*Biology for a Changing World 2e,* Chapter 12 Test Bank

1. Humans have how many autosomes?

1. 22 pairs
2. 23 pairs
3. 44 pairs
4. 46 pairs
5. 26 pairs

Answer: A

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes and sex determination

2. The sex chromosomes found in a typical male are

1. XX.
2. XY.
3. YY.
4. Y.
5. YXY.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes and sex determination

3. Zygotes with \_\_\_\_\_\_\_ usually cannot survive until birth.

1. three X chromosomes
2. a single X chromosome
3. no X chromosome
4. two X chromosomes
5. an X and a Y chromosome

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes and sex determination

4. The SRY gene on the Y chromosome is responsible for

1. female genitalia.
2. ovary suppression.
3. estrogen production.
4. testes development.
5. androgen receptors.

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts:SRY and sex determination

5. XXX, XO, XYY, and XXY conditions are the result of

1. an error during mitosis.
2. an error during meiosis.
3. a mutation event.
4. an egg containing two nuclei.
5. more than one sperm fertilizing an egg.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: aneuploidy, nondisjunction

6. \_\_\_\_\_\_\_\_ required to masculinize a developing fetus.

1. The Y chromosome is
2. The X chromosome is
3. All 46 chromosomes are
4. The autosomes are
5. Chromosomes 12 and 22 are

Answer: A

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: gender development

7. One of every \_\_\_\_\_\_\_ children born is neither strictly male nor female, but intersex.

1. 100
2. 1,600
3. 10,000
4. 16,000
5. 1,000,000

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:intersex

8. Define the term autosome.

*Answer:* Autosome is a term used to describe non-sex chromosomes 1–22 in humans.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: autosome

9. Explain three ways a child may become intersex.

*Answer:* One way is from having a chromosomal makeup other than XX or XY (i.e., XXY, XYY, X). A second way is through certain mutations, such as on the SRY gene of the Y chromosome. A mutation of this gene causes a child with XY chromosomes to be externally female. A third way would be mutations that keep a developing child from producing critical gender hormones, such as androgens, or mutations that prevent a developing child from producing the receptors for those hormones.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: intersex

1. What are autosomes?
2. chromosomes inherited from both mother and father that determine a child’s sexual identity
3. paired chromosomes, except for the X and Y chromosomes
4. cells with one set of chromosomes
5. cells with more than two sets of chromosomes
6. cells that divide uncontrollably

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, genotype, inheritance, autosome

1. What is the genotype of females and males, respectively? (Note that the number indicates the total number of individual chromosomes.)
2. 46 XY; XX
3. 46 XX; XY
4. 46 XX; XO
5. 23 XY; XX
6. 23 XX; XY

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, genotype, inheritance, male, female, XX, XY

1. Why can you say that males determine the sex of their children?
2. Since males have two X chromosomes, whichever one is passed along to their offspring will determine the sex.
3. Males will either contribute an X or a Y chromosome, whereas females will always contribute an X chromosome.
4. Male chromosomes are inherited preferentially over female chromosomes.
5. Y chromosomes are dominant; X chromosomes are recessive.
6. All of the above.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, genotype, inheritance, males, females

1. What is the significance of the X and Y chromosome in terms of sexual identity?
2. The X chromosome contains the *SRY* gene, which aids in the development of the ovaries.
3. The X and Y chromosomes aid in the production of ovaries and testes, respectively. These organs produce estrogen and testosterone, which in turn signal either female or male tissue to develop.
4. The *SRY* gene on the Y chromosome signals the testes to develop testosterone, which signals male tissues to develop.
5. A and B
6. B and C

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: chromosomes, genotype, inheritance, SRY, sex determination

14. Briefly explain the significance of the *SRY* gene. What phenotype(s) does it cause?

*Answer:* The *SRY* gene on the Y chromosome signals the testes to develop testosterone, which signals male tissues to develop.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts:SRY, phenotype

15. The term *autosome* refers to

1. all chromosomes, including the X and Y.
2. all chromosomes, except the X and Y.
3. all chromosomes, including the X but not the Y.
4. all chromosomes, including the Y but not the X.
5. only the X and Y chromosomes.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: autosome, chromosome, X chromosome, Y chromosome

16. Human males have

1. only one sex chromosome, an X.
2. only one sex chromosome, a Y.
3. two sex chromosomes, both Xs.
4. two sex chromosomes, both Ys.
5. two sex chromosomes, one X and one Y.

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosome, inheritance, Y chromosome

17. Why are X-linked traits more commonly expressed in males?

1. There is no masking of an affected X allele with a normal X in males.
2. Females must have two copies of the affected allele to display a phenotype.
3. Females may be unknowing carriers and pass on the trait to male progeny.
4. Males only have one X chromosome.
5. All of the above.

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: X-linked inheritance

18. Which of the following is not an X-linked trait?

1. cystic fibrosis
2. color-blindness
3. Duchenne muscular dystrophy
4. hemophilia

Answer: A

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: X-linked inheritance, X-linked traits

19. Which of the following statements is INCORRECT?

1. Males are more likely than females to express X-linked characteristics.
2. X-linked characteristics are almost always recessively inherited.
3. X-linked characteristics are genes that are recessive on the X chromosome and dominant on the Y chromosome.
4. Females with Duchenne muscular dystrophy are uncommon.
5. Hemophilia rarely affects women.

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: X-linked

20. Hemophilia is a recessive mutation on the X chromosome. Who is more likely to express the hemophilia phenotype, a son or a daughter? Explain.

*Answer:* The son is more likely to express hemophilia. A daughter has two X chromosomes, so she has a possibility of inheriting an X chromosome with a dominant allele for normal blood clotting, even if she gets an X with the recessive allele. So she has a chance that the recessive hemophilia allele will be masked by the dominant allele. However, a son only receives one X chromosome. If that X carries the recessive allele, he will develop hemophilia.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: hemophilia

21. Duchenne muscular dystrophy (DMD) is a recessive mutation on the X chromosome. Who is more likely to inherit DMD, a daughter with two X chromosomes or a daughter with Turner syndrome?

