Test Bank for Dynamic Child 2nd Edition by Manis

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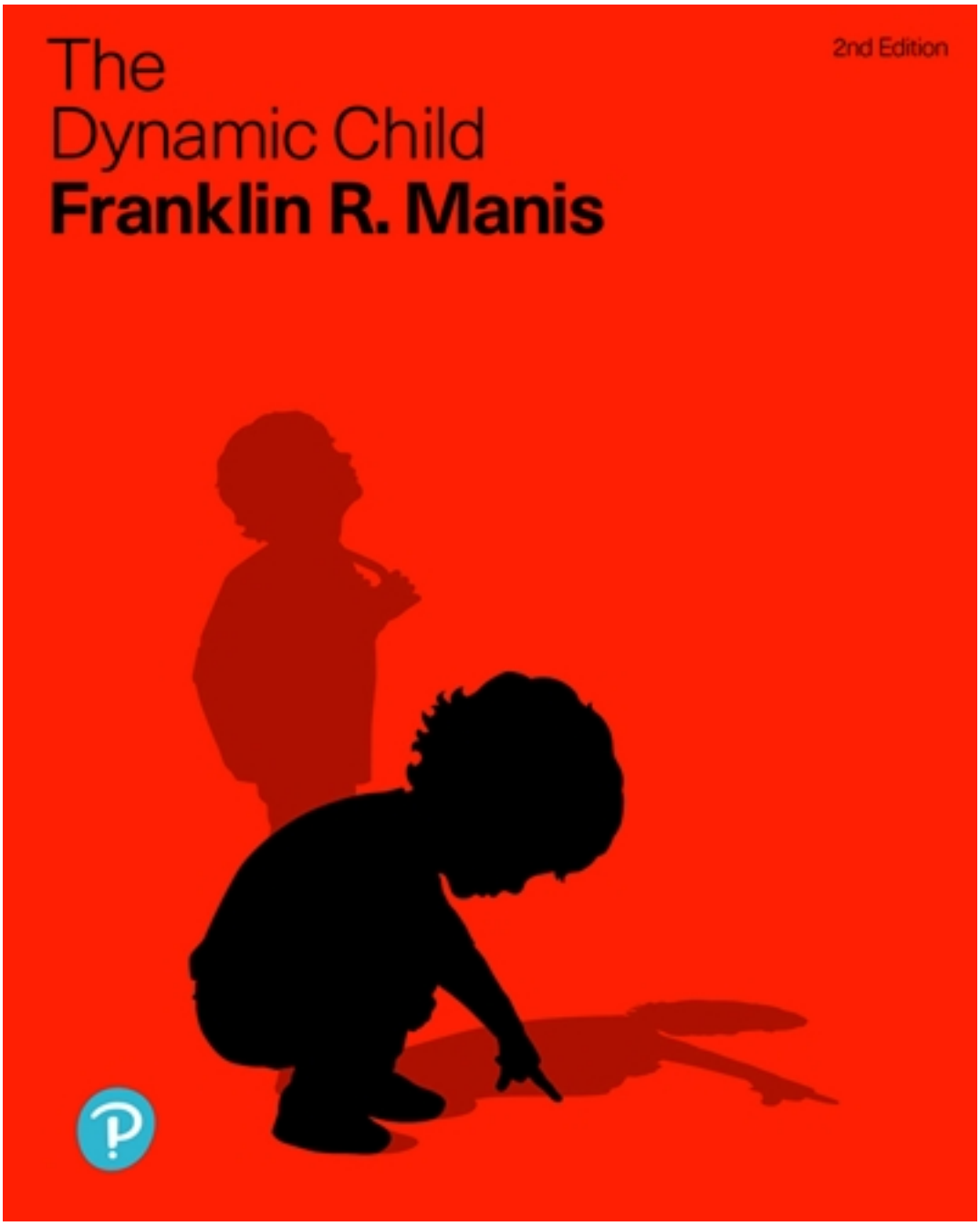

Test Bank

TOTAL ASSESSMENT GUIDE

Chapter 2 Heredity and Environment

Learning Objectives	Remember the Facts	Understand the Concepts	Apply What You Know	Analyze It
2.1.1: Explain the four major functions of genes.	1, 3–6	2	83	91
2.1.2: Explain how genes get passed from generation to generation and produce variability in human development.	7, 8, 12, 16		9, 14, 15, 17, 84, 92, 93	10, 11, 13
2.1.3: Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.	18, 20, 21	22	19, 94	
2.1.4: Describe the cause and the main characteristics of two instances of chromosomal errors.	23, 24, 26, 28, 29	25, 30	27, 85, 95	
2.1.5: Describe what genetic counselors do to help prospective parents consider whether to have a child.	31			32
2.2.1: Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.	33–37, 40		38, 39, 86, 97, 98	41, 96, 99
2.2.2: Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.	42, 44, 46	43, 48, 49	45, 47, 50, 87	100
2.2.3: Explain limitations involved in estimating hereditary and environmental influences on behavior.				51, 52, 101

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Learning Objectives	Remember the Facts	Understand the Concepts	Apply What You Know	Analyze It
2.3.1: Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.	53, 55	54, 56, 57	58–60, 88, 89, 102	
2.3.2: Explain how scientists obtain evidence for gene–environment interactions in humans.		61, 62		63, 103
2.3.3: Describe evidence from animal and human studies about how environments influence gene expression.	65, 67	64, 66, 68	104	105
2.4.1: Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.	69, 74, 75	70–72, 76	73, 106	
2.4.2: Explain how the influences of different levels of the external environment might be studied, using the example of obesity.	79	77, 78, 81, 82	80, 90, 107, 108	

Chapter 2: Heredity and Environment

Multiple-Choice Questions

1. A _____ is a segment of DNA that serves as a template for making one or more proteins.
    a. gamete
    b. gene
    c. phenotype
    d. chromosome

Answer: b
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

2. The 23 pairs of chromosomes in every human being are stored in _____.
    a. the master cell
    b. the RNA
    c. the brain
    d. every bodily cell

Answer: d
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

3. The basis of the genetic code in all living things is the _____.
    a. sequence of chemical bases in DNA
    b. types of proteins contained in the DNA
    c. arrangement of chromosomes in the cell
    d. pattern in which the DNA strand coils

Answer: a
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

4. The process by which cells divide and multiply is _____.
    a. mitosis
    b. meiosis
    c. DNA
    d. unknown to scientists

Answer: a
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

5. The type of cell division that occurs only in men's and women's reproductive cells is called _____.
    a. gametes
    b. the genetic code
    c. meiosis
    d. mitosis

Answer: c
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

6. The name for reproductive cells is _____.
    a. meiosis
    b. proteins
    c. gametes
    d. mitosis

Answer: c
Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

7. A(n) _____ is an alternate form of a gene—generally one comes from the mother and one comes from the father.

a. phenotype
b. genotype
c. allele
d. polygenic inheritance

Answer: c
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

8. The _____ is the observable trait or disease in an individual, influenced by genotype and environment.
a. phenotype
b. allele
c. X chromosome
d. Y chromosome

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

9. Kara has red hair, and Nora has dark brown eyes. These descriptions represent the _____.
a. phenotype
b. allele
c. genotype
d. Y chromosome

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

10. Two people with curly hair (a dominant trait) are wondering how likely it is that their first child will have curly hair. A geneticist determines that they are both heterozygous for curly hair (meaning they have one dominant and one recessive allele each). She tells them the probability of their first child having curly hair is about _____ percent.

a. 100
b. 75
c. 50
d. 25

Answer: b
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.3 Describe applications of psychology.

11. Huntington's disease _____.

a. can only be passed on if both parents have the allele for the disease
b. can be passed on if one or the other parent has the allele for the disease
c. can only be passed on if one parent has begun to show symptoms of the disease
d. will not be passed on if one parent has the allele for the disease and the other does not

Answer: b
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

12. The majority of genetic disorders involve _____ traits.

a. unknown
b. dominant
c. chromosomal
d. recessive

Answer: d
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

13. A woman who is a carrier of the disease PKU and a man who is also a carrier have a child. What are the child's chances of actually having the disease?

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

Answer: c
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.3 Describe applications of psychology

14. Color blindness runs in Shari's family. She just found out that she is pregnant with a boy. Shari is concerned that her baby may be color-blind because color blindness is more likely to occur in _____.

a. females because they have two X chromosomes
b. females because the effects of any genetic disorder are stronger for them
c. males because the Y chromosome does not have a corresponding allele to counteract the color-blindness allele on the X chromosome
d. males because the effects of any genetic disorder are stronger for them

Answer: c
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

15. Pat has one X chromosome and one Y chromosome. Therefore, Pat is a(n) _____.

a. male
b. female
c. PKU carrier
d. example of X-linked inheritance

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

16. _____ refers to traits or disorders influenced by the combined effects of more than one gene.
    a. Polygenic inheritance
    b. Down syndrome
    c. Fragile X syndrome
    d. X-linked

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

17. Seo-yun is one of four children. Her mother is short, and her father is tall. In all likelihood, when they are grown, Seo-yun and her siblings will have heights _____.
    a. like her mother
    b. in an intermediate range between the heights of her parents
    c. like her father
    d. all precisely in the middle between her mother's height and her father's height

Answer: b
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

18. Gene _____ is the extent to which a gene can perform its functions of regulating other genes or producing proteins used in the body.
    a. expression
    b. meiosis
    c. mitosis
    d. inheritance

Answer: a
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Easy
Skill Level: Remember the Facts

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

19. Patricia has fragile X syndrome, in which a gene on her X chromosome _____.
    a. functions normally
    b. is found only in females
    c. is silenced
    d. is damaged, affecting locomotion

Answer: c
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

20. In fragile X, deficient levels of the FMRP protein affect which of the following?
    a. height
    b. executive functions of the brain
    c. color blindness
    d. the ability to roll the tongue

Answer: b
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

21. Studies of brain functioning, cognition, and behavior in children with fragile X syndrome reveal that the pathway from genes to behavior _____.
    a. involves atypical brain development but not atypical cognitive functioning
    b. involves atypical aspects of both brain development and cognitive functioning
    c. is influenced more by the environment than by alterations in brain development
    d. involves atypical cognitive functioning but not atypical brain development

Answer: b
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Moderate
Skill Level: Remember the Facts

APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

22. Who is most likely to experience extreme effects of fragile X syndrome?
    a. males
    b. females
    c. Males and females are equally likely to experience extreme effects.
    d. It is unknown if males or females experience extreme effects.

Answer: a
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

23. Of the following, which is the most common source of cognitive disabilities?
    a. chromosomal errors
    b. the absence of an extra chromosome
    c. single-gene disorders
    d. exposure to radiation

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

24. Chromosomal errors generally occur during the process of _____.
    a. mitosis
    b. meiosis
    c. protein synthesis
    d. pregnancy

Answer: b
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

25. The absence of chromosomes or presence of extra chromosomes in a fetus usually results in _____.
    a. death of the fetus
    b. a normal baby of either gender
    c. a boy
    d. a girl

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

26. Having an infant with Down syndrome is more common if _____ is older.
    a. the mother, but not the father,
    b. the father, but not the mother,
    c. more than one sibling
    d. the mother or the father

Answer: d
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

27. Down syndrome is caused by _____.
    a. a missing chromosome
    b. two X chromosomes
    c. an extra 21st chromosome
    d. the presence of an X and a Y chromosome

Answer: c
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

28. Down syndrome is associated with _____.
    a. typical cognitive development
    b. heart conditions
    c. typical motor development
    d. typical physical development

Answer: b
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

29. The most common type of biologically based mild to moderate intellectual disability is _____.
    a. Down syndrome
    b. fragile X syndrome
    c. Klinefelter syndrome
    d. PKU

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

30. The symptoms of Klinefelter syndrome result from _____.
    a. heart conditions
    b. progressive dementia
    c. low testosterone levels
    d. intellectual disability

Answer: c
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

31. The role of a _____ includes helping potential parents consider genetic risks for disorders in their offspring.
    a. social worker
    b. mental health counselor
    c. genetic counselor
    d. psychologist

Answer: c
Learning Objective: 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.
Topic/Concept: Genetic Counseling
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

32. In genetic science, having a susceptibility gene _____.
    a. determines whether a person will develop a genetic disorder or not
    b. indicates that a person has an increased likelihood for developing a particular genetic disorder
    c. accounts for a large portion of the susceptibility to a particular disorder
    d. eliminates the influence of the environment on the likelihood of developing a genetic disorder

Answer: b
Learning Objective: 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.
Topic/Concept: Genetic Counseling
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.3 Describe applications of psychology.

