Chapter 3: Genetics: From Genotype to Phenotype

Multiple Choice Questions

1. Early researchers such as Mendel and Bateson learned about inheritance _____.

a. by looking at the genes themselves
b. by replicating small sequences of DNA
c. by studying human traits
d. by observing animal and plant traits

Correct Answer: d
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Moderate
Skill Level: Understand the Concepts

2. Bateson used _____ to understand Mendel's principles.

a. rabbits
b. moths
c. flies
d. pea plants

Correct Answer: b
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Remember the Facts

3. A gene that contains information important to initiating transcription is a _____ gene.

a. structural
b. regulatory
c. coding
d. phenotype

Correct Answer: b
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Understand the Concepts

4. Structural genes _____.

a. regulate a person's physical structure
b. are surrounded by regulatory regions
c. are always species-specific
d. only carry mutations that do not affect the phenotype

Correct Answer: b
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
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Difficulty Level: Moderate
Skill Level: Understand the Concepts

5. In many cases, the _____ is given by the interaction of the _____ with environmental stressors.

a. genotype; phenotype
b. allele; regulatory region
c. phenotype; genotype
d. protein; genotype

Correct Answer: c
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Moderate
Skill Level: Apply What You Know

6. Which of the following best defines the term *genotype*?

a. the actual alleles an organism carries
b. the physical expression of an organism's genes
c. the role the environment plays in gene expression
d. an organism's haploid gametes

Correct Answer: a
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Understand the Concepts

7. The observable physical features of an organism comprise its _____.

a. genotype
b. phenotype
c. allele frequency
d. recessive allele

Correct Answer: b
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Understand the Concepts

8. A recessive allele _____.

a. needs to be present on only one chromosome to be expressed
b. is never expressed
c. needs to be present on both chromosomes to be expressed
d. occurs as a regulatory gene only

Correct Answer: c
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Understand the Concepts

9. An allele that needs to be present on only one chromosomal locus to be expressed is called a _____ allele.

a. recessive
b. structural
c. dominant
d. phenotypic

Correct Answer: c
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Easy
Skill Level: Understand the Concepts

10. If the allele for type O blood is recessive and the allele for type A blood is dominant, a person with a A and O alleles would have type _____ blood.

a. A
b. O
c. AO
d. OA

Correct Answer: a
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Moderate
Skill Level: Apply What You Know

11. The pea plants Mendel studied were ideal because they display _____ for several independent traits.

a. blended inheritance
b. no variation
c. dominant alleles
d. dichotomous variation

Correct Answer: d
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

12. Blended inheritance was the hereditary theory that _____ considered as the most likely during his research.

a. Watson
b. Crick
c. Lyell
d. Darwin

Correct Answer: d
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

13. Mendel undertook his pea plants experiments even though he was a _____.

a. monk
b. politician
c. farmer
d. trucker

Correct Answer: a
Learning Objective: Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Remember the Facts

14. In Mendel's experiments, the F_1 generation _____.

a. was a mating of two lines that were true-breeding
b. had a 3:1 ratio in the expression of the original parental lines
c. revealed dominant and recessive traits
d. was a mating of different species

Correct Answer: a
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

15. Which of the following was a characteristic of Mendel's F_2 generation?

a. it had a 3:1 ratio in the expression of the original parental lines
b. dominant and recessive traits were blended
c. it was a mating of four lines that were true-breeding
d. it exhibited the traits of hybrid plants

Correct Answer: a
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

16. The "unit factors" mentioned in Mendel's postulates correspond with which biological unit?

a. alleles
b. cells
c. entire DNA strands
d. chromosomes

Correct Answer: a
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

17. Mendel found that when an individual has two different unit factors responsible for a characteristic, _____.

a. that characteristic was not expressed
b. only the allele from the father was expressed
c. the factor that is expressed is dominant
d. only the allele from the mother was expressed

Correct Answer: c
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Easy
Skill Level: Understand the Concepts

18. Which of the following best describes *Mendel's Law of Segregation*?

a. dominant alleles suppress recessive alleles
b. inheritance is governed by discrete particles
c. segregating pairs of unit factors assort independently
d. chromosomes randomly segregate into sex cells