*Answer:* The daughter with Turner syndrome. The daughter with two X chromosomes has a possibility of inheriting an X chromosome with a dominant allele for DMD, even if she gets an X with the recessive allele. So she has a chance that the disease would be masked by the dominant allele. However, a Turner-syndrome daughter only receives one X chromosome. If that X carries the recessive allele, she will develop DMD.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts:X-linked inheritance**,** Turner syndrome

22. Red-green color blindness is an X-linked recessive mutation. A color-blind man and a woman with normal vision have two biological children: a son with normal vision and a color-blind daughter. Describe the alleles for color blindness in the mother and father.

*Answer:* The man only has one X chromosome, and he is color blind, so he has the recessive allele for this gene. He has passed this X on to his daughter. The mother has normal vision, so she must have at least one dominant allele for this gene. However, the daughter is color blind. This means that the mother had to have a recessive allele to pass on to the daughter. Therefore, the mother is heterozygous for the color-blindness gene.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts:color blindness

23. What are X-linked traits?

1. Diseases or phenotypes that are determined by genes on an X chromosome.
2. Traits that only affect females since females have two X chromosomes.
3. Dominant traits located on X chromosomes.
4. Genes that are more likely to have an effect in males than females.
5. A and D

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:chromosomes, X-linked, inheritance

24. Explain why males with a diseased allele on their X chromosome can only pass it along to their daughters.

*Answer:* Males only have one X chromosome. If there is a mutation on it and they pass the X on to their offspring, that offspring will also have the mutated gene. Males can only pass their X chromosome on to daughters.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts:chromosomes, X-linked, inheritance

25. Using a Punnett square, calculate the probability of a son inheriting an X-linked trait if his mother is a carrier and his father is unaffected. (Use X for a normal chromosome, and X’ to represent a recessive X-linked trait.)

*Answer:*

X Y

|  |  |
| --- | --- |
| X’X | X’Y |
| XX | XY |

**X’**

**X**

A son has a 50% chance of inheriting the mutated allele from his mother.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts:chromosomes, X-linked, inheritance

27. Is it possible for a female to be color blind? Why or why not?

*Answer:* Yes, it is possible for a female to be color blind if she inherits two copies of the defective allele on her X chromosomes.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts:inheritance, X chromosome, X-linked

28. Can a man with hemophilia pass hemophilia on to his sons? Why or why not?

*Answer:* A man with hemophilia cannot pass hemophilia on to his sons because the gene causing hemophilia is carried on the X chromosome, and a man only passes his Y chromosome to his sons.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: inheritance, X chromosome, X-linked

29. All of the following are true of color blindness, EXCEPT

1. it can be passed from a color-blind father to his son.
2. it can be passed from a color-blind mother to her son.
3. it can be passed from a color-blind grandfather, through his daughter, to her son.
4. it can be carried by a female who has normal color vision herself.
5. it only rarely occurs in females.

Answer: A

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: inheritance, X chromosome, X-linked

30. Men are frequently told that male-pattern baldness is inherited from their maternal grandfather, not their father. Explain the reasoning behind this statement.

*Answer:* Male-pattern baldness is a trait carried on the X chromosome; therefore, if a man’s maternal grandfather was bald, he would have passed the defective allele on to his daughter through his X chromosome, and she, in turn could pass that X chromosome on to her son.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: inheritance, X chromosome, X-linked

31. All the male relatives of a color-blind man are also color blind. This man likely received the allele for color blindness from

1. his father.
2. his uncle.
3. his maternal grandfather.
4. his paternal grandfather.
5. either his maternal or paternal grandfather.

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: inheritance, X chromosome, X-linked

32. Which of the following is/are used to examine inheritance over generations?

1. karyotypes
2. a pedigree chart
3. genotypes
4. a family tree
5. phenotypes

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:X-linked inheritance and pedigrees

33. A pedigree chart reveals the presence of a disease trait in both a boy and his mother’s father. This pattern would suggest

1. autosomal recessive inheritance.
2. autosomal dominant inheritance.
3. X-linked inheritance.
4. Y-linked inheritance.
5. no inheritance pattern.

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Hard

Important Words/Concepts: X-linked inheritance and pedigrees

34. Fill in the following pedigree chart for hemophilia, giving genotypes of each individual. Circles are females and squares are males. Filled circles or squares indicate individuals with hemophilia. Give the genotypes as either XX, XY, XX, XY, XX, X?, or X?, where the underline (X) indicates a chromosome with the color-blindness allele and “?” indicates an unknown allele.

*Answer:*

Top Row: X?, XY

Middle Row: XX, XY XX, XY

Bottom Row: XX, XY X?, XY

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** inheritance, pedigree, X chromosome, X-linked

35. It is simpler to use DNA to identify the father for a son than for a daughter because

1. the X chromosome is passed intact to the daughter from the mother.
2. the Y chromosome may recombine during meiosis.
3. the Y chromosome may exchange genetic material with the X chromosome .
4. the X chromosome may recombine during meiosis while the Y is passed intact.
5. autosomes are passed intact to all progeny.

Answer: D

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: uses of Y chromosome analysis

36. Which two people would have the most different Y chromosomes?

1. a father and his biological son
2. a boy and his biological father’s father
3. a boy and his father’s paternal grandfather
4. a father and his daughter’s biological son
5. two fraternal twin brothers

Answer:D

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: uses of Y chromosome analysis

37. Y chromosome analysis has been used in

1. studying human evolution.
2. tracing genealogy.
3. evaluating stories about the descendants of Thomas Jefferson.
4. tracing the descendants of Genghis Khan.
5. All of the above.

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: uses of Y chromosome analysis

38. Y chromosome analysis would be LEAST useful for

1. studying familial relationships between females.
2. determining the relatives of Moses.
3. tracing the descendants of Genghis Khan.
4. deciding paternity.
5. studying the migration of humans out of Africa.