33. _____ is a field in which scientists study genetic and environmental contributions to psychological and physical traits.
    a. Twin studies
    b. Behavior genetics
    c. Adoption design
    d. Social work

Answer: b
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts

APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

34. _____ is a research design in which the contributions of genes and environment are teased apart by comparing individuals who share 100 percent or 50 percent of their segregating genes.
    a. The twin design
    b. Heritability
    c. The adoption design
    d. Epigenesis

Answer: a
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

35. In a(n) _____, biological parents, their adopted-away children, and the adoptive parents and siblings are compared.
    a. twin design
    b. singleton design
    c. adoption design
    d. polygenic inheritance

Answer: c
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

36. Correlations for the IQ scores of identical twins raised in the same home _____ those for fraternal twins raised in the same home.
    a. are lower than
    b. cannot be compared to
    c. are the same as
    d. are higher than

Answer: d
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts

APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

37. The correlations for IQ scores of biologically related parents and children _____ those for adoptive parents and children.
    a. are higher than
    b. are lower than
    c. cannot be compared to
    d. are the same as

Answer: a
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

38. As identical twins, Kijana and Elroi share what percentage of their segregating genes?
    a. 25 percent
    b. 50 percent
    c. 75 percent
    d. 100 percent

Answer: d
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

39. As fraternal twins, Oscar and Frank share about _____ percent of their segregating genes.
    a. 10
    b. 20
    c. 50
    d. 90

Answer: c
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

40. The IQ scores of adoptive parents are correlated with their adopted children, which represents a(n) _____.
    a. genetic influence
    b. coincidence
    c. environmental influence
    d. design error

Answer: c
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

41. Identical twins reared apart still have substantial correlations between their IQ scores, suggesting a role for _____, but the correlations are lower than those recorded for identical twins reared together, suggesting a role for _____.
    a. environment; genes
    b. genes; genes
    c. genes; environment
    d. environment; environment

Answer: c
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

42. _____ is the proportion of variance in a trait that is due to variation in genes.
    a. Shared environment
    b. Heritability
    c. Non-shared environment
    d. Gene–environment correlation

Answer: b
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

43. An important insight to take from the data on heritability of different traits and disorders is that _____.
    a. traits tend to be heritable, but disorders are not
    b. disorders tend to be heritable, but traits are not
    c. most traits and disorders are moderately to strongly heritable
    d. very few traits and disorders are heritable

Answer: c
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

44. _____ refers to influences that make children and adults raised in the same circumstances similar.
    a. Shared environment
    b. Nurture
    c. Behavior genetics
    d. Non-shared environment

Answer: a
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

45. Timo, age 7, and Nora, age 9, had the same parents, rode the bus every day to the same school, and had their rooms at home across the hall from each other. These experiences represent the _____.
    a. non-shared environment
    b. genetic influence
    c. shared environment
    d. heritability estimate

Answer: c
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

46. Behavior geneticists use the term _____ to refer to influences that make children and adults raised in the same circumstances different.
    a. shared environment
    b. twin design
    c. direct index
    d. non-shared environment

Answer: d
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

47. Mina and Lee are siblings who live in the same home. Mina has played soccer since she was 3 years old, and Lee has played the piano since he was 4 years old. Playing soccer and taking piano lessons are differences that are examples of _____.
    a. genetic variation
    b. non-shared environment
    c. an adoption study
    d. shared environment

Answer: b
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

48. Adoption studies have shown that _____ children become _____ similar with age in general cognitive ability.
    a. genetically unrelated; more
    b. genetically identical; less
    c. genetically related; more
    d. genetically related; less

Answer: c
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

49. Twin studies show that some personality traits, such as antisocial behavior and religiousness, show _____ with age.
    a. increasing heritability
    b. decreasing heritability
    c. no change in heritability
    d. increasing shared environmental influences

Answer: a
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

50. Tonya and Tamika are raised by the same parents, but Tonya is adopted and Tamika is a biological child. Their level of general cognitive ability will likely show _____ with age.
    a. increasing similarity
    b. decreasing similarity
    c. no change in similarity
    d. increases in both cases

Answer: b
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

51. Children with PKU may show very different outcomes with and without exposure to phenylalanine in the diet. This demonstrates the role of _____.
    a. a genetic disorder
    b. gene–environment interaction
    c. heritability
    d. variable phenotypes

Answer: b
Learning Objective: 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
Topic/Concept: Limitations of Behavior Genetic Studies
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

52. Svetlana's parents grew up in Russia, with many food shortages. When they immigrated to the United States, there was plenty of food for Svetlana. Svetlana's parents were of average height, but Svetlana was much taller. Presumably her parents had genes that would have enabled them to be taller than they were if they'd had adequate nutrition. The difference in the heights of Svetlana and her parents illustrates how _____.

a. environments influence gene expression
b. gene expression and environments are unrelated
c. gene expression influences environments
d. environments have no effect on gene expression

Answer: a
Learning Objective: 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
Topic/Concept: Limitations of Behavior Genetic Studies
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

53. _____ refers to differences in experiences that are based in part on genetic variations among different people.

a. Epigenesis
b. Distal influence
c. Gene–environment correlation
d. Gene–environment interaction

Answer: c
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

54. In _____ gene–environment correlations, children inherit genotypes correlated with their family environment.

a. active
b. passive
c. evocative
d. epigenetic

Answer: b
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate

Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

55. The finding in Tucker-Drob & Harden's (2012) longitudinal twin study that child cognitive ability at age 2 predicted parental stimulation of the child at age 4, and that this relationship was largely a genetic one, based on analyses of twin data, provided evidence for _____.
    a. a gene–environment interaction
    b. environments influencing gene expression
    c. a passive gene–environment correlation
    d. an evocative gene–environment correlation

Answer: d
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

56. In _____ gene–environment correlations, people elicit different responses from the people in their environments on the basis of their genetic predispositions.
    a. active
    b. passive
    c. evocative
    d. epigenetic

Answer: c
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

57. In _____ gene–environment correlations, people seek out or create environments correlated with their genetic predispositions.
    a. active
    b. passive
    c. evocative
    d. epigenetic

Answer: a

Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

58. Zoe, age 2, likes to create music by hitting pots and pans with a spoon. Her mother decides that Zoe has musical ability, and so she enrolls Zoe in music classes. Assuming Zoe actually has genes predisposing her to musical talent, the example demonstrates the _____ gene–environment correlation.

a. active
b. passive
c. evocative
d. epigenetic

Answer: c
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

59. Antonio, an athletic and muscular boy, decides to play high school soccer. Assuming some of Antonio's athleticism has a genetic origin, this is example of a(n) _____ genetic–environment correlation.

a. active
b. passive
c. evocative
d. epigenetic

Answer: a
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

60. Twila and Jerome are actors. They enroll their daughter Marla in children's theater. This is an example of a(n) _____ genetic–environment correlation.

a. active
b. passive
c. evocative

d. epigenetic

Answer: b
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

61. In a study of adults, scientists found that those maltreated in childhood had the greatest likelihood of depression as adults if they had _____ serotonin transporter gene allele.
a. the short-long (heterozygous)
b. the long
c. the short-short (homozygous)
d. an unknown type of

Answer: c
Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Topic/Concept: Gene–Environment Interactions
Difficulty Level: Difficult
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

62. In the study by Caspi et al. (2003) discussed in the text, genetic testing of males who were followed from childhood into adulthood revealed that individuals with a genetic vulnerability in the serotonin transporter gene (the s/s genotype) were _____.
a. more likely than individuals without such a vulnerability (the l/l genotype) to be depressed as adults, regardless of the level of maltreatment in childhood
b. more likely than individuals without such a vulnerability (the l/l genotype) to be depressed as adults, but only when child maltreatment was likely to have occurred
c. equally likely to be depressed in adulthood as individuals without such a vulnerability (the l/l genotype) when both had a history of severe maltreatment
d. depressed from childhood through adulthood

Answer: b
Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Topic/Concept: Gene–Environment Interactions
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.3 Describe applications of psychology.

63. Many studies demonstrate interactions between a single gene and specific environmental factors. However, in the real world, the most common interactions probably take place between _____ of genes and _____ environments.
    a. large numbers; diverse
    b. small numbers; diverse
    c. small numbers; limited
    d. large numbers; limited

Answer: a
Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Topic/Concept: Gene–Environment Interactions
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

64. The experiment by Meaney and colleagues (Meaney, 2010; Weaver et al., 2004) on rats raised by nurturant and non-nurturant mothers concluded that early experience _____.
    a. cannot modify gene expression
    b. can modify gene expression if it starts before birth
    c. can modify gene expression
    d. has no impact on gene expression

Answer: c
Learning Objective: 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

65. _____ is a mechanism in which chemicals attached to the genes can turn gene expression on or off, based on input from other genes or from the environment.
    a. Epigenesis
    b. Distal influence
    c. Heritability
    d. Proximal influence

Answer: a
Learning Objective: 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.2 Develop a working knowledge of psychology’s content domains.

66. As an epigenetic mechanism, methyl groups _____.
    a. have no impact on the expression of genes
    b. alter the sequence of letters in the DNA code
    c. attach to DNA and reduce the expression of some genes
    d. are present in DNA due to rare mutations

Answer: c
Learning Objective: 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

67. Studies have found that life stress _____ is associated with higher degrees of methylation in genes involved in brain development.
    a. after age 5
    b. at any point in the life span
    c. never
    d. in the first four years of life

Answer: d
Learning Objective: 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 2.5 Incorporate sociocultural factors in scientific inquiry.

68. Which of the following statements about epigenetics is true?
    a. Epigenetic changes are only one of many ways that experience can modify DNA expression.
    b. Epigenetic findings are rejected by most developmental scientists because they contrast with traditional views of heredity and environment.
    c. Epigenetics has proven that there is no biological mechanism through which experiences can affect gene expression.
    d. Through over a century of research, epigenetics has contributed substantially to the body of developmental knowledge.

Answer: a
Learning Objective: 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Moderate
Skill Level: Understand the Concepts

APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

69. The _____ approach claims that the emergence of social smiling results from factors ranging from genetic activity to the social environment.
a. developmental systems
b. traditional nature–nurture
c. polygenetic inheritance
d. segregating gene

Answer: a
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 1.3 Describe applications of psychology.

70. According to Gottlieb, development is probabilistic, meaning that _____.
a. developmental systems are in place from birth
b. the environment does little to influence genetic expression
c. development is not influenced by any specific factor with certainty
d. epigenetic changes are the only way the environment influences genetic expression

Answer: c
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Difficult
Skill Level: Understand the Concepts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

71. In Gottlieb's developmental systems model, the influences of genetic and neural activity are _____.
a. deterministic of behavior
b. part of the species-typical rearing environment
c. bidirectional
d. indistinguishable

Answer: c
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

72. Gottlieb proposed that each species inherits not only species-typical genes, but also _____.
    a. the same environmental context
    b. a species-typical rearing environment
    c. species-atypical genes
    d. identical epigenetic factors

Answer: b
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

73. Abnormal development resulting from the experience of institutionalized children in Romania who remained in the institutions for 18 months or more could be attributed in Gottlieb's model to _____.
    a. genetic activity
    b. neural activity
    c. epigenesis
    d. a major alteration to the species-typical rearing environment

Answer: d
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

74. According to Gottlieb, the inevitability of development is _____.
    a. the fundamental principle of human development
    b. a result of genetically controlled maturation and a species-typical rearing environment
    c. a result primarily of genetically controlled maturation
    d. applicable to humans in all circumstances

Answer: b
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Moderate
Skill Level: Remember the Facts
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

75. The first environment in which genes begin functioning is _____.
    a. different cell types
    b. a single cell
    c. the womb
    d. a variety of chemicals

Answer: b
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

76. The developmental systems model is best thought of as a(n) _____.
    a. conceptual framework
    b. specific theory about development
    c. concept that no longer applies to developmental science
    d. complex theory that is quite easy to test

Answer: a
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

77. Because the problem of obesity has occurred across children as a group, _____.
    a. it is entirely due to genetic factors
    b. it should probably no longer be viewed as a problem
    c. it is entirely due to environmental factors
    d. it cannot be entirely due to genetic factors

Answer: d
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.3 Engage in innovative and integrative thinking and problem solving.

78. Explanations for the rise in childhood obesity using the bioecological model of development highlight the role of _____.

a. genetics
b. the environment
c. epigenetics
d. nutrition

Answer: b
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 2.3 Engage in innovative and integrative thinking and problem-solving.

79. _____ refer(s) to environmental influences that are not present in the child's immediate environment, but can have an effect through the immediate environment.
a. Proximal influences
b. Epigenesis
c. Distal influences
d. Adoption design

Answer: c
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Easy
Skill Level: Remember the Facts
APA Learning Objective: 1.3 Describe applications of psychology.

80. In Caleb's house, snacks are readily available, and this contributes to his weight gain. According to the bioecological model of development, snacks in the home are _____.
a. proximal influences
b. biological factors
c. distal influences
d. inevitable

Answer: a
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

81. A(n) _____ influence on eating habits is the large portion sizes sold by fast-food restaurants.

a. healthy
b. proximal
c. distal
d. epigenetic

Answer: c
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

82. The federal policies set to govern what children eat in school lunches represents a(n) _____ influence on eating habits.
a. healthy
b. proximal
c. distal
d. epigenetic

Answer: c
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Understand the Concepts
APA Learning Objective: 1.3 Describe applications of psychology.

Short-Answer Questions

83. How do boys and girls differ in their chromosomal makeup?

Answer: The ideal answer should include:
1. Boys have an X and a Y chromosome.
2. Girls have two X chromosomes.

Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Easy
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

84. How are genotype and phenotype different? Provide an example of each.

Answer: The ideal answer should include:

1. The genotype is a set of one or more genes of an individual, and the phenotype is the observable expression of those genes in a given environment of rearing, in terms of the person's physical and psychological makeup.
2. For example, the PKU genotype contains a recessive allele.
3. The phenotype of PKU varies depending on how much phenylalanine is present in the individual's diet.

Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

85. John has Down syndrome. What can we infer about his chromosomal makeup?

Answer: The ideal answer should include:

1. Down syndrome is caused by an extra 21st chromosome.
2. Therefore, we can infer that John has three copies of the 21st chromosome instead of the typical two copies.

Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

86. Kallie and Kaylie are identical twins. How are identical twins formed?

Answer: The ideal answer should include:

1. Identical twins are formed when two identical collections of cells in an early phase of development divide into two identical copies of the cells, both of which develop in the mother's womb.
2. Kallie and Kaylie formed from one zygote that divided into two identical copies.

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

87. Genie and Susie are siblings who are both interested in music and play in the school band. Behavior geneticists explain the similarities between these siblings in what two ways?

Answer: The ideal answer should include:

1. They explain it in terms of shared genes as well as a shared environment.

Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Easy
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

88. Explain what is meant by the transactions between genes and the environment. Provide an example to support your response.

Answer: The ideal answer should include:

1. Genes and the environment continuously work together to produce developmental change.
2. The example may include a gene–environment correlation, in which the child's genetic characteristics are associated with the child's environment.
3. For instance, a child born to very athletic parents may have a genetic predisposition that includes athletic talents and interests. The genetic predisposition may lead to the child being exposed to greater-than-average amounts of experience with sports.

Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

89. What are the sources of the passive gene–environment correlation? Provide an example to support your response.

Answer: The ideal answer should include:

1. The sources of the passive gene–environment correlation are parents, siblings, and other genetically related individuals who are also part of the child's home environment.
2. An example is that parents who are musically talented might enroll their children in music classes.

Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

90. From an evolutionary perspective, why have humans evolved to prefer foods that are sweet and foods with dietary fat?

Answer: The ideal answer should include:

1. When food was scarce, early humans needed to search for ripe fruits and vegetables, which would have a sweeter taste, and sources of protein and fat, such as nuts and meat.

2. These were necessary as sources of energy and in order to survive.

Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

Essay Questions

91. Compare and contrast the four major functions of genes.

Answer: The ideal answer should include:

1. Genes are used in four different processes that enable various functions critical to development.
2. Genes are used to make proteins. The DNA sequence is used as a template for making proteins in the cell.
3. Genes duplicate themselves. The DNA sequence is duplicated when a cell divides by mitosis, an essential process in the growth of the body.
4. Genes enable sexual reproduction. Each chromosome pair duplicates itself and gamete cells are formed containing one of each pair of chromosomes (23 total) in the sperm cell and the ovum. These combine during fertilization to produce a zygote with 46 chromosomes that mingle the father's and mother's DNA.
5. Genes are used to regulate other genes.

