis AND express the recessive modifier? Show your Punnett square.

*Answer:*

D = dominant/no cystic fibrosis, D = recessive/cystic fibrosis

M = dominant/modifier inactive, m = recessive/modifier active

Father is DdMm; mother is Ddmm

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | DM | Dm | dM | Dm |
| Dm | DDMm | DDmm | DdMm | Ddmm |
| dm | DdMm | Ddmm | ddMm | Ddmm |

There is a 6 in 8 chance that a child will be carrier for cystic fibrosis, but they will not have the disease.

There is a 1 in 8 chance that a child will have cystic fibrosis, but they will have the inactive modifier.

There is a 1 in 8 chance that a child will have cystic fibrosis and the active modifier.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dihybrid cross

134. You have two parental varieties of peas: tall plants with axial flowers and short plants with terminal flowers. When the short plants with terminal flowers variety were crossed with the tall plants with axial flowers variety, all of the offspring were tall plants and axial flowers. You then cross these tall axial offspring with each other. Show a Punnett square for this cross. What are the phenotypes and genotypes of your offspring?

*Answer:*

T = tall, t = short; A = axial, a = terminal

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TA | Ta | tA | Ta |
| TA | TTAA | TTAa | TtAA | TtAa |
| Ta | TTAa | TTaa | TtAa | Ttaa |
| tA | TtAA | TtAa | ttAA | ttAa |
| ta | TtAa | Ttaa | ttAa | Ttaa |

9/16 are tall and axial, 3/16 are short and axial, 3/16 are tall and terminal, 1/16 are short and terminal

1 TTAA, 1 TTaa, 1 ttAA, 1 ttaa, 4 TtAa, 2 TtAA, 2 Ttaa, 2 TTAa, 2 ttAa

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: dihybrid cross

135. A friend just gave you a striped corn snake male and a blood red corn snake female. You know that both of these are recessive conditions that are located on different chromosomes. How many generations will it take you to produce striped, blood red corn snakes? What other types of snakes will you produce? Use S = No Stripe, s = stripe, B = no blood red, and b = blood red.

Your striped male must be recessive for both alleles for the striped gene and you can assume he is dominant for both alleles for the blood red gene.

Your blood red female must be recessive for both alleles for the blood red gene and you can assume she is dominant for both alleles for the striped gene. Show your Punnett squares.

*Answer:*

Male genotype = ssBB; female genotype = SSbb

Striped male × blood red female

|  |  |  |
| --- | --- | --- |
|  | sB | sB |
| Sb | SsBb | SsBb |
| Sb | SsBb | SsBb |

100% of offspring are heterozygous for both conditions but appear like normal corn snakes.

You now cross heterozygous males with females: SsBb × SsBb.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | SB | Sb | sB | Sb |
| SB | SSBB | SSBb | SsBB | SsBb |
| Sb | SSBb | SSbb | SsBb | Ssbb |
| sB | SsBB | SsBb | ssBB | ssBb |
| sb | SsBb | Ssbb | ssBb | Ssbb |

In this generation,

1 of 16 offspring should be striped and blood red (ssbb)

3 of 16 offspring should be striped and normal color (1 ssBB, 2 ssBb)

3 of 16 offspring would be nonstriped and blood red (2 Ssbb, 1 SSbb)

9 of 16 would be nonstriped with normal color (4 SsBb, 1SSBB, 2 SSBb, 2 SsBB)

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:dihybrid cross

136. Draw the Punnett square showing all the possible genotypes of children born to a man with genotype AABb and a woman with genotype AaBb.

*Answer:*

|  |  |  |
| --- | --- | --- |
|  |  | Father |
|  |  | AB | Ab | AB | Ab |
|  | AB | AABB | AABb | AABB | AABb |
| Mother | Ab | AABb | AAbb | AABb | AAbb |
|  | aB | AaBB | AaBb | AaBB | AaBb |
|  | ab | AaBb | Aabb | AaBb | Aabb |

DQ: Why do different traits have different inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: independent assortment, inheritance, multiple genes

137. There are three separate genes for the production of melanin (skin pigment). Each gene has two options: make melanin or don’t make melanin. How likely would it be for a couple that was each heterozygous for all three genes to have a child with no melanin? Show your Punnett square.

Label the three genes A, B, and C. Both parents are AaBbCc.

*Answer:*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ABC | ABc | AbC | Abc | aBC | aBc | abC | abc |
| ABC | AABBCC | AABBCc | AABbCC | AABbCc | AaBBCC | AaBBCc | AaBbCC | AaBbCc |
| ABc | AABB C | AABBcc | AABbCc | AABbcc | AaBBCc | AaBBcc | AaBbCc | AaBbcc |
| AbC | AABbCC | AABbCc | AAbbCC | AAbbCc | AaBbCC | AaBbCc | AabbCC | AabbCc |
| Abc | AABbCc | AABbcc | AAbbCc | AAbbcc | AaBbCc | AaBbcc | AabbCc | Aabbcc |
| aBC | AaBBCC | AaBBCc | AaBbCC | AaBbCc | aaBBCC | aaBBCc | aaBbCC | aaBbCc |
| aBc | AaBBCc | AaBBcc | AaBbCc | AaBbcc | aaBBCc | aaBBcc | aaBbCc | aaBbcc |
| abC | AaBbCC | AaBbCc | AabbCC | AabbCc | aaBbCC | aaBbCc | aabbCC | aabbCc |
| abc | AaBbCc | AaBbcc | AabbCc | Aabbcc | aaBbCc | aaBbcc | aabbCc | aabbcc |

Only 1 in 64 would have all recessive alleles, and thus lack melanin.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:trihybrid cross

138. A carrier is someone who

1. expresses a recessive disease.
2. expresses a dominant disease.
3. has two copies of a recessive allele.
4. will pass on a recessive disease to all of their children.
5. has one copy of a recessive allele and one copy of a dominant allele for a particular gene.

Answer: E

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Medium

Important Words/Concepts: Punnett Square

139. Explain the role of a modifier gene.

*Answer:* A modifier gene is one that can have an effect on the function of another gene or the severity of another condition. In the case of cystic fibrosis, the disease causes an accumulation of mucus in the lungs, resulting in bacterial growth. In most cases, the body has a moderate response to the infection, resulting in little tissue damage. However, some people have a modifier gene that causes a drastic immune response, resulting in lung tissue damage and scarring.

DQ: Why do different traits have different inheritance patterns?

Type: Use It

Difficulty: Medium

Important Words/Concepts:Punnett Square