Answer: A

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: uses of Y chromosome analysis

39. Which of the following human chromosomes usually does NOT exchange DNA during meiosis?

1. X chromosome
2. Y chromosome
3. chromosome 1
4. chromosome 12
5. chromosome 17

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Y chromosome

40. Which of the following chromosomes does NOT have a homologous partner in human males?

1. Chromosome 1
2. Chromosome 11
3. Chromosome 17
4. Chromosome 1
5. Y chromosome

Answer: E

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Y chromosome

41. Which of the following human chromosomes is passed on intact from father to son?

1. X chromosome
2. Y chromosome
3. Chromosome 1
4. Chromosome 3
5. Chromosome 12

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Y chromosome

42. Explain why Y chromosomes have no exchange of DNA during meiosis. Describe any relevant events that occur during meiosis, as part of your explanation.

*Answer:* During meiosis, homologous chromosomes pair up closely and exchange pieces with each other. However, males have only one Y chromosome, so there is no homologous chromosome pairing and no exchange of information. Therefore, the Y chromosome is passed on, unchanged, from generation to generation.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts:Y inheritance

43. Why do investigators use the Y chromosome for genetic analysis?

1. The Y chromosome is technically easier to extract from cells than the X chromosome.
2. The Y chromosome rarely undergoes genetic recombination because there is no homologous partner.
3. The X chromosome passes through generations largely unchanged and is therefore useless for tracking mutations
4. The Y chromosome mutates easily allowing ancestry to be traced over many generations.
5. When the X chromosome recombines with the Y chromosome the Y chromosome more accurately reflects inheritance from both parents

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, X, Y, inheritance

44. What is the main difference in behavior between the X and Y chromosome during meiosis?

1. The Y chromosome aligns with its homologous chromosome; the X does not.
2. The X chromosome undergoes crossing over; the Y does not.
3. The Y chromosome undergoes crossing over; the X does not.
4. During crossing over the X chromosome donates segments to the Y chromosome.
5. During crossing over the Y chromosome donates segments to the X chromosome.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, X, Y, meiosis, crossing over

45. Genghis Kahn ruled the largest empire in the world, pillaging his way across Mongolia and Asia in the 13th century. Today, 16 million men living in this same region are his descendents. How do you think scientists have been able to determine that all these men are related to Genghis Kahn? Specifically, what chromosome do you think they examined and why?

*Answer:* Because the Y chromosome is passed unchanged from father to son (except for occasional random mutations), scientists examined the Y chromosome to determine how many men were likely to be related to Genghis Kahn.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: inheritance, X chromosome, Y chromosome

46. All of the following are TRUE of the Y chromosome, EXCEPT

1. it can be used to trace male lineage.
2. it undergoes recombination with the X chromosome.
3. it is tiny and carries only a few genes.
4. it contains genes that influence the development of male characteristics.
5. it is passed only from father to son.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:inheritance, Y chromosome

47. Which of the following is TRUE of the sex chromosomes?

1. The X chromosome never undergoes recombination.
2. The Y chromosome never undergoes recombination**.**
3. Neither the X nor the Y undergo recombination.
4. During meiosis, the X and the Y exchange genes by crossing over.
5. During meiosis, only part of the X exchanges genes with the Y by crossing over.

Answer: B

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, X chromosome, Y chromosome

48. Ancestry and human evolution is researched using these differences in Y chromosomes.

1. single-nucleotide repeats
2. mutations in DNA coding regions
3. short-tandem repeats
4. telomere deletions
5. frameshift mutations

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: STR analysis of the Y chromosome

49. Thomas Jefferson is thought to have fathered the youngest son of slave Sally Hemings. This idea was investigated using Y chromosome analysis of

1. Sally Hemings’s oldest son.
2. Jefferson’s daughter.
3. Jefferson’s only direct son.
4. Jefferson’s paternal uncle.
5. Jefferson’s brother.

Answer: D

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: STR analysis of the Y chromosome

50. Investigators at a crime scene have isolated DNA from a Y chromosome and have analyzed it for its STRs. They have a prime suspect, but he is not cooperating. However, several of his relatives are willing to help by donating DNA samples. Which relative will have the most similar Y chromosome?

1. his half-brother
2. his mother’s brother
3. his father’s father
4. his mother’s father
5. his mother’s grandfather

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts:Y chromosome

51. You are home sick with the flu and, while flipping channels, you are riveted by a talk show. The show is searching for the real father of a woman’s child. None of the men admit paternity, but she insists that one of them must be the father. As the host reveals the results of the paternity test, he mentions that the results were based on STR analysis from the Y chromosome. He displays the following chart. Who does he reveal is the father?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | STR 1 | STR 2 | STR 3 | STR 4 | STR 5 |
| Potential father 1 | 17 | 5 | 11 | 11 | 7 |
| Potential father 2 | 18 | 5 | 11 | 11 | 7 |
| Potential father 3 | 17 | 5 | 11 | 9 | 7 |
| Potential father 4 | 17 | 5 | 4 | 9 | 8 |
| Child’s DNA | 17 | 5 | 11 | 9 | 7 |

*Answer:* Potential father #3 is the only one that matches the child for all five STRs, so he would be the father, based on these data.

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts: STR analysis of the Y chromosome

52. You are home sick with the flu and, while flipping channels, you are riveted by a talk show. The show is searching for the real father of a woman’s child. None of the men admit paternity, but she insists that one of them must be the father. As the host reveals the results of the paternity test, he mentions that the results were based on STR analysis from the Y chromosome. He displays the following chart. Who does he reveal is the father?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | STR1 | STR 2 | STR3 | STR 4 | STR 5 |
| Potential father 1 | 18 | 5 | 11 | 9 | 7 |
| Potential father 2 | 18 | 5 | 11 | 11 | 7 |
| Potential father 3 | 17 | 7 | 12 | 9 | 7 |
| Potential father 4 | 17 | 5 | 4 | 9 | 8 |
| Child’s DNA | 17 | 5 | 11 | 9 | 7 |

*Answer:* (*Drumroll…*) None of the potential fathers matches the child for all five STRs, so none of these men is the father.. (*Audience gasps*.)