Learning Objective: 2.1.1 Explain the four major functions of genes.
Topic/Concept: The Nature of Chromosomes, Genes, and Sexual Reproduction
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

92. How does dominant-recessive inheritance work? Apply this to a specific example of dominant-recessive inheritance.

Answer: The ideal answer should include:

1. One of the two alleles is dominant in dominant-recessive inheritance. This means that the dominant allele is expressed, and the other allele is recessive.
2. Recessive alleles are expressed only when a child receives one recessive allele from each parent.
3. The text gives several examples of dominant-recessive inheritance patterns, including tongue rolling, dimpled cheeks, Huntington's disease, and PKU.

Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance

Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

93. Peter, a junior high school student, is color-blind. Why is Peter, a boy, more likely than a girl to be color-blind?

Answer: The ideal answer should include:

1. Color blindness is caused by a recessive allele on the X chromosome.
2. Boys have only one X chromosome, while girls have two.
3. Boys are more likely to be color-blind than girls because they only need inherit one allele on an X chromosome, whereas girls must inherit two recessive alleles.
4. The recessive allele on the X chromosome is expressed as color blindness in boys because there is no corresponding allele on the Y chromosome.

Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Topic/Concept: Patterns of Inheritance
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

94. Explain how genes affect behavior using the example of fragile X syndrome.

Answer: The ideal answer should include:

1. Genetic level: Fragile X occurs when a gene on the X chromosome is silenced due to a mutation. The gene thus fails to instruct the cell to assemble a particular protein known as FMRP that is used in building the brain.
2. Neural level: A brain deficiency of FMRP leads to reduced neural activity and widespread low-level impairment of brain areas involved in executive functions and other cognitive processes.
3. Cognitive level: Executive functioning, memory, speech, language, and spatial dysfunctions occur, leading to poorer performance on tests of these abilities.
4. Environmental level: The cognitive impairments affect the way the individual selects and responds to environmental stimuli.
5. Behavioral level: The individual has problems such as hyperarousal, lack of inhibitions of behavior, and social anxiety.

Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Topic/Concept: Understanding the Path from Genes to Behavior: Fragile X Syndrome
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

95. Describe the chromosomal basis of Down syndrome and the physical and behavioral characteristics of typical children with this disorder.

Answer: The ideal answer should include:

1. Down syndrome occurs when there is an extra 21st chromosome in the ovum, and an individual is born with three instead of two 21st chromosomes.
2. The physical characteristics include a shorter-than-average height, flattened face, protruding tongue, small ears and mouth, and distinctive eye shape.
3. Children have varying degrees of intellectual impairment resulting in slow development of motor, social, and cognitive skills.
4. Individuals with Down syndrome often suffer heart problems and have a shortened life span.

Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Topic/Concept: Chromosomal Errors
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

96. Compare and contrast how identical and fraternal twins are formed. Then, link this to the percentage of genetic similarity in each.

Answer: The ideal answer should include:

1. Identical twins are formed when two identical collections of cells in an early phase of development divide into two identical copies of the cells, both of which develop in the mother's womb.
2. Fraternal twins are formed when two separate ova are fertilized, both of which develop in the mother's womb.
3. Because identical twins are formed from one zygote that splits into two, they are 100 percent genetically similar. Because fraternal twins form from two separate ova, they are 50 percent genetically similar.

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 1.2 Develop a working knowledge of psychology's content domains.

97. Explain how the twin design is used to separate influences of genes and environment on human behavior. What types of conclusions can be drawn from the different types of twin designs?

Answer: The ideal answer should include:

1. Identical twins share 100 percent of their genes and fraternal twins only 50 percent.
2. In comparison studies, if identical twins are more similar on a given physical or psychological trait than fraternal twins, it provides evidence that genes make an important contribution to that trait.
3. Because the environments of identical twins may be more similar than those of fraternal twins, the twins reared apart design is an important method of examining

whether identical twins are still more similar than fraternal twins even when raised in different homes and cultural environments.

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

98. Explain how the adoption design is used to separate influences of genes and environment on human behavior. What types of conclusions can be drawn from an adoption study?

Answer: The ideal answer should include:

1. A comparison is made between the child's psychological traits and those of the adoptive parent, who shares no genes but raised the child, and the biological parent, who shares 50 percent of the child's genes but did not raise the child.
2. Conclusions that can be drawn include the relative role of genetics and the environment in development. For instance, increased similarity on a given trait between the biological parent and child indicates genetic influence. Increased similarity on a given trait between the adoptive parent and child indicates environmental influence.

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

99. Compare and contrast twin designs and adoption designs. What conclusions can be drawn from each design about the relative influence of genetics and the environment on development?

Answer: The ideal answer should include:

1. In twin designs, identical twins share 100 percent of their genes and fraternal twins only share 50 percent. In one type of twin designs, identical and fraternal twins who are reared in the same home are compared on various traits.
2. In comparison studies, if identical twins are more similar on a given physical or psychological trait than fraternal twins, it provides evidence that genes make an important contribution to that trait.
3. In some twin design studies, identical twins who are reared apart are compared to fraternal twins who are reared together. If identical twins who are reared apart are more similar to one another compared to fraternal reared together, the role of genetics is highlighted.
4. Because the environments of identical twins may be more similar than those of fraternal twins, the twins reared apart design is an important method of examining whether identical twins are still more similar than fraternal twins even when raised in different homes and cultural environments.

5. In adoption designs, a comparison is made between the child's psychological traits and those of the adoptive parent, who shares no genes but raised the child, and the biological parent, who shares 50 percent of the child's genes but did not raise the child.
6. A positive correlation between the biological parent and the child on a particular trait indicates a genetic influence. A positive correlation between the adoptive parent and child on a particular trait indicates an environmental influence.

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Topic/Concept: Using Family Resemblance to Study Heredity and Environment
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

100. Compare and contrast the concepts of heritability, shared environment, and non-shared environment. Why is the non-shared environment typically viewed as more influential in development compared to the shared environment?

Answer: The ideal answer should include:
1. Heritability is the proportion of variation on a trait within a population that is due to genetic variation.
2. Shared environment is part of the environmental variation—specifically, influences that make children or adults raised in the same environment more similar than people raised in different environments.
3. Non-shared environment refers to influences that make children or adults raised in the same general environment different from one another.
4. Some of these differences may also be due to error of measurement, which is indistinguishable from non-shared environmental influences.
5. The non-shared environment is typically viewed as more influential in development compared to the shared environment because the non-shared environment reflects different, individual experiences. These different experiences may help account for the individual differences seen in children, especially among children who grow up in the same home and thus also have many shared experiences.

Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Topic/Concept: Heritability and Shared and Non-Shared Environment
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

101. Describe the limitations to behavior genetics studies. How do these limitations impact the types of conclusions that we can draw from behavior genetics studies?

Answer: The ideal answer should include:
1. There are three limitations that are important to consider in behavior genetic studies:
2. Genes influence environments.

3. Gene–environment interaction occurs.
4. Environments influence gene expression.
5. The impact on conclusions drawn means that we must always consider the role of both the environment and genetics in understanding development. The constant, bidirectional processes that occur must always be considered when explaining development.

Learning Objective: 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
Topic/Concept: Limitations of Behavior Genetic Studies
Difficulty Level: Moderate
Skill Level: Analyze It
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

102. Explain and give examples of passive, evocative, and active gene–environment correlations.

Answer: The ideal answer should include:

1. A passive gene–environment correlation refers to a situation in which children inherit a genotype that is correlated with their family environment. For example, a child with genes predisposing him to be a strong reader also is likely to have more experiences with books because his parents carry similar genes and they provide experiences with books in the home environment.
2. An evocative gene–environment correlation refers to a situation in which individuals evoke reactions from other people on the basis of their genotype, thus changing the environment to be more consistent with their genotype. For example, a physically active child induces her parents to provide her with more exercise and experience with sports.
3. An active gene–environment correlation refers to a situation in which individuals seek out or create environments that are correlated with their genetic predispositions. For example, children who are more sociable seek out more occasions for interacting socially with peers or adults, and thus gain in social skills not only because of their genetic tendencies, but the altered environment they experience.

Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Topic/Concept: Gene–Environment Correlations
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

103. Describe research evidence for gene–environment interactions in human behavior. What types of conclusions can be drawn from these studies?

Answer: The ideal answer should include:

1. The two studies by Caspi and colleagues provide such evidence.
2. In Caspi et al. (2002), adults with low MAOA activity showed a larger effect of degrees of maltreatment in their earlier years on later antisocial behavior than individuals with high MAOA activity.

3. We could say that low MAOA activity is a genetic risk factor for negative effects of maltreatment on antisocial behavior, and high MAOA activity is a genetic protective factor for reduced effects of maltreatment on antisocial behavior.
4. In Caspi et al. (2003) adults with a short allele in the 5-HTT serotonin transporter gene showed a larger difference in rates of adult depression as a function of variations in severity of maltreatment in their earlier years than was the case for individuals with either a combination of long and short alleles or with two long alleles.
5. We could say that two long alleles were a protective genetic factor for negative influences of maltreatment on depression, and two short alleles were a genetic risk factor for negative effects of maltreatment on depression.
6. Conclusions from these studies support the role of genes and the environment in influencing developmental outcomes. Results from these studies demonstrate that genetic inheritance may put one at increased risk for maladaptive outcomes, provided that the individual has the requisite experience.

Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Topic/Concept: Gene–Environment Interactions
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

104. Describe how epigenetics works in the expression of genes. Then, apply this to explaining why the epigenetic profiles of identical twins may become less similar as they age.

Answer: The ideal answer should include:
1. Epigenesis is a mechanism in which chemicals such as methyl groups attach to the genes and can control where and when genes get expressed.
2. The DNA code itself is not altered. This occurs based on input from other genes, or from the environment.
3. Biologists and developmental scientists increasingly believe that environmental effects on gene expression may operate partly through epigenesis. There is some evidence that this may be the case.
4. Epigenetic profiles of identical twins may become less similar with age because as twins age, they may have fewer of the same environmental experiences. For instance, one twin may exercise regularly, and the other does not. One twin may begin smoking cigarettes, and the other does not.
5. These different experiences may lead to differences in the epigenetic profile between identical twins.

Learning Objective: 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 2.1 Use scientific reasoning to interpret psychological phenomena.

105. Describe evidence from animal and human studies that environments influence gene expression. What types of conclusions can be drawn from these studies?

Answer: The ideal answer should include:

1. Studies show that mother rats vary genetically in their tendency to lick and groom their offspring and engage in arched back nursing.
2. To determine whether differences in offspring behavior were due to genes or environment, the pups of nurturant mother rats were switched to the care of non-nurturant rats and vice versa (cross-fostering).
3. The results were that the type of mothering mattered more for the behavior of the pups than the genetic predispositions of the rats.
4. Studies of the baby rats' brains indicated that those raised by less nurturant mothers had reduced protein-making activity of genes controlling the brain's system for producing stress hormones.
5. One conclusion that can be drawn is that genetic expression can be modified by early experience. This means that the quality of the environment may have important implications for the offspring's behavior. In this case, environmental experience has the potential to modify the way that the brain functions, particularly in the management of the stress hormone response.

Learning Objective: 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
Topic/Concept: Environmental Influences on Gene Expression
Difficulty Level: Difficult
Skill Level: Analyze It
APA Learning Objective: 2.4 Interpret, design, and conduct basic psychological research.

106. Explain why development is viewed as probabilistic in Gottlieb's model. Despite this, why do most human beings develop motor and language skills in a similar way?

Answer: The ideal answer should include:

1. Development of a particular behavior is not determined with any certainty by any single factor (from among genetic, neural, cognitive, behavioral, and environmental influences).
2. If all of these factors push development in a particular direction, it is more likely to happen.
3. We do not see the probabilistic nature of development until one of the factors is strongly out of sync with the others. For example, in the Caspi study, genetically susceptible individuals had about the same levels of antisocial behavior and depression as less genetically susceptible individuals. However, when exposed to a grossly abnormal early environment (severe maltreatment), the genetically susceptible individuals were more likely than less susceptible individuals to have behavior problems and mental health issues.
4. Outcomes are probabilistic because both genes and environment play a role in development, and it is the particular combination that determines outcomes.
5. Gottlieb proposed that basic developmental outcomes (e.g., learning to walk and talk) are similar across human beings because development is a result of both species-typical

genes and a species-typical rearing environment, and most human beings are exposed to a species-typical rearing environment.

Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Topic/Concept: The Developmental Systems Framework
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.1 Describe key concepts, principles, and overarching themes in psychology.

107. Explain and give an example of proximal and distal influences on the trend for American children to be overweight or obese.

Answer: The ideal answer should include:

1. Distal influences are outside the immediate environment of the child. Examples include the tendency for fast-food restaurants to offer high-fat and high-sugar foods in large portions for an economical price and to give free refills of sodas.
2. Proximal influences are in the immediate environment of the individual. One family going to the restaurant may read the menu and choose lower-fat and lower-sugar items. In this family, the proximal influences overrode the distal influences of the type of menu.
3. Another family going to the restaurant might give in to their children's desire for higher-fat and higher-sugar content, and so the proximal influence tends to reinforce the distal influence of menu type.

Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Moderate
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

108. Explain and give an example of proximal and distal influences on the trend for American children to increasingly use technology.

Answer: The ideal answer should include:

1. Distal influences are outside the immediate environment of the child. Examples include the increasing role that technology plays at a macrosystem level, such as the influence of technology companies in influencing public policy or the increasing adoption of technology in education on the whole.
2. Proximal influences are in the immediate environment of the individual. In the child's home, proximal influences may include access to various forms of technology, from tablet/computer access in the home to the child having his or her own smartphone. In the school, the child may have access to laptops that are funded by technology companies and the teacher may use free educational software funded by technology companies.
3. In this example, the proximal and distal influences work together to support a child's use of technology.

Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Topic/Concept: Bioecological Systems Model
Difficulty Level: Difficult
Skill Level: Apply What You Know
APA Learning Objective: 1.3 Describe applications of psychology.

Revel Quizzes

The following questions appear at the end of each module and at the end of the chapter in Revel for *The Dynamic Child*, Second Edition.

Quiz: The Dynamic Gene

EOM Q2.1.1
Which of the following is the process in which a cell duplicates the DNA strand and divides into two cells?

a. mitosis
b. gene expression
Consider This: Gene expression refers to the extent to which a gene can perform its function. 2.1.1 Explain the four major functions of genes.
c. polygenic inheritance
Consider This: Polygenic inheritance refers to traits or disorders influenced by the combined effects of more than one gene. 2.1.1 Explain the four major functions of genes.
d. meiosis
Consider This: Meiosis is the division of reproductive cells into daughter cells containing only one strand of DNA. 2.1.1 Explain the four major functions of genes.