Correct Answer: d
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

19. Dihybrid cross experiments were essential to _____.

a. Mendel's Law of Segregation
b. Mendel's Law of Independent Assortment
c. discovering the particulate nature of inheritance in general
d. discovering the nature of dominant and recessive alleles

Correct Answer: b
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Apply What You Know

20. *Mendel's Law of Independent Assortment* indicates that _____.

a. dominant alleles suppress recessive alleles
b. inheritance is governed by discrete particles
c. segregating pairs of unit factors assort independently
d. chromosomes randomly segregate into sex cells

Correct Answer: c
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Easy
Skill Level: Understand the Concepts

21. *Linkage* refers to _____.

a. genes that are on the same chromosome
b. alleles that appear on different chromosomes but are linked to the same trait
c. several traits that are linked to the same genes
d. the correlation of biological and cultural traits

Correct Answer: a
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Easy
Skill Level: Understand the Concepts

22. The closer genes are to each other on a chromosome _____.

a. the more likely they are to be separated due to crossing over
b. the less likely they are to be separated due to crossing over
c. the more likely they are to be linked in mitosis
d. the less likely they are to be linked

Correct Answer: b
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Difficult
Skill Level: Apply What You Know

23. Mutations during meiosis are especially important because they _____.

a. are usually lethal
b. tend to occur in regulatory genes
c. are inherited
d. are more common

Correct Answer: c
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

24. Mutations in _____ are much more critical.

a. non-coding regions
b. structural genes
c. introns
d. RNA

Correct Answer: b
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

25. A point mutation occurs when _____ is changed.

a. a single gene
b. an allele pair is changed
c. an intron is changed
d. a single base in a gene

Correct Answer: d
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

26. Which of the following is true of sickle cell disease?

a. it shortens the life span of red blood cells
b. it is protective against typhoid fever
c. it affects the white blood cells
d. it only affects adults

Correct Answer: a
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

27. An autosomal recessive disease occurs when an individual is _____.

a. heterozygous for a dominant, disease-causing allele
b. codominant for a recessive, disease-causing allele
c. homozygous for a dominant, disease-causing allele
d. homozygous for a recessive, disease-causing allele

Correct Answer: d
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Difficult
Skill Level: Understand the Concepts

28. Because sickle cell anemia is an autosomal recessive disease, there is a _____ % chance that the child of two carriers will have the disease.

a. 0
b. 25
c. 50
d. 100

Correct Answer: b
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Apply What You Know

29. Trinucleotide repeat diseases are caused by _____.

a. insertion mutations
b. autosomal recessive mutations
c. deletion mutations
d. point mutations

Correct Answer: a
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

30. Which of the following is caused by an insertion mutation?

a. sickle cell disease
b. Down's syndrome
c. Habsburg face
d. Huntington's disease

Correct Answer: d
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

31. An autosomal dominant disease occurs when an individual is _____.

a. heterozygous for a dominant deleterious allele
b. codominant for a recessive deleterious allele
c. homozygous for a recessive beneficial allele
d. homozygous for a deleterious allele

Correct Answer: a
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

32. Huntington's disease is an example of a _____.

a. disease caused by exposure to second hand smoke
b. genomic deletion
c. trinucleotide repeat disease
d. disease common among African populations

Correct Answer: c
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

33. About half of the known trinucleotide diseases are characterized by _____ repeats.

a. CAG
b. GA
c. ATA
d. GCA

Correct Answer: a
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Difficult
Skill Level: Remember the Facts

34. The vast majority of mutations are probably _____.

a. good
b. bad
c. neutral
d. fatal

Correct Answer: c
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

35. Mutations often have little phenotypic effect because _____.

a. they often occur in non-coding regions
b. codon changes are usually deleterious
c. protein synthesis is not linked to DNA
d. they are often beneficial