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Hard

Important Words/Concepts:STR analysis of the Y chromosome

53. Why is it a good idea to use STRs on Ychromosomes for ancestry instead of STRs on X chromosomes?

1. The Y chromosome is passed on to every generation no matter what.
2. The X chromosome is passed on to every generation no matter what.
3. The X chromosome undergoes crossing over; the Y does not.
4. The Y chromosome undergoes crossing over; the X does not.
5. There are more available STRs on the Y chromosome than on the X chromosome

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts:chromosomes, X, Y, meiosis, crossing over, ancestry, STR

54. What is the best genetic marker to use when trying to see if two people are related?

1. STRs on the X chromosome
2. STRs on an autosome
3. STRs on the Y chromosome, if male relatives are available
4. coding regions on the X chromosome
5. only one specific gene, but it can be on any chromosome

Answer: C

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, X, Y, meiosis, crossing over, ancestry, STR

55. Tracing a paternal line of inheritance usually involves

* 1. sequencing the entire Y chromosome.
  2. sequencing five or more coding regions on one autosome.
  3. sequencing five or more coding regions on different autosomes.
  4. STR analysis of the Y chromosome.
  5. STR analysis of regions on at least ten different autosomes.

Answer: D

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Know It

Difficulty: Easy

Important Words/Concepts: inheritance, STR, Y chromosome

56. You wish to determine if a male child is the descendant of your grandfather. However, your grandfather is only known to have had daughters. The best strategy is to

1. compare the child’s X chromosome with the X chromosome of your grandfather’s sister.
2. compare the child’s Y chromosome with the X chromosome of your grandfather’s sister.
3. compare the child’s X chromosome with the X chromosome of your grandfather’s brother.
4. compare the child’s Y chromosome with the Y chromosome of your grandfather’s brother.
5. Because your grandfather only had daughters, there is no way to test such a relationship.

Answer: D

DQ: How do chromosomes determine sex, and how does sex influence the inheritance of certain traits?

Type: Use It

Difficulty: Easy

Important Words/Concepts: inheritance, STR, Y chromosome

57. An example of incomplete dominance is

1. hair color.
2. wavy hair.
3. blue eyes.
4. height.
5. color blindness.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: incomplete dominance and phenotype

58. How much wavy protein is expressed in people with curly hair, compared with people with wavy hair?

1. twice as much
2. a single amount
3. half the amount
4. four times as much
5. none

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: incomplete dominance and phenotype

59. Hair texture is a result of

1. multifactorial inheritance.
2. codominance.
3. incomplete dominance.
4. a single gene affecting many traits.
5. many genes affecting one trait

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** incomplete dominance and phenotype

60. A man with curly hair has three children with a woman who has straight hair. What type of hair will their children have?

* + 1. 100% will have straight hair
    2. 25% will have wavy hair
    3. 100% will have curly hair
    4. 50% will have curly hair
    5. 100% will have wavy hair

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:incomplete dominance

61. You are trying to breed a crop that has a sweeter fruit and are working on one particular gene. In repeated trials, when you cross a very sweet variety with a slightly sweet variety, you consistently get medium-sweet fruit. What is happening?

*Answer:* This is an example of incomplete dominance, where the heterozygous condition has its own phenotype that is midway between the other phenotypes (in this case, medium sweet is between slightly sweet and very sweet).

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:incomplete dominance

62. You have a white flower and you know it is homozygous for the flower color gene, and you have a red flower that is also homozygous for flower color. When you cross these, 100% of the offspring are pink. Explain this, using a Punnett square. What kind of inheritance pattern is being exhibited?

*Answer:* This is an example of incomplete dominance, where the heterozygous condition has its own phenotype, in this case, pink.

CA = white CB = red

|  |  |  |
| --- | --- | --- |
|  | CA | CA |
| CB | CA CB | CA CB |
| CB | CA CB | CA CB |

CA CB = pink

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: incomplete dominance

63. You have a white flower and you know it is homozygous for the flower color gene, and you have a red flower that is also homozygous for flower color. When you cross these, 100% of the offspring are pink. Now, you cross these pink offspring. What percentage of their progeny will be pink? Explain this, using a Punnett square.

*Answer:* This is an example of incomplete dominance, where the heterozygous condition has its own phenotype, in this case, pink.

CA = white CB = red

|  |  |  |
| --- | --- | --- |
|  | CA | CA |
| CB | CA CB | CA CB |
| CB | CA CB | CA CB |

CA CB = pink

CA CB × CA CB

|  |  |  |
| --- | --- | --- |
|  | CA | CB |
| CA | CACA | CA CB |
| CB | CA CB | CBCB |

25% will be white CACA, 25% will be red CBCB, and 50% will be pink CACB.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: incomplete dominance

64. You cross a red flower with a white flower, and all the seeds result in pink flowers. This is an example of

1. codominance.
2. incomplete dominance.
3. multiple allele inheritance.
4. multifactorial inheritance.
5. polygenic inheritance.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:incomplete dominance, inheritance

65. If red flower color (R) is incompletely dominant to white flower color (r), then what is the genotype of pink flowers?

1. RR
2. rr
3. Rr
4. The genotype depends on the genotype of a modifier gene.
5. The genotype cannot be determined.

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** incomplete dominance, inheritance

66. Codominance is when

1. one allele masks the effect of the other in the phenotype.
2. both alleles contribute equally to the phenotype.
3. an intermediate phenotype is expressed in the heterozygote.
4. more than one gene contributes to the phenotype.
5. the environment contributes to the phenotype.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:codominance, phenotype and inheritance

67. An example of a codominant trait is

1. Rh factor.
2. wavy hair.
3. type AB blood.
4. height.
5. color blindness.

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:codominance, phenotype and inheritance

68. The universal donor blood group MOST in demand during catastrophic times is

1. type A, Rh negative.
2. type O, Rh positive.
3. type AB blood, Rh negative.
4. type O, Rh negative.
5. type AB, Rh positive.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:codominance, phenotype and inheritance

69. ABO blood type inheritance is an example of

1. incomplete dominance.
2. polygenic inheritance.
3. X-linked recessive alleles.
4. codominance.
5. Y-linked recessive alleles.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:codominance

70. You have a gene with alleles X, Y, and Z, and you know that these are codominant alleles. You cross an individual that is homozygous X with an individual that is homozygous Z. What phenotypes will the offspring of this cross express?