Answer: a
Learning Objective: 2.1.1 Explain the four major functions of genes.
Difficulty: Moderate
Skill: Remember

EOM Q2.1.2
For an individual to have the behavioral expression of the disorder PKU, the individual must inherit a recessive combination of alleles and _____.

a. be exposed to phenylalanine in the diet
b. a neurocognitive deficit
Consider This: PKU can cause neurocognitive deficits but is not caused by them. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
c. an X-linked trait
Consider This: PKU is not an X-linked trait like fragile X. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
d. be exposed to a negative social environment
Consider This: The social environment may modify a child's behavior but the actual PKU disorder is not caused by the social environment. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Difficulty: Moderate
Skill: Understand

EOM Q2.1.3
Fragile X is typical of genetic disorders in that it involves _____.

a. the silencing of a gene that is critical to normal development
b. building up of the X chromosome, causing it to block other chromosomes
Consider This: In fragile X syndrome, a portion of the X chromosome can break down. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
c. more severe effects in girls because they have two X chromosomes
Consider This: Girls with fragile X often show lessened effects of the disorder because they have a normal version of the fragile X gene on the unaffected chromosome. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
d. no noticeable effect on the patient's life, thus making it difficult to diagnose
Consider This: Although fragile X can vary in its expression (and hence severity) across individuals, in most people it leads to problems in development. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.

Answer: a
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Difficulty: Moderate
Skill: Remember

EOM Q2.1.4
When many genes act together, this is called _____.

a. polygenic
b. a phenotype
Consider This: A phenotype is an observable trait or disease shown by an individual, influenced in varying degrees by genotype and by environment. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
c. mitosis
Consider This: Mitosis is the process in which a cell duplicates the DNA strand and divides into two cells. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
d. meiosis
Consider This: Meiosis is the division of reproductive cells into daughter cells containing only one strand of DNA. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Difficulty: Moderate
Skill: Understand

EOM Q2.1.5
The increased risk of having a baby with Down syndrome is for mothers who are _____.

a. over the age of 35
b. between the ages of 25 and 34
Consider This: It is true that 80 percent of Down syndrome cases in the United States occur to mothers younger than 35, because they are more likely as a group to have babies. However, risks for an individual woman within this particular group are not as high as at other ages. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
c. between the ages of 18 and 24
Consider This: It is true that 80 percent of Down syndrome cases in the United States occur to mothers younger than 35, because they are more likely as a group to have babies. However, risks for an individual woman within this particular group are not as high as at other ages. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
d. white
Consider This: Down syndrome is not related to race or ethnicity. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Difficulty: Moderate
Skill: Remember

Quiz: Genes and Environment in Human Behavior

EOM Q2.2.1
One of the problems in determining the meaning of extremely high correlations of the cognitive ability scores of identical twins is that they share genes and a common environment. A design that gets around this limitation is _____.

a. the study of identical twins reared apart and reunited
b. the study of parents who raised their biological children
Consider This: A study of parents and biological children raised by the parents does not distinguish between genetic and environmental contributions to variation in cognitive ability. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
c. the study of fraternal twins reared apart
Consider This: Studying fraternal twins alone does not tease apart genes and environment, as they are no more genetically similar than any other set of biological siblings. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
d. an intervention attempting to raise the cognitive ability of twins
Consider This: Intervention studies can show whether environments can modify cognitive ability but do not provide an estimate of the relative roles of genes and environment in contributing to the variation in cognitive ability. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.

Answer: a
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Difficulty: Difficult
Skill: Understand

EOM Q2.2.2
Which of the following definitions corresponds to the term “segregating genes”?

a. genes that have different alleles and hence can produce variation among people
b. structures that contain the DNA strands
Consider This: Chromosomes are structures that contain the DNA strands. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
c. the fertilized ovum, containing the full complement of chromosomes from mother and father
Consider This: The zygote is the fertilized ovum, containing the full complement of chromosomes from mother and father. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
d. the particular combination of alleles present in an individual
Consider This: The genotype is the particular combination of alleles present in an individual. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.

Answer: a

Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Difficulty: Moderate
Skill: Remember

EOM Q2.2.3
The variability of IQ in children is found to be about half attributable to genetic differences. Approximately _____ is attributable to variation in shared environment, and _____ is attributable to variation in non-shared environment or error.

a. 25 percent; 25 percent
b. 64 percent; 62 percent
Consider This: These percentages reflect the heritability of the traits of sociability and activity-impulsivity. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
c. 22 percent; 50 percent
Consider This: These percentages reflect the heritability of the traits of processing speed and conservatism. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
d. 50 percent; 50 percent
Consider This: The heritability for IQ is estimated to be about 48 percent for adoption studies and 52 percent for twin studies. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.

Answer: a
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Difficulty: Difficult
Skill: Analyze

EOM Q2.2.4
Heritability of intelligence _____ with age, and the contribution of shared environment to variations in intelligence _____ with age.

a. increases; decreases
b. decreases; also decreases
Consider This: Heritability does not decrease with age. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
c. increases; also increases
Consider This: For most characteristics, the contribution of shared environment decreases. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
d. decreases; increases
Consider This: The developmental pattern in adoption studies indicates that genetically related children become more similar with age in general cognitive ability. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.

Answer: a

Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Difficulty: Moderate
Skill: Understand

EOM Q2.2.5
Children of immigrant parents who moved from a country in which nutrition was inadequate often grow up to be taller than their parents. But the taller parents among the immigrant group tend to have taller children. This indicates that _____.

a. without adequate nutrition, some genes affecting height might not get fully expressed
b. height is not heritable
Consider This: Height is estimated from twin studies to be about 90 percent heritable. 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
c. eating adequate amounts of food is a strong genetic trait
Consider This: Food availability is an environmental factor. 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
d. height is primarily influenced by environmental factors
Consider This: Height is estimated from twin studies to be about 90 percent heritable. 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.

Answer: a
Learning Objective: 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
Difficulty: Moderate
Skill: Apply

Quiz: Gene–Environment Transactions

EOM Q2.3.1
Passive gene–environment correlations are _____.

a. present from childhood and correlated with the family environment
b. those in which individuals seek out or create environments correlated with their genetic predispositions
Consider This: Active gene–environment correlations are those in which individuals seek out or create environments correlated with their genetic predispositions. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
c. present when a child is adopted into a family to which s(he) is not genetically related
Consider This: Passive gene–environment correlations can only occur if a child is raised by a biological parent. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
d. likely to increase between childhood and adulthood
Consider This: The evocative and active gene–environment correlations tend to increase between childhood and adulthood. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.

Answer: a
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Difficulty: Difficult
Skill: Analyze

EOM Q2.3.2
In the study by Tucker-Drob and Harden (2012), higher cognitive ability at age 2 was correlated with parents providing more cognitive stimulation at age 4, taking into account the parents' tendency to provide cognitive stimulation at age 2. This provides evidence for _____.

a. evocative gene–environment correlations
b. passive gene–environment effects
Consider This: Because the child's cognitive ability is thought to elicit parental stimulation in this study, this does not fit the definition of a passive gene–environment correlation. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
c. active gene–environment correlations
Consider This: Because the parents are providing stimulation in response to children's cognitive ability, and the child is not described as actively seeking out new experiences, this does not fit the definition of active gene–environment correlations. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
d. a pure environmental influence of parents on children
Consider This: The results of this study provided impressive support for the idea that child behavior and the environment influence each other bidirectionally over time. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.

Answer: a
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Difficulty: Moderate
Skill: Understand

EOM Q2.3.3
In the studies by Caspi and colleagues shown in Figures 2.6 and 2.7, gene–environment interaction occurred when levels of maltreatment were associated with different outcomes (in this case, antisocial behavior or depression) for children with different _____.

a. genotypes
b. gametes
Consider This: Gametes are the reproductive cells, e.g., sperm in males or ovum in females. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
c. personalities
Consider This: Children were not put into groups on the basis of personality. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
d. epigenomes
Consider This: The study presented no direct evidence that any of the effects in the study were effects of the environment on genetic expression through epigenetic mechanisms. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.

Answer: a
Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Difficulty: Moderate
Skill: Remember

EOM Q2.3.4
Experiments by Meaney and colleagues used a technique called cross-fostering to provide direct evidence that early experience can modify _____ in rats.

a. gene expression
b. selective breeding
Consider This: Selective breeding was used to develop the nurturant and non-nurturant strains of mother rats. 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
c. environment
Consider This: These studies dealt with the effect of environment on genes, not effects of experience on environments. 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
d. genotype
Consider This: The studies did not provide evidence that genotype (i.e., the DNA sequence) was altered by early experience. 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.

Answer: a

Learning Objective: 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
Difficulty: Moderate
Skill: Understand

EOM Q2.3.5
One mechanism by which experience can "get under the skin" is epigenesis, in which _____.

a. experiences influence chemical processes that control where and when genes get expressed
b. experience leads individuals to associate stressful experiences with certain stimuli through classical conditioning
Consider This: Epigenesis is a chemical response, not a psychological one. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
c. experiences lead individuals to injure themselves
Consider This: Epigenesis operates at the level of the DNA, rather than at the level of overt injury to the body. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
d. experience causes mutations in genes that control whether other genes are expressed
Consider This: Epigenesis does not involve a process of mutating DNA. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.

Answer: a
Learning Objective: 2.3.3 Describe evidence from animal and human studies that environments influence gene expression.
Difficulty: Difficult
Skill: Understand

Quiz: Developmental and Bioecological Systems Approaches

EOM Q2.4.1
In Gottlieb's model, the *probabilistic* aspect of development refers to the idea that the characteristics of organisms at any point in their development (such as the current status of brain development or behavior) _____.

a. are determined by genetic and environmental factors and the interaction of such factors, but not with absolute certainty
b. are determined by genetic mutations that are probabilistic
Consider This: Gottlieb's theory does not discuss the process by which genetic mutations occur. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
c. are completely determined by genes operating on brain development
Consider This: Gottlieb's theory proposes that influences on brain development go beyond simply genetic influences. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
d. are completely determined by the environment operating on behavior
Consider This: Gottlieb's theory is based on more than just environmental influences on behavior or brain development. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.

Answer: a
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Difficulty: Moderate
Skill: Understand

EOM Q2.4.2
According to the developmental systems model, normal or typical developmental sequences occur due to both the influences of species-typical genes and the influences of _____.

a. a species-typical rearing environment
b. atypical environmental influences
Consider This: Atypical environmental influences would tend not to produce normal or typical developmental sequences. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
c. the prenatal environment, but not the postnatal environment
Consider This: Environmental influences and interactions with other factors could occur at any point in development, not just the prenatal period. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
d. rare genetic disorders
Consider This: Gottlieb's model focused primarily on genes and environments that would commonly occur. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.

Answer: a
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.

Difficulty: Moderate
Skill: Understand

EOM Q2.4.3
Because of the relatively rapid increase in obesity (over the past 30 to 40 years), it is likely that the change stems mostly from changes in the _____.

a. environment or environmental contexts
b. genetic variation among people
Consider This: Although genes predispose some people to gain weight, the weight gain has occurred across children as a group, and hence cannot be due entirely to genetic factors. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
c. exosystems of families only
Consider This: Influences in multiple ecological systems are thought to underlie the rapid increase in obesity. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
d. microsystems of children only
Consider This: Influences in multiple ecological systems are thought to underlie the rapid increase in obesity. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.

Answer: a
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Difficulty: Easy
Skill: Understand

EOM Q2.4.4
Changes to fast-food restaurants (which now generally display the caloric content of items on the menu) would be considered a(n) _____ influence, whereas a parent who lets the child decide to select an extra-large helping of cheese would be considered a _____ influence.

a. distal; proximal
b. microsystem; macrosystem
Consider This: Changes to fast-food restaurants might be considered a macrosystem, or chronosystem, influence, whereas family eating habits are a microsystem influence. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
c. exosystem; macrosystem
Consider This: Fast-food restaurants are not an exosystem influence because they potentially affect the entire population, not just the child's family; family eating habits are part of the microsystem, not the macrosystem. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
d. genotypical; phenotypical
Consider This: Genotypes are the particular combinations of alleles present in an individual; phenotypes are the observable traits or diseases shown by an individual, influenced in varying degrees by genotype and environment. 2.4.2 Explain how the

influences of different levels of the external environment might be studied, using the example of obesity.

Answer: a
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Difficulty: Moderate
Skill: Understand

Chapter Quiz: Heredity and Environment

EOC Q2.1
The sex of the offspring is determined _____.
a. at fertilization by the 23rd chromosome pair
b. by genes located on several of the chromosomes
Consider This: Genes relevant to sex determination are only found on one chromosome pair. 2.1.1 Explain the four major functions of genes.
c. by which ovum (X or Y) the sperm penetrates
Consider This: The sperm, not the ovum, determines sex, because sperm can have an X or Y chromosome, but ova have only an X chromosome. 2.1.1 Explain the four major functions of genes.
d. by any of several sperm cells that simultaneously penetrate the ovum
Consider This: Only one sperm cell can penetrate each ovum. 2.1.1 Explain the four major functions of genes.
Answer: a
Learning Objective: 2.1.1 Explain the four major functions of genes.
Difficulty: Moderate
Skill: Remember

EOC Q2.2
When genes switch on or off during development, this specifically refers to _____.
a. whether they make proteins (on) or not (off)
b. whether there is a disorder (on) or not (off)
Consider This: Disorders can occur either when a gene is switched on or when it is switched off, but usually occur when a gene is switched off. 2.1.1 Explain the four major functions of genes.
c. whether they cause a disease (off) or not (on)
Consider This: Many diseases are caused by genes that are switched off, as in fragile X, but much of normal development depends on switching genes on and off at various points. 2.1.1 Explain the four major functions of genes.
d. whether they contain the correct DNA sequence inherited from the parent (on) or not (off)
Consider This: The DNA sequence inherited from the parents remains the same during development, but certain portions can be turned on or off. 2.1.1 Explain the four major functions of genes.
Answer: a
Learning Objective: 2.1.1 Explain the four major functions of genes.
Difficulty: Moderate
Skill: Understand

EOC Q2.3
A dominant gene for a disorder, such as the gene for Huntington's disease, _____.
a. can be inherited if only one parent carries the Huntington allele
b. can be inherited only from the father

Consider This: The Huntington's gene is located on chromosome 4, not 23, and hence is not classified as a sex-linked disorder. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
c. can be inherited only from the mother
Consider This: The Huntington's gene is located on chromosome 4, not 23, and hence is not classified as a sex-linked disorder. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
d. can be inherited only if both parents carry the gene
Consider This: Recessive disorders can be inherited only if both parents carry the gene, and the child inherits both recessive alleles, but this is not how dominant genes work. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Difficulty: Easy
Skill: Analyze

EOC Q2.4
The inheritance pattern in most single-gene disorders in human beings is _____.

a. recessive
b. dominant
Consider This: Dominant disorders such as Huntington's Disease are rare. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
c. X-linked
Consider This: Although some single-gene disorders (such as fragile X) are sex-linked, there are 22 other chromosomes on which single-gene disorders can be found, and hence most are on non-sex chromosomes. 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
d. via chromosomal errors
Consider This: Chromosomal errors can involve displacement or deletion of portions of chromosomes during the process of meiosis, and hence are not really inherited from the parent (meaning the disorder was not present in the parent's genetic line). 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.