Correct Answer: a
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

36. Of the 22nd pair of chromosomes, the _____.

a. Y is larger in size
b. X is larger in size
c. size is equal
d. size varies

Correct Answer: b
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

37. Because X-linked disorders are essentially _____, they will only appear in the _____ sex.

a. autonomic recessive disorders; homogametic
b. autonomic dominant disorders; homogametic
c. autonomic recessive disorders; heterogametic
d. autonomic dominant disorders; heterogametic

Correct Answer: c
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Difficult
Skill Level: Apply What You Know

38. The non-X-linked disorder below is _____?

a. red-color blindness
b. green-colorblindness
c. Huntington's disease
d. hemophilia

Correct Answer: c
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

39. DNA changes are categorized as insertion, point, and _____mutations.

a. revision
b. deletion
c. additive
d. collateral

Correct Answer: b
Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Easy
Skill Level: Understand the Concepts

40. _____ variation lends itself to Mendelian explanations.

a. Phenotypic
b. Qualitative
c. Phylogenic
d. Quantitative

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

41. Quantitative variation refers to _____.

a. rare variations
b. non-overlapping phenotypic variants
c. monogenic traits
d. continuous variation for a given trait

Correct Answer: d
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Easy
Skill Level: Understand the Concepts

42. Traits that occur as a continuum in a population are likely to be due to _____.

a. X-linked disorders
b. polygenic inheritance
c. single gene effect
d. the effects of pollutants

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Analyze It

43. Polygenic traits _____.

a. are usually caused by single genes
b. are easily explained by Mendelian genetics
c. appear as a continuum in a population
d. are very rare in humans

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Easy
Skill Level: Understand the Concepts

44. *Pleiotropy* is best defined as _____.

a. one gene, one effect
b. one gene having multiple phenotypic effects
c. heritability
d. the effect of the environment on gene function

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Easy
Skill Level: Understand the Concepts

45. The twin method is a way of investigating _____.

a. the role of the environment on trait expression
b. the role of differential selection
c. the role of negative selection
d. the role of convergent evolution

Correct Answer: a
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

46. A significantly higher concordance rate for a trait in monozygotic twins indicates that _____ may be important in the expression of that trait.

a. the environment
b. pleiotropy
c. genetic factors
d. the house in which the twins were raised

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Apply What You Know

47. Heritability is a _____.

a. direct measure of a specific gene's contribution to the expression of a trait
b. general population statistic used to characterize genotypic influence on trait expression
c. direct measure used to characterize environmental influence on trait expression
d. way to determine if twins are monozygotic or dizygotic

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Easy
Skill Level: Understand the Concepts

48. Which group consistently scores highest on IQ tests?

a. Caucasian Americans
b. African Americans
c. Asian Americans
d. Native Americans

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Remember the Facts

49. With regards to IQ tests, heritability scores only apply _____.

a. within a population
b. among populations
c. within a sex category
d. within a specific social class

Correct Answer: a
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

50. A misapplication of Mendelian genetics is _____.

a. eugenics
b. progenics
c. in vitro fertilization
d. stem cell research

Correct Answer: a
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

51. Certain artifacts from the Adena people have been interpreted as observations of phenotypic traits, such as _____.

a. obesity
b. anorexia
c. dwarfism
d. sickle cell disease

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

52. Eugenics is thought to have been a guiding principle for the _____.

a. Romans
b. Greeks
c. Nazis
d. Vikings

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

53. A 1920s public presentation of Mendelian genetics would emphasize _____.

a. the dangers of evolution
b. the dangers of mating with "abnormal" people
c. Darwin's ideas of natural selection
d. ideas of blending inheritance

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Apply What You Know

54. The Eugenics movement has frequently been employed against _____.

a. recent immigrants
b. the 'upper class'
c. the elderly
d. Germanic people

Correct Answer: c
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Remember the Facts

55. Encouraging the educated upper classes to procreate was an example of _____.

a. positive eugenics
b. negative eugenics
c. natural selection
d. positive selection

Correct Answer: a
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

56. The popularity of the eugenics movement waned in the United States _____.

a. by the 1920s
b. after WWII
c. in the late twentieth century
d. before WWII

Correct Answer: d
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Remember the Facts

57. The symptoms of phenylketonuria include _____.

a. macrocephaly
b. characteristic gait and stance
c. hyperpigmentation
d. blood clumping in capillaries