1. phenotypes of X and Z, equally
2. a phenotype between Z and X
3. phenotype Y
4. phenotype X
5. phenotype Z

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:codominance

71. Hair texture is an example of incomplete dominance. A person who is homozygous dominant for the *H* gene has curly hair. What genotype would someone with wavy hair have?

1. *HH*
2. *hh*
3. *HHhh*
4. *Hh*
5. *HHHH*

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

72. Hair texture is an example of incomplete dominance. A person who is homozygous dominant *HH* has curly hair and they mate with a person who has straight hair (homozygous recessive *hh*). What percentage of their offspring will have wavy hair? (Draw a Punnett square to help you figure this out.)

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

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

73. Hair texture is an example of incomplete dominance. A person who is homozygous dominant *HH* has curly hair and they mate with a person who has straight hair (homozygous recessive *hh*). What percentage of their offspring will have straight hair? (Draw a Punnett square to help you figure this out.)

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

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

74. Hair texture is an example of incomplete dominance. A person who is homozygous dominant *HH* has curly hair and they mate with a person who has straight hair (homozygous recessive *hh*). What percentage of their offspring will have curly hair? (Draw a Punnett square to help you figure this out.)

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

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

75. A black dog is bred with a brown dog, and all the puppies have patches of black and brown. The coat color alleles for black and brown are an example of

1. **codominance.**
2. incomplete dominance.
3. multiple-allele inheritance.
4. multifactorial inheritance.
5. polygenic inheritance.

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: codominance, inheritance

76. Blood type (blood group plus the Rh factor) is an example of two types of inheritance patterns. These patterns are

1. codominance and incomplete dominance.
2. codominance and classic dominant/recessive inheritance.
3. incomplete dominance and classic dominant/recessive inheritance.
4. polygenic inheritance and incomplete dominance.
5. polygenic inheritance and classic dominant/recessive inheritance.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts**:** blood type, codominance, inheritance

77. For each of the following phenotypes, identify the type of inheritance pattern. Write C for codominant, DR for dominant and recessive, P for polygenic, or I for incomplete dominant:

1. \_\_\_\_ Rh negative
2. \_\_\_\_ Wavy hair
3. \_\_\_\_ Type AB blood
4. \_\_\_\_ Height
5. \_\_\_\_ Pink flowers from white and red flowered parents
6. \_\_\_\_ Eye color

*Answer:* A. DR; B. I; C. C; D. P; E. I; F. P

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts**:** codominance and incomplete dominance

78. How does codominance differ from incomplete dominance?

*Answer:* In incomplete dominance, the heterozygote is a separate phenotype midway between the two homozygous phenotypes. In codominance, the heterozygous condition completely expresses both phenotypes.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:codominance and incomplete dominance

79. A person who has a heterozygous genotype for a trait

1. will express both phenotypes of the gene if the trait exhibits codominance.
2. will only express the dominant phenotype, in all circumstances.
3. will express an intermediate phenotype if the trait exhibits incomplete dominance.
4. A and C
5. All of the above..

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts:chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous, codominance

80. Imagine you cross a red flower with a white flower. What will the offspring look like if red and white are incompletely dominant to each other? What will the offspring look like if red and white are codominant?

*Answer:* If red and white are incompletely dominant to each other, the offspring will be pink; if red and white are codominant, then the offspring will have patches of red and patches of white.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:codominance, incomplete dominance, inheritance

81. Which of the following best describes blood type O negative?

1. It is the universal recipient.
2. It is the universal donor.
3. It is the least common blood group.
4. It is the most common blood group.
5. It has the most surface markers.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood groups and transfusions

82. In O− blood, the “negative” means that there are no \_\_\_\_\_ surface markers.

1. A, B, or O
2. A
3. Rh
4. A or B
5. Rh, A, or B

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:blood groups and transfusions

83. A patient with an AB blood type can receive a transfusion from a donor with blood type \_\_\_\_\_\_\_ only.

1. AB
2. AB or O
3. AB, A, or O
4. AB, A, B, or O
5. AB, A, or B

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:blood groups and transfusions

84. A patient with an O blood type can receive a transfusion from a donor with blood type \_\_\_\_\_\_\_ only.

1. AB
2. O
3. AB, A, or O
4. AB, A, B, or O
5. AB, A, or B

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:blood groups and transfusions

85. People with type AB+ blood can receive blood from people with \_\_\_\_\_ blood type.

1. A+
2. O−
3. AB−
4. AB+
5. All of the above.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:blood types

86. People with blood type O− can donate blood to people with which blood type?

1. A+
2. O−
3. AB−
4. AB+
5. All of the above.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:blood types

87. Which blood type is known as the universal donor?

1. AB−
2. AB+
3. O−
4. O+
5. A and B

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood types

88. The letters for blood types represent

1. markers on the surface of blood cells.
2. types of hemoglobin in blood cells.
3. different shapes of red blood cells.
4. different types of white blood cells.
5. different shapes of white blood cells.

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts: blood types

89. You have a patient who needs a lot of blood. The patient is blood type A+. You have the following blood in stock. How many liters of blood can you give the patient before you will have to find other sources of blood?

|  |  |
| --- | --- |
| Blood type | Liters available |
| O+ | 2 |
| O− | 12 |
| A+ | 4 |
| A− | 4 |
| B+ | 10 |
| B− | 24 |
| AB+ | 30 |

A. 8

B. 14

C. 22

D. 46

E. 86

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood types

90. You have a patient who needs a lot of blood. The patient is blood type A+. How many types of blood can this patient accept?