Answer: a
Learning Objective: 2.1.2 Explain how genes get passed from generation to generation and produce variability in human development.
Difficulty: Difficult
Skill: Understand

EOC Q2.5
When an individual has a disorder, such as fragile X, but the effects of the disorder on the brain are lessened by some factor (such as the sex of the offspring—male or female), these are effects on _____.

a. gene expression
b. gene mutation
Consider This: Gene mutations affect the DNA sequence and can cause disorders such as fragile X, but this is not the term used to refer to lessening of the effects of these disorders. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
c. the DNA sequence
Consider This: The DNA sequence remains unchanged in the bodily cells of the organism during its lifetime. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
d. the environment
Consider This: Although the environment might be involved in lessening genetic effects, it is not the term used to refer to them. 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.

Answer: a
Learning Objective: 2.1.3 Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome.
Difficulty: Moderate
Skill: Analyze

EOC Q2.6
The most common cause of Down syndrome is an extra 21st chromosome _____.

a. in the ovum
b. in a parent older than 35
Consider This: Eighty percent of cases of Down syndrome occur with parents younger than 35 because they have more babies as a population than parents over 35. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
c. in a father over 35
Consider This: Older fathers may supply an extra 21st chromosome in a sperm cell, but this is not the most common source of Down syndrome. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
d. in the sperm cell
Consider This: The extra chromosome can come from an older father, but this occurs in only a small number of cases. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Difficulty: Easy
Skill: Remember

EOC Q2.7
Klinefelter syndrome, in which a male is born with an extra X chromosome, manifests itself typically as _____.

a. specific deficits in verbal, academic, attention, and motor skills
b. widespread, severe intellectual impairment

Consider This: Boys with Klinefelter syndrome tend to have specific, rather than global, intellectual impairment. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.

c. high estrogen levels, leading to feminization of the body

Consider This: Some of the physical characteristics of those with Klinefelter syndrome include enhanced breast development and female body fat distribution, but this is the result of low testosterone, not high estrogen levels. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.

d. low estrogen and high testosterone levels, which result in early development of male secondary sex characteristics

Consider This: Delayed puberty and infertility, symptoms of Klinefelter syndrome, are caused by low testosterone levels. 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.

Answer: a
Learning Objective: 2.1.4 Describe the cause and the main characteristics of two instances of chromosomal errors.
Difficulty: Moderate
Skill: Understand

EOC Q2.8
Genetic counselors help prospective parents and other individuals _____.

a. navigate a bewildering number of potential genetic tests and access what their family history and genetic test results might mean for a future offspring

b. make a decision based on the exact probability their child will have a serious medical or mental disorder

Consider This: Genetic counselors discuss possibilities and help individuals deal with possible risks. 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.

c. understand the laws of genetics, but leave counseling to psychologists

Consider This: Certified genetic counselors generally have a master's degree in their specialty, in addition to other training in biology and psychological counseling techniques. 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.

d. make use of new tools that allow a pinpoint diagnosis of disorders such as autism and schizophrenia in a child they may conceive

Consider This: Genetic counselors cannot make pinpoint diagnoses but discuss possibilities. 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.

Answer: a
Learning Objective: 2.1.5 Describe what genetic counselors do to help prospective parents consider whether to have a child.
Difficulty: Easy
Skill: Remember

EOC Q2.9
The pattern of findings in family studies (higher correlations for IQ scores among relatives that are genetically more similar) _____.

a. supports the influences of both genes and environment
b. generally supports a small role for environment in human psychological traits
Consider This: Behavior genetics studies generally find evidence of environmental contributions to variation in traits. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
c. reveals that neither genes nor environment strongly influence IQ
Consider This: The values of heritability for common traits and for major mental disorders are significant, and also leave room for environmental contributions to variation in psychological traits. Shared environment, for example, is estimated to account for about 25 percent of the variability in IQ in children. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
d. generally supports a small role for heredity in human psychological traits
Consider This: The upshot of several decades of twin and adoption studies is that virtually all psychological characteristics of interest have some degree of heritability. 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.

Answer: a
Learning Objective: 2.2.1 Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.
Difficulty: Difficult
Skill: Analyze

EOC Q2.10
Which term refers to the proportion of variation of a trait (such as IQ) within the population that can be attributed to variation in gene expression?

a. heritability
b. polygenic inheritance
Consider This: Polygenic inheritance refers to traits or disorders influenced by the combined effects of more than one gene and does not refer to a proportion of variance. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
c. gene expression
Consider This: Gene expression means the extent to which a gene can perform its function (of regulation of other genes or production of proteins used in the body). 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
d. segregating genes
Consider This: Segregating genes have different alleles and therefore can be inherited in different patterns from one person to another, but they do not provide any information about proportion of variance in a trait. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.

Answer: a

Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Difficulty: Easy
Skill: Remember

EOC Q2.11
In many developmental and mental disorders, the heritability is very high (between 70 percent and 90 percent). This means that _____.

a. there is still room for an impact of the environment
b. the shared environment makes up the remaining 10 to 30 percent
Consider This: Behavior geneticists break environmental influences into two broad categories: shared environment and non-shared environment. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
c. the non-shared environment generally makes up the remaining 10 to 30 percent
Consider This: Both shared environment and non-shared environment make contributions to most traits. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
d. the disorder is generally worse than disorders with lower heritability
Consider This: Heritability refers to the proportion of variance in a trait or disorder due to genes and has nothing to do with the severity of the disorder, which can depend on multiple genetic and environmental factors. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.

Answer: a
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Difficulty: Moderate
Skill: Understand

EOC Q2.12
In the Colorado Adoption Study, the correlation in adolescence between the IQ scores of biological parents and adopted-away children was _____ the correlation between adoptive parents and their adopted children.

a. higher than
b. the same as
Consider This: Correlations for adoptive parents and their adoptive children are small and decline over time. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
c. lower than
Consider This: Correlations for adoptive parents and their adoptive children are small and decline over time. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
d. much lower than
Consider This: Correlations for adoptive parents and their adoptive children are small and decline over time. 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.

Answer: a
Learning Objective: 2.2.2 Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.
Difficulty: Moderate
Skill: Remember

EOC Q2.13
A child who is adopted by parents who are not frequent readers keeps showing an interest in reading. Eventually, the adoptive parents respond by getting the child a library card and reading along with the child to help him. This is an example of one factor that has been proposed as a limitation to the behavior genetics approach. The factor that fits best here is _____.

a. gene–environment correlation
b. gene–environment interaction
Consider This: Gene–environment interactions have been found, but a better example would be that children with PKU show different outcomes in different environments (those with and without phenylalanine). 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
c. high heritability of reading skill and interest
Consider This: Although reading ability does have significant heritability, this only can explain the child's interest in reading, not the adoptive parents' response. 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
d. environmental impact on genetic expression
Consider This: Environments influence gene expression, but a better example would be that parents who grow up in poverty in one country and immigrate to another country may have children who grow up to be considerably taller than the parents. 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.

Answer: a
Learning Objective: 2.2.3 Explain limitations involved in estimating hereditary and environmental influences on behavior.
Difficulty: Difficult
Skill: Understand

EOC Q2.14
A child impresses her science teacher with her high interest in science and quick learning of science in the classroom. The teacher chooses her as one of only two children from her class that will prepare an exhibit for the district-wide science fair. This most likely represents _____.

a. both evocative and active gene–environment correlations
b. an evocative gene–environment correlation
Consider This: In an evocative gene–environment correlation, individuals evoke reactions on the basis of their genetic predispositions but do not create them. This is not the only correlation that applies here. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
c. an active gene–environment correlation
Consider This: In an active gene–environment correlation, individuals seek out or create environments correlated with their genetic predispositions, but this is not the only

correlation that applies here. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
d. a passive gene–environment correlation
Consider This: In passive gene–environment correlation, the individual providing the environmental stimulation is genetically related to the child. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.

Answer: a
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Difficulty: Difficult
Skill: Apply

EOC Q2.15
In the study by Tucker-Drob and Harden (2012), the relationship between parental stimulation at age 2 and child cognitive ability at age 4 was found to be primarily _____.
a. an environmental influence
b. a genetic influence
Consider This: Although parental stimulation could be part of a passive gene–environment correlation, the researchers used twin data to determine whether relationships were primarily genetic or environmental, and this particular relationship was not primarily genetic. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
c. an instance of an evocative gene–environment correlation
Consider This: In an evocative gene–environment correlation, children evoke reactions from the parents and other family members. 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
d. an instance of gene expression
Consider This: Gene expression is the extent to which a gene can perform its function (of regulation of other genes or production of proteins used in the body). 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.

Answer: a
Learning Objective: 2.3.1 Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.
Difficulty: Moderate
Skill: Understand

EOC Q2.16
Suppose scientists identify a gene related to shyness in children, but not in all cases. They find that children with this gene were more likely to withdraw from social situations when subjected to the stress of moving to a new school than when they stayed in the same school. By contrast, children without the gene showed no difference in social withdrawal in the two types of situations. This example fits most closely to the concept of _____.
a. a gene–environment interaction
b. an evocative gene–environment correlation

Consider This: Gene–environment correlation refers to genetic variation among people that influences the environments to which they are exposed, and the environment in this case is described as independent of the child's genes. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.

c. an active gene–environment correlation

Consider This: Gene–environment correlation refers to genetic variation among people that influences the environments to which they are exposed, and the environment in this case is described as independent of the child's genes. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.

d. a strong effect of environment on behavior

Consider This: A strong environmental influence would be more likely if scientists observed similar reactions to switching schools in children with varying genotypes. 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.

Answer: a
Learning Objective: 2.3.2 Explain how scientists obtain evidence for gene–environment interactions in humans.
Difficulty: Moderate
Skill: Apply

EOC Q2.17
As demonstrated by Meaney et al. in their experiments with nurturant and non-nurturant rat mothers, one way that epigenesis works is by increasing the extent of attachment of chemicals called _____ to DNA, which tends to reduce the expression of certain genes.

a. methyl groups

b. chromosomes

Consider This: Chromosomes are structures that contain the DNA strands. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.

c. RNA

Consider This: RNA is a partner compound to DNA, which is not associated with reducing the expression of certain genes. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.

d. ATCG

Consider This: The genetic code consists of a string of four different chemical bases (signified with the letters A, T, C, and G) that is approximately 3 billion letters long. 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.

Answer: a
Learning Objective: 2.3.3 Describe evidence from animal and human studies about how environments influence gene expression.
Difficulty: Moderate
Skill: Remember

EOC Q2.18
According to Gottlieb's developmental systems model, the fact that if one twin has schizophrenia, only 41 percent to 65 percent of identical twins have the disorder indicates that _____.

a. the gene (or genes) for schizophrenia could have been turned on by stressful experiences in the environment for one member of a twin pair but not for the other in some cases
b. the twins must not have shared the gene for schizophrenia
Consider This: Identical twins share all their genetic material. Any differences between them must be caused by environment. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
c. genetic influences on schizophrenia are very small
Consider This: The concordance rate for fraternal twins is 0 percent to 28 percent, which is lower than the concordance rate for identical twins, indicating schizophrenia is influenced in part by genes. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
d. influences on schizophrenia are not bidirectional, as was previously thought
Consider This: Genes create proteins, which form the basis for nerve cells, and nerve cells are organized into the brain. But influences are bidirectional because the activity of the nerve cells can turn on or off particular genes. 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.

Answer: a
Learning Objective: 2.4.1 Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.
Difficulty: Easy
Skill: Understand

EOC Q2.19
A higher rate of obesity is found among poor families living in the inner city. Using Bronfenbrenner's bioecological model, this is likely due to _____.

a. influences at both the microsystem and the exosystem levels
b. a great interest among children of poor families in playing video games rather than outdoor sports
Consider This: Families in low-income neighborhoods are likely interested in their children playing sports but are less able to afford the money and time to enroll their children in organized sports. Recreational sports and casual outdoor activities are less available to inner-city families due to overcrowded and busy streets and safety concerns of the parents. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
c. working parents cooking unhealthy food rather than relying on the portion control provided by prepared foods
Consider This: More parents are working and there are more single-parent homes, meaning that families often do not have time to prepare meals at home and hence are more likely to eat out. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.

d. genetic differences between poor and middle-class families in proneness to obesity
Consider This: Because the rise in obesity has occurred across children as a group, it is likely that most of the rise in obesity is due to environmental, rather than genetic, factors. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.

Answer: a
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Difficulty: Easy
Skill: Apply

EOC Q2.20
Understanding the interactions between biology and environment is complicated by _____.

a. the fact that environmental contexts have multiple levels of potential influence on the child
b. the fact that behavior genetics studies have not been as rigorous or complete in measuring genes as they have been in measuring the environment
Consider This: Behavior genetics studies have not been as rigorous or complete in measuring the environment as they have been in measuring genes. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
c. the fact that these two influences are impossibly intertwined and should no longer be studied as influences on development
Consider This: One way to explore how influences at multiple levels affect the child is to examine a problem that has environmental origins and investigate multiple levels of influence. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
d. the interplay of genes and chromosomes
Consider This: The interplay of genes and chromosomes occurs at a genetic level and hence is not relevant to understanding biology–environment interactions. 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.

Answer: a
Learning Objective: 2.4.2 Explain how the influences of different levels of the external environment might be studied, using the example of obesity.
Difficulty: Moderate
Skill: Analyze

Chapter 2: Heredity and Environment

BRIEF DESCRIPTION OF CHAPTER

This chapter examines the interaction between genes and the environment in producing developmental outcomes. It begins with a discussion of basic genetics, including the function of genes, cell division, and the relation between genes and behavior. Patterns of genetic inheritance are covered next, highlighting specific examples such as fragile X syndrome, dominant–recessive patterns, X-linked inheritance, and polygenic inheritance. Down syndrome is explored as an example of behavior resulting from chromosomal abnormalities. The role of genetic counselors is then explored. The chapter then focuses on the interplay between genes and the environment and the evidence to support these interactions, discussing heritability, shared and non-shared environments, and gene–environment correlations. Lastly, frameworks for understanding development are applied to understanding the complex interplay between genes and the environment.