Correct Answer: b
Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Understand the Concepts

58. The effects of the phenylketonuria allele _____.

a. can be combated with dietary regulation
b. are immediately fatal
c. pose no threat to infants
d. are more dangerous in adults

Correct Answer: a
Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Understand the Concepts

59. From a gene's perspective, the "environment" is made up mainly of _____.

a. nutritional factors
b. factors such as air temperature and atmospheric gasses
c. body temperature
d. other genes

Correct Answer: d
Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Understand the Concepts

60. Phenylketonuria is caused by _____.

a. a single point mutation
b. a dominant allele
c. environmental factors such as diet
d. a recessive allele

Correct Answer: d
Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Understand the Concepts

True/False Questions

61. Regulatory regions are likely to play a stronger role than structural genes in creating variations between related species.

a. True
b. False

Correct Answer: a
Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Moderate
Skill Level: Understand the Concepts

62. Mendel's work supported the blended nature of inheritance.

a. True
b. False

Correct Answer: b
Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Easy
Skill Level: Understand the Concepts

63. One gene can have multiple phenotypic effects.

a. True
b. False

Correct Answer: a
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Easy
Skill Level: Understand the Concepts

64. Determining heritability provides direct insight into individual genetic mechanisms.

a. True
b. False

Correct Answer: b
Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Understand the Concepts

65. Nutritional intervention can completely suppress the effects of the phenylketonuria allele.

a. True
b. False

Correct Answer: a
Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Understand the Concepts

Essays

66. Explain the difference between structural and regulatory genes. What is the role of regulatory genes in creating variation between related species?

Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
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Difficulty Level: Moderate
Skill Level: Understand the Concepts

67. Explain the mechanics of the ABO blood system. What is the relationship between genotype and phenotype within this system? Be sure to include the terms *recessive, dominant,* and *codominant.*

Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Difficult
Skill Level: Understand the Concepts

68. Using obesity as an example, explain the complex relationship among genes, environments, and phenotypes.

Learning Objective: LO 3.1: Compare and contrast genotype and phenotype using the examples of the ABO blood type system and the biological basis of obesity.
Topic: From Genotype to Phenotype
Difficulty Level: Moderate
Skill Level: Apply What You Know

69. Outline and explain Mendel's postulates.

Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Moderate
Skill Level: Understand the Concepts

70. Using a Punnett square, illustrate and explain the F_2 generation of Mendel's pea experiments.

Learning Objective: LO 3.2: Describe Mendel's experiments on the garden pea and how they formed the basis of his genetic laws and postulates.
Topic: Mendelian Genetics
Difficulty Level: Difficult
Skill Level: Apply What You Know

71. Using specific examples, explain the difference between *autosomal recessive* and *autosomal dominant* disorders.

Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Moderate
Skill Level: Understand the Concepts

72. Citing examples, explain how some mutations can have deleterious effects while others may be neutral, emphasizing the role of the environment.

Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Difficult
Skill Level: Apply What You Know

73. Please characterize the role of advantageous mutations in evolutionary terms.

Learning Objective: LO 3.3: Recognize the different types of mutations, and discuss their importance for genetic disease and as a source of variation for natural selection to act upon.
Topic: Mutation
Difficulty Level: Difficult
Skill Level: Analyze It

74. Discuss the concept of heritability. How might twin studies help us determine heritability?

Learning Objective: LO 3.4: Summarize how scientists can measure the relative contributions of genetics and the environment to produce phenotypes. Compare and contrast: pleiotropy/polygenic traits, qualitative variation/quantitative variation.
Topic: Genetics Beyond Mendel
Difficulty Level: Moderate
Skill Level: Analyze It

75. What is phenylketonuria and how is it inherited? Explain how phenylketonuria is as much a result of environment as it is of genetics.

Learning Objective: LO 3.5: Summarize how phenylketonuria serves to illustrate the relationship between genotype and phenotype.
Topic: Phenylketonuria: Illustrating Mendelian and Post-Mendelian Concepts
Difficulty Level: Moderate
Skill Level: Apply What You Know