1. 1
2. 2
3. 3
4. 4
5. 8

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** blood types

91. You have a patient who needs a lot of blood. The patient is blood type A−. How many different types of blood can this patient accept?

1. 1
2. 2
3. 3
4. 4
5. 8

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood types

92. A woman who is blood type A gives birth to a child who is blood type O. The child’s father is blood type O. Which of these three is heterozygous for blood type? Explain.

*Answer:* To be blood type O, you have to have two copies of the allele for O. Alleles A and B code for chemicals on the blood surface; O is the lack of surface markers. The mother expresses blood type A, but her child has no A markers, so the mother must be heterozygous with one allele for A and one allele for O.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood types

93. A woman with blood type A and a man with blood type O have three children. The children’s blood types are A, O, and AB. Which of these cannot be the man’s biological child?

*Answer:* The child that is AB cannot be the man’s child. He can only contribute an O and the mother can contribute an A or an O. The B had to be from a different male parent.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: blood types

94. Why is matching blood type important?

*Answer:* Blood type is based on markers on the surface of the blood and the body’s immune system does not recognize any markers that are not on the individual’s own blood cells. So, if you do not have marker A and you receive A blood, this triggers an immune response.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood types

95. You have a patient who needs a lot of blood. The patient is blood type A+. You have the following blood in stock. How many liters of blood can you give the patient before you will have to find other sources of blood? Explain.

|  |  |
| --- | --- |
| Blood type | Liters available |
| O+ | 2 |
| O− | 12 |
| A+ | 4 |
| A− | 4 |
| B+ | 10 |
| B− | 24 |
| AB+ | 30 |

*Answer:* A person who is A+ can accept A−, A+, O−, and O+ blood. They cannot accept any blood with a B. So, you will need more blood after using up 22 liters, including the 2 liters of O+, 12 liters of O−, 4 liters of A+, and 4 liters of A−.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: blood types

96. A person with the AB blood type expresses which markers on their red blood cell surface?

1. only A
2. only B
3. A and B
4. They have no markers on their cell surface.
5. They have A, B, and O markers on their cell surface.

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, blood type, marker

97. A person with the AB blood type recognizes which of the following blood types as foreign?

1. only A
2. only B
3. A and B
4. O
5. They do not recognize any blood types as foreign.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, blood type, marker

98. A person with the O blood type recognizes which of the following blood types as foreign?

1. only A
2. only B
3. A and B
4. O
5. They do not recognize any blood types as foreign.

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, blood type, marker

99. A person with the blood type A can donate to which types? And receive blood from which types?

A. only A; only A

B. A and AB; only A

C. A, AB, and O; A, AB, and O

D. A and AB; A, AB, and O

E. A and AB; A and O

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, blood type, marker

100. A man with AB blood type marries a heterozygous woman with blood type A. They have children. What percentage of their offspring would have blood type O? (Draw a Punnett square to help you figure this out.)

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

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

101. A person with B blood type marries someone with blood type A. They have children. What is the LARGEST percentage of their offspring that could have blood type O, if both parents are heterozygotes? (Draw a Punnett square to help you figure this out.)

1. 0%
2. 25%
3. 50%
4. 75%
5. We don’t have enough information to answer this.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: chromosomes, incomplete dominance, genotype, phenotype, homozygous, heterozygous

102. The universal recipient for all blood types is

1. negative.
2. positive.
3. AB negative.
4. AB positive.
5. AB negative or positive.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: blood type, codominance, inheritance

103. If you have type A negative blood, you can donate blood to people with all the following blood types, EXCEPT

* + - 1. A negative.
      2. A positive.
      3. AB negative.
      4. AB positive.
      5. O negative.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:blood type, codominance, inheritance

104. A child is born with O blood, but the mother is unsure of the father. The mother has type O blood. One potential father has type A blood, and the other potential father has type O blood. Based on this information, can you determine paternity? Why or why not?

*Answer:* Paternity cannot be determined given this information because the man with type A blood may still carry a type O allele and therefore could have passed this O allele to the child.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:blood type, codominance, inheritance

105. A child is born with O negative blood. Both the mother and the father have O positive blood, and they are concerned that the hospital gave them the wrong child. Should they be concerned? Why or why not?

*Answer:* No, they do not need to be concerned because the Rh factor is inherited in a dominant/recessive fashion. Both parents may be heterozygous for the Rh factor, and they may both have passed on the Rh negative allele to their child.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts**:** blood type, codominance, inheritance

106. Which is NOT an example of a polygenic trait?

1. Rh factor
2. eye color
3. skin color
4. height
5. These are ALL polygenic traits.

Answer: A

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:polygenic and multifactorial inheritance

107. Multifactorial inheritance includes what factors in addition to multiple genes interacting?

1. diet
2. environment
3. general health
4. amount of exercise
5. All of the above.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:polygenic and multifactorial inheritance

108. If we drew a graph for a trait exhibiting polygenic inheritance, the graph would be

1. a straight line.
2. a bell curve.
3. J-shaped.
4. S-shaped.
5. U-shaped.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: polygenic and multifactorial inheritance

109. Skin tone is based on the amount of melanin present in the human skin. The huge range of skin tones is related to the fact that at least three genes are involved in determining the amount of melanin you inherit. During our lives, our bodies are exposed to sources of ultraviolet radiation, which leads to DNA damage in skin cells. One response to this damage is the production of extra melanin, leading to tanning of the skin. Based on this knowledge, is the amount of melanin in skin cells polygenic, multifactorial, or both?