CHAPTER-AT-A-GLANCE GRID

Chapter Outline	**Instructor's Resources**	**Multimedia Resources**
2.1 The Dynamic Gene	Learning Objectives 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5 Thinking About Your Virtual Child: Reflection Activity Pair and Share: Genetic Testing Activity Break: Dominant versus Recessive Traits; Discussion of Genetic Inheritance Application Activity: Huntington's Disease; Polygenic Inheritance; National Fragile X Foundation; Linking Fragile X with Genetic Testing Video Assignment: Fragile X Video Activity: Down Syndrome or Klinefelter Syndrome Debate: Genetic Testing Writing Assignment: Interview a Genetic Counselor; Interview a Caregiver Guest Speaker or Writing Assignment: X-Linked Inheritance Application Assignment: Research a Topic in Genetic Counseling The Dynamic Child in the Classroom: Nature and Nurture: Similarities and Differences Among Triplets	The Dynamic Child in the Classroom: Nature and Nurture: Similarities and Differences Among Triplets video (7:32)
2.2 Genes and Environment in Human Behavior	Learning Objectives 2.2.1, 2.2.2, 2.2.3 Application Activity: Compare and Contrast Twin and Adoption Studies; Minnesota Center for Twin and Family Research; A	Observing the Dynamic Child 2.2: Parental Views on Inheritance video

	Group Socialization Theory of Development; Evaluate Behavior Genetic Studies; Height and the Impact of the Environment Pair and Share: Shared and Non-Shared Environments Video Assignment: Steven Pinker, Parenting and Child Development Guest Speaker: Professor of Genetics Observing the Dynamic Child 2.2: Parental Views on Inheritance video	(3:05)
2.3 Gene–Environment Transactions	Learning Objectives 2.3.1, 2.3.2, 2.3.3 Application Activity: Gene-Environment Correlations and You; Temperament as Passive Gene–Environment Correlation; Research Articles and Gene–Environment Interactions; The Dutch Hunger Winter and Epigenetics Video Assignment: Epigenetics Observing the Dynamic Child 2.3: Studies of Twins Separated at Birth Class Discussion: Exploring Genetic Testing and Ethics; Identical Twins, Nature, and Nurture	Observing the Dynamic Child 2.3: Studies of Twins Separated at Birth video (5:07)
2.4 Developmental and Bioecological Systems Approaches	Learning Objectives 2.4.1, 2.4.2 Application Activity: Let's Move Campaign: Distal and Proximal Influences Pair and Share: Causes of Obesity and Bronfenbrenner's Model; Compare and Contrast Developmental Systems Framework and the Bioecological Model of Development; Gene–Environment Interactions and the Developmental Systems Framework; Apply Bronfenbrenner's Bioecological Model to Another Developmental Issue Shared Writing: Combating Urban Poverty	

INNOVATIVE IDEAS FOR CHAPTER 2

- Investigate a Genetic Disorder Writing Assignment or Presentation
- Epigenetics, Smoking, and Public Health Group Presentations
- Child Temperament, Passive Gene–Environment Correlations, and the Role of the Family Discussion

CHAPTER OUTLINE WITH LEARNING OBJECTIVES

Introduction: Identical Twin Sisters Reunite
What to Expect When Raising Your Virtual Child
2.1 The Dynamic Gene
- The Nature of Chromosomes, Genes, and Sexual Reproduction
  - **2.1.1** *Explain the four major functions of genes.*
- Patterns of Inheritance
  - **2.1.2** *Explain how genes get passed from generation to generation and produce variability in human development*.
    - Dominant–Recessive Inheritance
    - Huntington's Disease and PKU: Dominant versus Recessive Disorders
    - X-Linked Inheritance
    - Polygenic Inheritance
- Understanding the Path from Genes to Behavior: Fragile X Syndrome
  - **2.1.3** *Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome*.
- Chromosomal Errors
  - **2.1.4** *Describe the cause and the main characteristics of two instances of chromosomal errors*.
    - Down Syndrome
    - Klinefelter Syndrome
- Genetic Counseling
  - **2.1.5** *Describe what genetic counselors do to help prospective parents consider whether to have a child.*

The Dynamic Child in the Classroom: Nature and Nurture: Similarities and Differences Among Triplets

2.2 Genes and Environment in Human Behavior
- Using Family Resemblance to Study Heredity and Environment
  - **2.2.1** *Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.*
- Heritability and Shared and Non-Shared Environment
  - **2.2.2** *Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.*
- Limitations of Behavior Genetic Studies
  - **2.2.3** *Explain limitations involved in estimating hereditary and environmental influences on behavior*.

2.3 Gene–Environment Transactions
- Gene–Environment Correlations
  - **2.3.1** *Describe how the three types of gene-environment correlations help explain findings of twin and adoption studies*.
    - Three Types of Gene–Environment Correlations
    - Gene–Environment Correlations: Explanations and Evidence
- Gene–Environment Interactions
  - **2.3.2** *Explain how scientists obtain evidence for gene–environment interactions in humans.*
- Environmental Influences on Gene Expression
  - **2.3.3** *Describe evidence from animal and human studies about how environments influence gene expression.*
    - Evidence of Environmental Effects

Epigenesis: A Possible Mechanism of Environmental Influence on Gene Expression

Observing the Dynamic Child: Studies of Twins Separated at Birth

2.4 Developmental and Bioecological Systems Approaches

The Developmental Systems Framework

2.4.1 *Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment*.

Bioecological Systems Model

2.4.2 *Explain how the influences of different levels of the external environment might be studied, using the example of obesity.*

Shared Writing: Combating Urban Poverty

LESSON PLANS

Module 2.1 The Dynamic Gene

Introduction/hook to stimulate students' interest (5 minutes)

- Organizing theme: How do genes account for individual differences in development?
- Link the experiences of identical twins separated at birth (Introduction to chapter) to the discussion of genes and the environment. Highlight the constant interplay between these factors.
- Inform students that we will explore how genes and the environment constantly influence one another, resulting in individual development.

Integrating the Information: Thinking About Your Virtual Child: Reflection Activity (5 minutes): Ask students to consider how their virtual child may demonstrate the gene–environment relationship. *(This may be used as an in-class writing assignment or class discussion.)*

Learning Objective 2.1.1 Lecture Notes: *Explain the four major functions of genes.*

- Research increasingly shows the process of development is *dynamic*—that is, genes and the environment interact constantly and continuously in every aspect of development.
- Begin the discussion by presenting the most basic features of genes (each bodily cell contains 23 chromosomes, chromosomes contain DNA, ***genes*** are segments of DNA that serve as templates for making one or more proteins in the body).
- In 2004, scientists succeeded in mapping the entire genetic code for humans.
- DNA also serves the function of replication through ***mitosis***, in which cells divide and multiply. DNA additionally makes reproduction possible through ***meiosis***, or cell division that occurs in male and female reproductive cells (***gametes***). In meiosis, chromosomal material separates into gamete cells that only contain 23 chromosomes (sperm and ova). During fertilization, sperm and ovum meet to produce a ***zygote***, an organism that contains a unique combination of DNA from both the mother and father.
- The sex of the offspring is determined at fertilization by the 23rd pair of chromosomes. Each ovum contains only two copies of the X chromosome, while sperm may contain either an X or Y chromosome. Sperm with the X chromosome results in female offspring (XX); sperm with the Y chromosome results in male offspring (XY).
- Genes serve the function of regulating other genes, referred to as *non-coding DNA* because these DNA sequences do not appear useful in creating proteins.

Suggested Activity Break: Discussion of Genetic Inheritance (5 minutes)
Ask students to consider any ways that they are similar to their biological parents (e.g., personality traits, physical features, athletic skills, musical skills, etc.). Then ask them to consider any ways they are different from biological parents using the same framework. You may also ask students who have biological siblings to consider similarities/differences. Ask students to consider what accounts for these similarities and differences. This should lead to a lively discussion on the interplay between genes and the environment.

Learning Objective 2.1.2 Lecture Notes: *Explain how genes get passed from generation to generation and produce variability in human development.*

- Genes in the first 22 pairs of chromosomes have two or more ***alleles***, or forms, from the mother and father. The unique combination of alleles forms a person's individual ***genotype***. The observable characteristics (e.g., disease, physical features) of a person's genotype constitute the ***phenotype***.
- If alleles from each parent are the same, the child is ***homozygous*** for that trait. If the alleles from each parent differ, the child is ***heterozygous*** for that trait. The allele that is expressed is referred to as ***dominant***, and the allele that is not expressed is referred to as ***recessive.*** If a parent is heterozygous for a trait, the parent is considered a ***carrier***, meaning the parent can pass that recessive trait to any offspring.
- Huntington's disease is an example of a dominant disorder. Symptoms include destruction of the brain and nervous system, with accompanying loss of intelligence, muscle control, speech, and balance.
- Phenylketonuria (PKU) is an example of a recessive disorder. In this disorder, the person cannot convert the amino acid phenylalanine to tyrosine (another amino acid). As a result of eating foods with phenylalanine, individuals with PKU experience brain damage and mental impairment. Environmental interventions (e.g., avoiding foods with phenylalanine) greatly reduce the impact of PKU, illustrating the interplay between genes and the environment.
- *X-linked inheritance* describes patterns of mutation that are exclusive to the X chromosome in the 23rd pair. Because males and females differ in the 23rd pair of chromosomes (males: XY, females: XX), the expression of X-linked inheritance differs between males and females. Color blindness, found more often in males than females, is an example of X-linked inheritance.
- ***Polygenic inheritance*** involves patterns of inheritance involving more than one gene.

Activity Break: Dominant versus Recessive Traits (5 minutes)
Compile a list of different dominant and recessive traits. (A simple web search will reveal many common traits.) Share this list with students during class. You may conduct an informal poll by asking students how many have a few of the particular traits listed. Alternatively, you may copy the examples and ask students to check what they have from each column (e.g., either the dominant or recessive trait). Then, ask students to share with a partner and compare examples.

Application Activity: Huntington's Disease
Have students visit the Huntington's Disease Society of America website (http://hdsa.org/), select one topic from the site, and collect information on the topic. *This may be used as a class discussion or in-class writing assignment.*

Application Activity: Polygenic Inheritance
Have students research some of the possible causes for abnormalities that result from polygenic inheritance, such as autism, learning disorders, attention deficit-hyperactivity disorder

(ADHD), depression, obesity, heart disease, or diabetes. Then, have students present their findings in either class discussion, presentations, or a short (two- to three-page) paper.

Learning Objective 2.1.3 Lecture Notes: *Explain the indirect pathway by which genes affect human behavior, using the example of fragile X syndrome*.

- Fragile X syndrome is the most common single-gene disorder linked with cognitive disability. Fragile X occurs in approximately 1 in 4,000 males and 1 in 8,000 females (Knopik et al., 2017).
- In fragile X syndrome, one gene at the tip of the X chromosome breaks down, resulting in inability to produce the protein FMRP. This gene is critical to normal development.
- *Figure 2.3* shows four levels of influence in the pathway from genes to behavior for fragile X syndrome (genetic level, brain and cognitive level, environmental level, and behavioral level). Because there is widespread impairment of the brain, there is a variety of cognitive deficits that impair the processing of information from the environment and lead to behavior problems.
- Fragile X syndrome shows how genes vary in terms of ***gene expression***, or the overall impact on development. Females with fragile X often show less effects, because they have a normal version of the fragile X gene on the unaffected chromosome. Males with fragile X do not have a normal version of the fragile X gene to counterbalance the effects. In males, the effects of the fragile X gene are widely varied and may include intellectual impairment, attention deficits, anxiety, hyperactivity, or autism spectrum disorder comorbidity (Johnson & de Haan, 2015).

Application Activity: National Fragile X Foundation

To learn more about fragile X, ask students to visit the website for the National Fragile X Foundation (https://fragilex.org). As part of a class discussion, have students compare and contrast the differences in the expression of fragile X by sex, comparing the effects of the syndrome on males and females. Have students apply their understanding of sex and genetics to explaining the differences.

Application Activity: Linking Fragile X with Genetic Testing (10 minutes)

Have students research the individuals who should seek genetic testing for fragile X. Ask students to summarize their findings. Note: The information can be somewhat complicated, so this might work best as an in-class activity so the instructor can help students understand the biological side better.

Video Assignment: Fragile X

Have students find a video that chronicles a family or person dealing with fragile X syndrome. In a class discussion, ask them to consider the impact that something like fragile X may have on a family unit or an individual with the syndrome.

Learning Objective 2.1.4 Lecture Notes: *Describe the cause and the main characteristics of two instances of chromosomal errors.*

- During meiosis, problems can occur with chromosomal replications. There may be too many or too few chromosomes present. Often, this results in termination of the pregnancy. When there is an extra 21st chromosome, the pregnancy is often not terminated, resulting in Down syndrome. Another exception results in the addition of a sex chromosome.
- In ***Down syndrome***, there is an extra 21st chromosome. This is the most common genetic cause of intellectual disability. The risk for Down syndrome increases with maternal age (after age 35) and increases somewhat with paternal age.

- Results of Down syndrome include cognitive disability, short lifespan, heart conditions, and early dementia.
- Klinefelter syndrome refers to a chromosomal error that results in an extra X chromosome in males (XXY instead of the typical XY chromosomal makeup). Results of this syndrome are a function of low testosterone levels, which manifests in delayed puberty, infertility, small testes, and physical development characteristics that resemble female features (e.g., breast development, body fat distribution).

Video Activity: Down Syndrome or Klinefelter Syndrome

Have students find a video that chronicles a family or person dealing with either Down syndrome or Klinefelter syndrome. In a class discussion, ask them to consider the impact that these syndromes may have on a family unit or an individual with the syndrome. Alternatively, ask students if they have ever worked with an individual with Down syndrome. In particular, ask students to describe the individual's personality, abilities, and areas in which help was needed (e.g., adaptive behavior skills). You will find that many students have had this type of experience, and they enjoy discussing working with this population.

Learning Objective 2.1.5 Lecture Notes: *Describe what genetic counselors do to help prospective parents consider whether to have a child.*

- Genetic counselors help potential parents make decisions about conceiving based on understanding of their own genetic conditions.
- *Susceptibility genes* are any changes in DNA that are associated with disease or disorder. At present, there are tests to identify these genes, but they play only a small part in determining likelihood of developing a disorder.