*Answer:* It is both. It is polygenic because more than one gene is involved in determining the amount of melanin. It is multifactorial because an environmental condition (UV exposure) can increase melanin amounts.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts:polygenic, multifactorial

110. Which of the following types of inheritance can be directly affected by the environment?

1. polygenic
2. incomplete dominance
3. complete dominance
4. multifactorial
5. recessive inheritance

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, multifactorial inheritance, incomplete dominance, environment

111. Which of the following types of inheritance CANNOT be accurately predicted using a Punnett square?

1. polygenic
2. incomplete dominance
3. complete dominance
4. multifactorial
5. recessive inheritance

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts: chromosomes, codominance, multifactorial inheritance, incomplete dominance, environment, Punnett square

112. Skin color is controlled by six separate genes, making the inheritance of skin color a good example of

1. codominance.
2. incomplete dominance.
3. multiple-allele inheritance.
4. multifactorial inheritance.
5. polygenic inheritance.

Answer: E

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts:inheritance, polygenic

113. Imagine that twins are separated at birth. One is raised speaking only English, while the other is raised in a bilingual household and speaks both English and Spanish. Years later, the twins meet and decide to learn French together. The bilingual twin has a remarkably easy time learning French, while the other twin struggles. This difference may be explained by

A. codominance.

B. incomplete dominance.

C. multiple-allele inheritance.

D. multifactorial inheritance.

E. polygenic inheritance.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:inheritance, multifactorial

114. A shorter form of the allele for serotonin transporter protein has been linked to \_\_\_\_\_\_\_\_ in humans.

1. alcoholism
2. drug abuse
3. anxiety disorder
4. seizure disorder
5. All of the above.

Answer: C

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: Alleles affect phenotype.

115. Testosterone is a hormone that causes the development of masculine characteristics. What do you think would happen to the development of a male child who had a mutation in the gene that coded for testosterone receptors so that the receptor no longer responded properly to testosterone?

*Answer:* If the testosterone receptors no longer responded to testosterone, then the male child would have underdeveloped male characteristics, such as underdeveloped reproductive organs. In severe cases, the male child may actually appear to be female.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: allele, phenotype

116. In addition to a genetic component, some human disorders like depression have been linked to

1. diet.
2. sleep patterns.
3. drug abuse.
4. stressful events.
5. disease.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: environmental impacts on phenotype

117. Up to 40% of human height can be attributed to environmental rather than genetic factors; thus, we call height inheritance

1. polygenic.
2. codominant.
3. recessive.
4. multifactorial.
5. dominant.

Answer: D

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Easy

Important Words/Concepts: multifactorial

118. Hydrangea plants have a gene that codes for having flower color or having no flower color. For those plants that do have flower color, the exact color depends on the amount of aluminum in the plant: they are pink or red when little aluminum is present and blue when aluminum is present. Plants take up more aluminum in acidic soils, so a plant with red flowers can be turned into a plant with blue flowers by lowering the pH of the soil. This is an example of \_\_\_\_\_\_ inheritance.

1. polygenic
2. multifactorial
3. recessive
4. codominant
5. dominant

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: amino acids

119. Explain how programs like Women with Infants and Children (WIC) that focus on prenatal and early-childhood nutrition can have an impact on phenotype.

*Answer:* Nutrition during developmental stages is important. Your DNA is what you CAN be, not what you WILL be. Providing adequate nutrition allows children to develop at the maximum of their genetic capability.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts**:** childhood nutrition

120. A study was conducted among the Yaqui people in Mexico. The Yaqui who had migrated to the valley adopted Westernized agriculture, including use of pesticides and herbicides. Those who remained in the hills maintained a lower-impact form of agriculture. When the children of these two groups were examined, those in the valley had lower memory and hand-eye coordination and slower mental development than those in the hills. Yet these children were from closely related families, many of them being first cousins. Explain how they could be so different. What type(s) of inheritance might be involved?

*Answer:* The environment has many impacts on the expression of multifactorial inheritance. The children exposed to various toxins in their environment were not attaining their full genetic potential.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Hard

Important Words/Concepts: multifactorial inheritance

121. “If you have a genetic predisposition to a disease, such as cancer, you will eventually get it.” Is that a true statement?

A. Yes, eventually you will get the disease.

B. It is not necessarily true; it may be dependent on the environment.

C. Yes it is true, especially if the disease is multifactorial.

D. Yes, if one of your parents had the disease, you will have it.

E. None of the above.

Answer: B

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:chromosomes, multifactorial inheritance, environment

122. Name the two primary factors that determine a person’s phenotype, and discuss how they interact to influence that phenotype.

*Answer:* Both genetics and the environment determine a person’s phenotype. Genetics provides the realm of possibilities, while the environment modifies how those possibilities are expressed.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Know It

Difficulty: Hard

Important Words/Concepts:environment, genetics, phenotype

123. Alleles of several genes have been linked to antisocial behaviors such as criminal activity, alcoholism, and drug abuse. Imagine twins fathered by a man who spent most of his life in and out of jail for assault and battery, and struggled with drug addictions. One twin is raised in a home by parents who have similar antisocial behaviors and a long record of arrests. The other twin is raised by parents who have never been arrested and who actively participate in community outreach programs. Do you think both children are at the same risk of developing drug addictions at age 16? Why or why not?

*Answer:* The child raised by antisocial parents is likely to have a higher risk of developing a drug addiction at age 16 than the child raised by parents who are active in their community. Although they have the same genetics, the environment in which they were raised will likely influence their future behaviors.

DQ: Some traits are not inherited in simple dominant or recessive inheritance patterns. What are some complex inheritance patterns?

Type: Use It

Difficulty: Easy

Important Words/Concepts:environment, genetics, phenotype

124. Nondisjunction or failure of chromosomes to separate can occur

1. during mitosis of sex cells.
2. during meiosis I or II of sperm or egg cells.
3. during meiosis I only of sperm or egg cells.
4. during meiosis II of sperm or egg cells.
5. during meiosis I or II in egg cells only.

Answer: B

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts:nondisjunction in meiosis

125. A karyotype from a person with Down syndrome would show

1. three copies of chromosome 20.
2. nondisjunction of the sex chromosomes.
3. three copies of chromosome 21.
4. three copies of chromosome 22.
5. one copy of chromosome 21.

Answer: C

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts: nondisjunction in meiosis

126. Aneuploidy is the result of

1. mutation.
2. chromosomal damage.
3. chromosomal deletions.
4. nondisjunction.
5. radiation therapy.

Answer: D

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts: nondisjunction in meiosis

127. A heart muscle cell of a person with Down syndrome has \_\_\_\_\_chromosomes.

1. 24
2. 23
3. 52
4. 46
5. 47

Answer: E

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts: Down syndrome

128. The rate of aneuploidy \_\_\_\_\_ as the age of the mother increases.

*Answer:* increases

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Hard

Important Words/Concepts: aneuploidy

129. Nondisjunction that occurs only in meiosis I can result in cells with

1. 47 or 45 chromosomes.
2. 47, 46, or 45 chromosomes
3. 24, 23, or 22 chromosomes.
4. 24 or 22 chromosomes.
5. None of the above.

Answer: D

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts:chromosomes, nondisjunction, meiosis

130. Nondisjunction that occurs only in meiosis II can result in cells with

1. 47 or 45 chromosomes.
2. 47, 46, or 45 chromosomes.
3. 24, 23, or 22 chromosomes.
4. 24 or 22 chromosomes.
5. None of the above.

Answer: C

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts:chromosomes, nondisjunction, meiosis

131. If a human zygote is aneuploid, it has

1. fewer than 46 chromosomes.
2. more than 46 chromosomes.
3. exactly 46 chromosomes.
4. fewer or more than 46 chromosomes.
5. fewer, more than, or exactly 46 chromosomes.

Answer: D

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts: aneuploid, chromosome, meiosis

132. Chromosomes are numbered based on their size, such that chromosome 1 is the largest and chromosome 22 is the smallest. Do you think a child with a nondisjunction of chromosome 1 is more or less likely to survive than a child with a nondisjunction of chromosome 22? Explain your answer.

*Answer:* A child with a nondisjunction of chromosome 1 is less likely to survive than a child with a nondisjunction of chromosome 22 because chromosome 22 is small and has fewer genes than chromosome 1. Therefore, fewer proteins will be affected, and the child has a higher chance of survival.

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts:aneuploid, chromosome, meiosis, nondisjunction

133. If a nondisjunction occurs during meiosis I,

1. none of the four resulting cells will be aneuploid.
2. one of the four resulting cells will be aneuploid.
3. two of the four resulting cells will be aneuploid.
4. three of the four resulting cells will be aneuploid.
5. all four resulting cells will be aneuploid.

Answer: E

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts:aneuploid, chromosome, meiosis, nondisjunction

134. If a nondisjunction was going to occur and you could choose for it to happen in either meiosis I or meiosis II, which would you choose and why? Which one is likely to have a better outcome?

*Answer:* A nondisjunction occurring in meiosis II is preferred over a nondisjunction in meiosis I because if the nondisjunction occurs during meiosis I, then all four resulting cells are aneuploid. But if it occurs during meiosis II, then only two of the four resulting cells are aneuploid, and there is a possibility that the child will have a normal number of chromosomes.

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts: aneuploid, chromosome, meiosis, nondisjunction

135. Explain why the incidence of aneuploidy increases as a woman’s age increases.

*Answer:* All of a woman’s eggs are formed by the time of birth, and they are paused during meiosis I. When a female reaches reproductive age, each month an average of 1 egg will continue the process of meiosis, but the older the woman is, the older the egg is and the longer it has been paused during meiosis. The longer the pause is, the more likely that it will have mistakes when finishing meiosis.

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Hard

Important Words/Concepts:aneuploidy

136. A karyotype is

1. a diagram depicting the inheritance pattern of a disease allele within a family.
2. a chart showing your detailed genetic makeup.
3. DNA stripped of all its proteins.
4. a diagram of all chromosomes in a cell.
5. your blood group.

Answer: D

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts: amniocentesis and karyotyping

137. Why is amniocentesis usually performed?

1. to detect fetal abnormalities by karyotyping
2. to detect problems with the placenta
3. to determine the sex of the fetus
4. to determine if gene therapy is indicated
5. to assess the risk of premature birth

Answer: A

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts:amniocentesis and karyotyping

138. How can liquid from the amniotic sac tell you anything about the DNA of the developing child?

*Answer:* Amniotic fluid contains cells from the fetus.

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts:amniocentesis

139. The fluid around a fetus can be used to

1. determine the age of a fetus.
2. create a karyotype.
3. determine the sex of a fetus.
4. detect placenta abnormalities.
5. B and C.

Answer: E

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Easy

Important Words/Concepts:chromosomes, amniocentesis, karyotype, fetus

140. A karyotype

1. will always show 46 chromosomes.
2. will always show 23 chromosomes
3. can be made from the mother’s skin cells to help determine whether her child has too many or too few chromosomes.
4. will show you exactly which genes are mutated.
5. can be made using amniotic fluid to detect chromosomal abnormalities.

Answer: E

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Hard

Important Words/Concepts: chromosomes, amniocentesis, karyotype, fetus

141. Amniocentesis is

1. the removal of fluid from the womb.
2. the removal of tissue from the placenta.
3. the chromosomal analysis of cells.
4. a listing of the alleles present at each gene.
5. a listing of the physical characteristics.

Answer: A

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Know It

Difficulty: Easy

Important Words/Concepts:amniocentesis, chromosome, karyotype

142. What are some of the reasons a couple may decide to have amniocentesis performed?

*Answer:*

The mother or father may be older than 35 years and may be worried about birth defects due to their age.

There may be a family history of birth defects.

A couple may wish to know if they should prepare for a disabled child.

A couple may wish to terminate the pregnancy if there are genetic abnormalities.

DQ: How do numerical abnormalities of chromosomes occur, and what are the consequences of these abnormalities?

Type: Use It

Difficulty: Easy

Important Words/Concepts: amniocentesis, chromosome, karyotype