Pair and Share: Genetic Testing (10 minutes)

Ask each student to pair with a classmate and consider the role of genetic testing and counseling. As this practice becomes more widespread (especially for older parents), ask students to consider the following prompts:

- Under what circumstances would you seek genetic testing or counseling?
- If you learned through testing results that your child may have Down syndrome, what would you do?
- What are the important factors in making these decisions? (Note: Some students may emphasize things such as religious or ethical concerns, quality of life issues, etc.)

The Dynamic Child in the Classroom: Nature and Nurture: Similarities and Differences Among Triplets

https://mediaplayer.pearsoncmg.com/assets/mypsychlab-2016-manis1e_0136049745-fraternal_and_identical_twins

Overview

The Chapter 2 video (7:32; for in-class use) introduces students to adult triplets. (They are likely a pair of identical twins and one sister who is not identical to the other two. However, without genetic testing, it is impossible to know for sure.) The triplets reflect on the ways in which their similarities and differences—in childhood and adulthood—were influenced by both nature and nurture. On-screen questions help students consider how personality traits (e.g., introversion/extroversion) work with environment (e.g., parental decisions to create similar or different childhood environments) to affect individual siblings and the siblings as a unit. This video also would work well if used after discussing Module 2.2 Genes and Environment in Human Behavior, or after discussing Module 2.3 Gene–Environment Transactions. The

discussion questions from the video make use of concepts introduced in Modules 2.2 and 2.3, such as shared and non-shared environment and gene–environment correlations.

Discussion Questions from the Video

1. In what ways are the sisters' personalities alike and different? How might we attribute these similarities and differences to genetics, shared environment, and non-shared environment?

   Chris and Jess gravitated toward certain aspects of their father's personality, which they describe as agreeable and laid-back, while Faith seems to share certain aspects of their mother's personality, which involves a willingness to disagree or to express controversial opinions. Similarities within families are attributed to shared environment. Chris and Jess shared a more similar environment because they were more influenced by their father. Faith and her mother shared similar traits and thus a more similar environment because of their willingness to disagree or go against the flow.

   However, we also have to bear in mind that each child shares on average 50 percent of their genes with each parent. Therefore, these similarities to parents could be a result of both genetic tendencies and environmental influences. Faith and Chris (the identical twins) seem more similar in terms of extroversion and risk-taking behavior (such as a willingness to perform in front of a group) than Jess, who prefers quieter and more "behind-the-scenes" activities. Extroversion is a heritable trait, but we must also consider that Faith's and Chris's behavior might have taken them to different settings (e.g., traveling or doing activities without the other sisters), which would involve both a non-shared environment (an environment they did not share with Jess) and a gene–environment correlation (e.g., they experienced these new environments in part because of genetic tendencies toward extroversion and risk-taking).
2. How might the sisters' dating and spousal choices reflect a gene–environment correlation?

   The sisters agree that the more extroverted personalities of Chris and Faith were associated with more extroverted dating and marriage partners. This could be a gene–environment correlation because a behavior trait that was partly genetically based (extroversion) led to different kinds of interpersonal experiences (the experience of being married to or dating an extroverted person).
3. To what extent do the sisters share interests and activities? How might this be attributed to genetics, shared environment, and non-shared environment?

   Chris and Faith shared similar interests in sports and music, suggesting that their similar interests might be due to their greater genetic similarity. However, Jess was also interested in sports, which suggests a shared environment in which their parents encouraged sports and took all three to the same practices at the same time for convenience. They also mention a shared interest in scrapbooking that they believe is due to the high value they all place on family relationships, a likely candidate for a shared environmental influence. Likewise, their common interest in travel might be a shared environmental influence because their parents took them on frequent trips. However, it could also be a genetic influence from their parents, stemming from personality traits having to do with curiosity and openness to new experiences.
4. Siblings often try to carve out different niches. Both Chris and Jess are fifth-grade teachers. Listen to Faith talk about her career choice. How might this process be more intense among triplets?

   The choice of a career seems to involve carving out different niches. Faith describes being drawn to helping children, but she wanted to avoid falling into the familiar role of doing the same thing as her sisters. Hence, even though being an elementary school teacher was an attractive career, she decided to pursue pediatric nursing. She mentions that her mother was a nurse, which gave her opportunities to observe this career choice firsthand. The process might be more intense because triplets grow up at the same time and in the same

place, and are placed in similar activities for convenience by their parents. This makes issues of developing an individual identity especially salient. An interesting point is that Faith suggested she was more similar to her mother in certain personality traits, and this may have had something to do with selecting the same career as her mother.

Links to Additional Activities, Demonstrations, and Exercises for this Module

1. **Debate: Genetic Testing (15–20 minutes)**
   Divide the class into two groups. Assign one group to be in favor of genetic testing and the other group to be against genetic testing. Have students research their side of the argument. In class, have students debate this controversial topic. Specifically, you may present hypothetical scenarios to students to get the debate started. For instance, how would you respond if you were fairly certain your child will be born with Down syndrome? What if you are pregnant with twins, and only one of the twins is likely to be born with Down syndrome? How would you respond, and why?
2. **Writing Assignment: Interview a Genetic Counselor**
   Direct students to interview a genetic counselor. If they cannot locate one, they may use the National Society for Genetic Counselors website (http://www.nsgc.org/), which provides many answers to the questions below. In the interview, have students include the following questions:
   - What are your typical daily responsibilities?
   - What is your educational background? What types of education and training are required to do this job?
   - Who are your typical clients?
   - When you have bad news to share with clients, how do you do this?
   - What are your responsibilities to the client following the delivery of bad news?
   - What are your favorite parts of this job? Least favorite?
   - What qualities do you need to be successful in this career?

   Students may also add additional questions. At the end of the paper, have students reflect on the responses they gathered. Is this a career option for them? Why or why not? Has their perception of this job changed from their initial impressions? Students may compile responses in a three- to four-page paper.
3. **Writing Assignment: Interview a Caregiver**
   Direct students to locate a person who provides care for an individual with a genetic abnormality (e.g., Down syndrome, fragile X, PKU, Klinefelter syndrome). If students cannot locate a specific person to interview, they may instead locate a video or blog on the topic. In interviewing this person, have students ask the following questions:
   - What is a typical day like for you?
   - What are the best parts of working with this person? Worst parts?
   - What qualities does a person need to be a successful caregiver?
   - How has working with this person impacted various areas of your life (e.g., outside career, family relationships, finances, etc.)?

   Students may add additional questions. At the end of the paper, have students reflect on the responses they gathered. Has their perception of what it is like to care for someone with a genetic abnormality changed? Why or why not? Students may compile responses in a three- to four-page paper.
4. **Writing Assignment or Guest Speaker: X-Linked Inheritance Interview**
   Direct students to find someone who is color-blind. Students may ask this person to describe the color blindness, such as colors that are difficult to distinguish. To help students apply the X-linked inheritance pattern, have them ask this person if relatives are also color-blind. Ask students to apply what they know about X-linked inheritance to color blindness, specifically how this pattern may be passed from one generation to the next. Students may

compile responses in a two- to three-page paper. As an alternative to this assignment, you might invite in a guest speaker who is color-blind. Direct students to prepare at least two questions ahead of time. If the speaker is amenable to it, show the tests for color blindness (Ishihara tests) to demonstrate.

5. **Application Assignment: Research a Topic in Genetic Counseling**
   Have students visit the website of the National Society of Genetic Counselors (http://www.nsgc.org/). Ask students to choose a particular topic from the site (e.g., patient advocacy, patient concerns, education, public policy statements) and present their findings to the class. You may also choose to have students write a short paper summarizing their findings.

Module 2.2: Genes and Environment in Human Behavior

Introduction/hook to stimulate students' interest (5 minutes)

- Inform students that this section looks at ways to tease out influences of the environment versus genetic influences in development.
- Ask students to consider how their own genetic inheritance has played a role in the people they are today. Prompt students to discuss ways in which they are similar to their parents.

Learning Objective 2.2.1 Lecture Notes: *Explain how scientists identify genetic and environmental contributions to complex traits such as IQ.*

- The field of ***behavior genetics*** attempts to determine how much variation in a particular trait is due to genes versus the environment. ***Heritability*** refers to the proportion of variance in a given trait that is attributed to genetics.
- ***Twin designs*** seek to separate the impact of genes and the environment on particular traits by comparing identical twins (share 100 percent of segregating genes) and fraternal twins (share 50 percent of segregating genes). ***Segregating genes*** are genes that have different alleles that can result in individual differences.
- In examining the correlation between genetic relatedness and IQ scores, individuals who share more genetic relation tend to have more highly correlated IQ scores.
- Behavioral geneticists use different designs to account for the role of genetics and the environment, including identical twins reared together or apart (twin designs) and adoption designs.
- ***Adoption designs*** compare biological parents with their adopted-away children to correlations between adopting parents and their genetically unrelated children. Correlations in IQ between adoptive parents and their genetically unrelated children support the role of environmental influence.

Application Activity: Compare and Contrast Twin and Adoption Studies (5 minutes)

Have students pair up and compare and contrast twin and adoption studies. How are they similar? How are they different? What types of conclusions may be drawn from each, and what is the relative contribution of each to developmental science?

Application Activity: Minnesota Center for Twin and Family Research

The University of Minnesota is credited with much of the early research on twin studies. Have students visit the Minnesota Center for Twin and Family Research website and summarize the information presented there. *This may be used as an in-class writing assignment or class discussion.*

Learning Objective 2.2.2 Lecture Notes: *Explain the concepts of heritability and shared and non-shared environment and how their contributions change with age.*

- Behavioral geneticists calculate *heritability*, a mathematical index of the proportion of variance in a given trait that is due to variation in genes. Heritability for IQ is estimated to be approximately 50 percent in adoption and twin studies (Pennington, 2015).
- Behavioral geneticists are concerned with environmental influences as well. The ***shared environment*** refers to similar influences that children and adults raised in the same environment experience. The ***non-shared environment*** refers to experiences that are unique to the individual child or adult. The shared environment accounts for approximately 25 percent of the variability in IQ scores in children, and the non-shared environment accounts for approximately 25 percent of the variability.
- Heritability generally increases with age for most characteristics.

Application Activity: A Group Socialization Theory of Development

Have students read the following article outside class time:

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review*, *102*, 458–489.

The article argues that parents have very little influence on development, and peers/genetics are largely responsible for child outcomes. After reading the article, have students evaluate the claims made. What evidence is provided for the limited role of parents? What evidence is provided for the impact of the non-shared environment? What evidence is provided for the role of genetics? How does this argument compare with what is presented in Chapter 2 of the text? (Note: This article is also useful in Chapters 9 and 12 in discussions of the impact of parenting on socioemotional development.) *This may be used as an in-class writing assignment or class discussion.*

Pair and Share: Shared and Non-Shared Environments (5 minutes)

Ask each student to pair with a classmate to discuss the shared and non-shared environments they experienced growing up. For students who do not have siblings, ask them to think about their environments compared with that of a close friend or school classmate. Ask students to consider the impact the shared and non-shared environments may have had on their development. For example, are students very similar or different from siblings? How do they explain this? What activities did they participate in that siblings did not? How might this non-shared environment impact development?

Learning Objective 2.2.3 Lecture Notes: *Explain limitations involved in estimating hereditary and environmental influences on behavior.*

- Behavior genetic studies have several limitations:
  1. First, it is difficult to precisely parse out the influences of genes and the environment.
  2. Additionally, genes have different effects in different environments.
  3. Lastly, environments influence gene expression.
- These limitations make it very challenging to estimate the relative impact of genes and the environment in producing individual differences.

Application Activity: Evaluate Behavior Genetic Studies (5 minutes)

Ask students to consider how the different limitations of behavior genetic studies impact the usefulness of the conclusions drawn. Ask them to consider if there will ever be a point in time in which behavior genetic studies will precisely parse out the impact of genetics and the environment. Why or why not?

Application Activity: Height and the Impact of the Environment

Since height is a feature known to be impacted by the environment (e.g., nutrition), have students locate research on changing heights with improved nutrition standards. Have students draw the connection between genes and the environment. *This may be used as an in-class writing assignment or class discussion.*

Observing the Dynamic Child 2.2: Parental Views on Inheritance

https://mediaplayer.pearsoncmg.com/assets/mypsychlab-2015-manis1e_0134410971-parental_views_on_inheritance

Ask each student to pair up with another student. Present students with a worksheet containing the following questions and ask them to work in pairs. Show the *Observing the Dynamic Child 2.2: Parental Views on Inheritance* video (3:05). This can be used as an in-class participation grade. NOTE: Be sure to remove the * before using this as a handout for students!

1. What differences in personality does the mother describe in childhood?
   a. One child was interested in music, the other was not.
   b. *One child was more stubborn and persistent and the other easier to persuade.
   c. One child was highly active and excitable and the other moderately active and excitable.
   d. One child seemed anxious to be the best at something, whereas the other was content to be second best.
2. According to the mother, the twins played an active role in their own development in all of the following ways EXCEPT _____.
   a. choosing particular topic areas to read about
   b. choosing a musical instrument (piano or guitar) to specialize in
   c. *one actively chose to be in choir and the other did not
   d. in their choice of leisure-time activities such as playing video games and making jewelry
3. The mother seems to assume that the consistent tendency for the twins to choose different activities in which to excel was attributable to _____.
   a. a desire to excel in a different area than the twin
   b. a desire to be as similar as possible in their interests
   c. a desire on the part of both twins to please their mother
   d. “natural” (or genetically influenced) differences in interests
   e. *both a and d

To encourage additional critical thinking following the Observing the Dynamic Child video, consider asking students to address this prompt:

> Michael and McCourt are fraternal twins. Their father, David, was a gifted soccer player in high school but had to stop playing due to a permanently impairing injury. David’s brother, Jack, went to the University of Alabama on a football scholarship. Both Michael and McCourt show little interest in soccer, yet are athletically gifted in controlling the soccer ball. However, both boys do have an affinity for football like their Uncle Jack, though neither is nearly as adept in football skills. Should David encourage his young sons toward soccer or football? Explain your decision.

Links to Additional Activities, Demonstrations, and Exercises for this Module

1. **Video Assignment: Steven Pinker, Parenting and Child Development**
   Have students search for videos featuring Steven Pinker (or find some to share with students). Then, lead class discussion on Pinker’s presentation of research on parenting and its limited effects on child outcomes. Do students agree with the research? Why or why

not? How could research on parenting be improved to account more fully for the role of genetics?

2. **Guest Speaker: Professor of Genetics**
   If you have a professor on your campus who teaches genetics, ask this person to come to your class to speak about the world of genetic testing. In particular, the speaker may highlight things such as the ethics of testing and how this is approached in the scientific community. Direct students to come prepared with at least two questions for the speaker on the topic.

Module 2.3 Gene–Environment Transactions

Introduction/hook to stimulate students' interest (5 minutes)

- Organizing theme: How do developmental scientists attempt to account for the constant interplay between genes and the environment in explaining individual differences in development?
- Inform students that we will explore different ways to account for the mutual influence of genes and the environment in producing individual outcomes. Developmental scientists account for the ***transaction of genes and environment***, recognizing that these do not develop in isolation and are constantly interacting.
- Ask students why they think identical twins (such as Mia and Alexandra, discussed in the chapter introduction) may develop similarly even though they are raised in different homes. Provide hints, such as: Could it involve a process of genes affecting how children respond to and select environments?

Learning Objective 2.3.1 Lecture Notes: *Describe how the three types of gene–environment correlations help explain findings of twin and adoption studies.*

- In ***gene–environment correlations***, genetic variations among people influence the environment to which they are exposed.
- *Passive* gene–environment correlations result when children inherit genotypes associated with family environment. *Evocative* gene–environment correlations occur when individuals evoke reactions from the environment based on genetic predispositions. *Active* gene–environment correlations occur when the individual seeks out environments that support genetic predispositions.
- Research evidence supports the roles of passive, evocative, and active correlations in development (Plomin et al., 1997; Tucker-Drob & Harden, 2012).

Application Activity: Gene–Environment Correlations and You (5 minutes)

Ask students to come up with their own examples of gene–environment correlations. You may need to prompt students to think about the types of extracurricular activities they engaged in as children. Then ask them why they were in particular activities. Often, students will cite parental influence, natural talent, enjoyment, etc. Help students connect these reasons to the gene–environment correlations.

Application Activity: Temperament and Gene–Environment Correlations

Have students research the work of temperament researcher Jerome Kagan by locating a video in which he describes his work. Have students summarize Kagan's research on temperament in infancy and possible associated outcomes. Ask students to apply the concept of the passive gene–environment correlation here. How do temperaments in early childhood represent a passive influence? In what ways might temperaments also involve evocative and active gene–environment correlations?

Learning Objective 2.3.2 Lecture Notes: *Explain how scientists obtain evidence for gene–environment interactions in humans.*

- Specific genes affect a child's responsiveness to specific environmental hazards (Kim-Cohen & Gold, 2009; Manuck & McCaffery, 2014)).
- In ***gene–environment interactions***, negative environmental effects are seen for only one version of a particular gene.
- For example, research by Caspi et al. (2003) shows that the effects of child maltreatment and number of stressful life events are stronger in individuals with the short form of a particular allele (they had the highest levels of depression at age 26; *Figure 2.7*).

Application Activity: Research Articles and Gene–Environment Interactions

Have students find the following article on gene-environment interactions:

Karg, K., Burmeister, M., Shedden, K., & Sen, S. (2011). The serotonin transporter promoter variant (5-HTTLPR), stress, and depression meta-analysis revisited: Evidence of genetic moderation. *Archives of General Psychiatry, 68* (5), 444-454.

Outside class, have students read the article and provide a summary of the main points. Direct students to link the article findings to gene–environment interactions. *This may be used as a writing assignment (a two- to three-page paper), class discussion, or presentation.*

Learning Objective 2.3.3 Lecture Notes: *Describe evidence from animal and human studies about how environments influence gene expression.*

- The expression of genes is influenced by a variety of factors, including the internal environment of the cell and body and the external environment. Using *cross-fostering*, rat pups who were genetically predisposed to have low anxiety levels showed elevated levels of anxious behavior as adults when reared by non-nurturant mothers. Pups reared by nurturant mothers showed less anxious behaviors as adults (Meaney, 2010; Weaver et al., 2004).
- ***Epigenesis*** refers to chemical processes that surround the gene to control expression of the gene. Unlike genetic mutations, epigenetic effects do not alter the DNA sequence in activating or silencing gene expression. Epigenesis works in humans by attaching methyl groups to DNA through ***methylation***, reducing the expression of some genes.
- Evidence for the effects of epigenetic changes comes from twin studies (Fraga et al., 2005) and studies of the impact of stress in the first four years of life (Conradt et al., 2016; Essex et al., 2013; Romens, McDonald, Svaren, & Pollak, 2015).

Video Assignment: Epigenetics

Direct students to find a video about epigenetics. There are many TED Talks on the topic, as well as many documentaries that students can watch. After students have watched the video, discuss the field of epigenetics and what it tells us about the role of the environment and genetic inheritance. *This may be incorporated into an in-class writing assignment or class discussion*.

Observing the Dynamic Child 2.3: Studies of Twins Separated at Birth

https://mediaplayer.pearsoncmg.com/assets/_video.true/mypsychlab-2018-manis2e_0135167434-twins_separated_at_birth

Ask each student to pair up with another student. Present students with a worksheet containing the following questions and ask them to work in pairs. Show the *Observing the Dynamic Child 2.3: Studies of Twins Separated at Birth* video (5:07). This can be used as an in-class participation grade. NOTE: Be sure to remove the * before using this as a handout for students!

1. According to researcher Nancy Segal, which of the following is a limitation of studying identical twins raised together, stimulating a need for studies of identical twins raised apart?

a. Identical twins raised together are treated more similarly by their parents than fraternal twins raised together.
b. *Identical twins raised together may become more similar over time because they imitate and learn from each other, which introduces environmental, rather than purely gene-based, similarities.
c. Identical twins raised together tend to have more similar epigenetic influences than identical twins raised apart.
d. Identical twins raised together try to be different from each other to carve out their own niches in the family.

2. According to Nancy Segal, genetic influences are stronger for some traits than others. Choose the correct rank ordering, from highest to lowest degree of genetic influence, from the following lists.
   a. *physical traits, intelligence, personality, job satisfaction
   b. intelligence, personality, physical traits, job satisfaction
   c. physical traits, intelligence, job satisfaction, personality
   d. physical traits, personality, intelligence, job satisfaction
3. Which of the following are similarities in personality, attitudes, or interests mentioned by the twins in the video?
   a. intelligence
   b. interest in school vs. practical work
   c. political and social views
   d. enjoyment of coffee
   e. *both interest in school vs. practical work *and* political and social views
4. Based on your observation of the physical traits and behavior of the twins in the video, which of the following are likely differences between the twins that are environmentally based?
   a. diet and exercise
   b. interest in school
   c. specific skills acquired, such as riding a motorcycle
   d. both diet and exercise *and* interest in school
   e. *both diet and exercise *and* specific skills acquired, such as riding a motorcycle

To encourage additional critical thinking following the Observing the Dynamic Child video, ask students to address these questions: What are some specific examples of environmental factors that could influence social or political views and interests such as volunteer firefighting? Is it possible to discern with absolute certainty the origin of traits as either nature or nurture? If yes, what explains your certainty?

Links to Additional Activities, Demonstrations, and Exercises for this Module

1. **Class Discussion: Exploring Genetic Testing and Ethics**
   Direct students to research the ethics of genetic testing. Ask students to look at the pros and cons of this practice. You may also choose to apply this to a case study to highlight the role of ethics. *This may also be used as a writing assignment.*
2. **Class Discussion: Identical Twins, Nature, and Nurture**
   Direct students to locate a video or story about identical twins separated at birth (students may be interested in extending the opening story of identical twins that is presented at the beginning of Chapter 2). Ask students to share what they found about twins separated at birth. Ask students to consider the relative roles of genetics and environmental experience. *This may also be used as a writing assignment.*

3. **Application Activity: The Dutch Hunger Winter and Epigenetics**
   The field of epigenetics gathers evidence from many sources, such as the Dutch Hunger Winter, to illustrate the impact of starvation on the epigenome. To get started, have students read the following article:
   Heijmans, B. T., Tobi, E. W., Stein, A. D., Putter, H., Blauw, G. J., Susser, E. S., Slagboom, P. E., … Lumey, L. H. (2008). Persistent epigenetic differences associated with prenatal exposure to famine in humans. *Proceedings of the National Academy of Sciences of the United States of America*, *105*(44), 17046-9.
   This article looks at the relation between the timing of starvation in adults and the developing fetus. Have students link this evidence to the field of epigenetics and speculate about the long-term consequences found in the study. Additionally, you may ask students to recommend specific social policies that may address the impact of starvation during pregnancy. What could be done from a societal level to prevent negative impact to the fetus? *This may be used as a writing assignment or class discussion.*

Module 2.4: Developmental and Bioecological Systems Approaches

Introduction/hook to stimulate students' interest (5 minutes)

- Organizing theme: How do developmental systems and bioecological systems explain the interplay between genes and the environment?
- Inform students that we will apply these two frameworks to understanding the transactional nature of genes and the environment, and explain that these approaches attempt to provide a holistic account of genes and the environment.

Learning Objective 2.4.1 Lecture Notes: *Describe how the developmental systems framework explains relationships among genes, the brain, behavior, and environment.*

- A *developmental system* includes the genetic and environmental influences on the developing organism, including changes over time.
- In Gottlieb's developmental systems framework, development is probabilistic, meaning that a behavior or trait is not determined by any single factor or combination of factors with any certainty. Applying this framework to human development, individual development involves the interplay among genetic activity, neural activity, behavior, and the environment (*Figure 2.9*). The environment encompasses all influences outside genes (Gottlieb, 2007). The systems constantly interact to produce development.
- Development results from species-typical genes and ***species-typical rearing environments***, which help to structure the environment that shapes gene activity, neural activity, and behavior in similar ways for all members of a species. This helps to explain why developmental outcomes are quite similar across members of a species.

Learning Objective 2.4.2 Lecture Notes: *Explain how the influences of different levels of the external environment might be studied, using the example of obesity.*

- Bronfenbrenner's bioecological model of development examines the role of the microsystem, exosystem, macrosystem, and chronosystem in explaining development.
- ***Distal influences*** are macro-level influences that impact ***proximal influences***, which operate more in the child's immediate experience.
- Applied to obesity, distal influences include changes in portion size at fast-food restaurants without corresponding changes in price (the text uses the example of french fries). This impacts children at the proximal level, in that families who have less time to prepare foods at home might turn to fast food as a viable option. Children then are exposed to larger portion sizes of the fast food, and this contributes to obesity.

Pair and Share: Causes of Obesity and Bronfenbrenner's Model (10 minutes)

Have each student pair with a classmate and discuss causes of childhood obesity. Then, have students outline how each cause fits in Bronfenbrenner's model. For instance, students may draw connections between distal influences such as federal policy (e.g., school lunch funding, importance of achieving test scores) and proximal influences (e.g., quality of food available for child's lunch, schools with low test scores may remove recess or physical education from the curriculum) and the link to childhood obesity.

Application Activity: Let's Move Campaign: Distal and Proximal Influences

As one initiative to combat childhood obesity, have students research the Let's Move campaign started by former First Lady Michelle Obama. In researching this topic, have students draw connections between distal and proximal processes and how these impact the individual child. *This may be used as a writing assignment or class discussion.*

Shared Writing: Combating Urban Poverty

The following is the shared writing prompt from REVEL. It can be assigned within REVEL, with the guideline of writing a minimum of 140 characters, or as a longer in-class writing activity or group discussion.

> *Suppose you are collaborating with others to produce a community intervention program for families that live in urban poverty. Identify one distal and one proximal influence of living in poverty that are linked together, and likely influence child development in a negative way. Briefly describe how your community program would address these linked influences on child development.*

Links to Additional Activities, Demonstrations, and Exercises for this Module

1. **Pair and Share: Compare and Contrast Developmental Systems Framework and the Bioecological Model of Development (10 minutes)**
   Have each student pair with another student to compare and contrast the basic tenets of the developmental systems approach and the bioecological model for development. How are they the same? How are they different? Link this comparison back to the discussion of theory in Chapter 1. How well does each describe, explain, and predict development? Caution students that these approaches are quite difficult to test, so they are used as a framework instead of a theory.
2. **Pair and Share: Gene–Environment Interactions and the Developmental Systems Framework (10 minutes)**
   Have students pair up and take turns explaining to their partner how fragile X and the two Caspi et al. studies of gene–environment interactions fit Gottlieb's developmental systems framework. After students take a crack at explaining it to each other, they might have further questions to discuss as a whole class.
3. **Pair and Share: Apply Bronfenbrenner's Bioecological Model to Another Developmental Issue (Aside from Childhood Obesity) (10 minutes)**
   Have each student pair with another student to choose another developmental issue that applies the distal and proximal factors in the bioecological model of development. For instance, students may choose issues such as educational policies, access to health care or urban poverty (this is the issue addressed in the Shared Writing activity for this chapter). Have students outline the distal and proximal factors for the chosen issue. How does the model specifically account for these factors? How might a researcher measure the impact of the distal and proximal factors?

INNOVATIVE IDEAS FOR CHAPTER 2

Writing Assignment or Presentation: Investigate a Genetic Disorder (To be completed outside class)

Students should choose one genetic disorder (covered in the text or elsewhere) to investigate. In researching the disorder, students should address the following areas:

- Risk factors for disorder
- Etiology of disorder—what causes it?
- Affected population
- Symptoms of disorder and related effects
- Prognosis of disorder
- Available treatments
- Ways to prevent the disorder

Have students write a two- to three-page paper that presents the relevant information. You may also choose to have students present this information to the class in a formal presentation.

Student Group Presentations: Epigenetics, Smoking, and Public Health

Direct students to find information on the role of smoking in prenatal development. Then, direct students to research the effects of smoking on epigenetics and its association with disease. Students should then form opinions as to whether there is sufficient evidence that smoking negatively affects epigenetics. From this, students will consider whether smoking should be banned nationally to prevent damage to the health of the population as well as future generations. Instruct students to imagine that their recommendations will be considered by public health entities.

Class Discussion: Child Temperament, Passive Gene–Environment Correlations, and the Role of the Family

Outside class, have students read the following article:

Lemery-Chalfant, K., Kao, K., Swann, G., & Goldsmith, H. H. (2013). Childhood temperament: Passive gene–environment correlation, gene–environment interaction, and the hidden importance of the family environment. *Development and Psychopathology*, *25*(1), 51–63.

The article discusses many of the concepts presented in this chapter, including heritability, genetic inheritance, passive gene–environment correlations, and the role of the environment. In discussing the article, have students consider how each of these concepts may be applied to child temperament. What evidence is there for the heritability of temperament? Ask students to consider how the role of temperament may function over time—for instance, is it always a passive influence, or might it change as children age?