Chapter 2
Quick Quiz

1. The first 22 pairs of chromosomes are called _____ while the 23rd pair is known as _____.
   a. sex chromosomes; autosomes
   b. autosomes; sex chromosomes
   c. eggs; sperm
   d. sperm; eggs

2. Each group of nucleotide bases that provides a specific set of biochemical instructions is a(n) _____.
   a. egg
   b. sperm
   c. chromosome
   d. gene

3. If the allele for Type O blood is recessive, and the alleles for Type A and B blood are dominant, which of the following individuals would have Type O blood?
   a. a person with an AO genotype
   b. a person with a BO genotype
   c. a person with an OO genotype
   d. all of these

4. The most common autosomal disorder (caused by an abnormal number of autosomes) is
   a. Klinefelter's syndrome.
   b. Turner's syndrome.
   c. Down syndrome.
   d. Tay-Sach's disease.

5. Miranda has one X chromosome and no Y chromosome. Miranda has
   a. Turner syndrome.
   b. Down syndrome.
   c. Klinefelter's syndrome.
   d. fetal alcohol syndrome.

6. The branch of genetics that deals with inheritance of behavioral and psychological traits is known as
   a. polygenic inheritance.
   b. behavioral genetics.
   c. applied developmental science.
   d. dominant-recessive inheritance.

7. Bobby (male) and Brandy (female) are _____ twins.
   a. identical
   b. monozygotic
   c. dizygotic
   d. either monozygotic or dizygotic (it is impossible to tell without more information)

8. The fact that behavioral consequences of genetic instruction depend on the environment in which those instructions develop is best illustrated by the concept of
   a. reaction range.
   b. niche-picking.
   c. nonshared environmental influences.
   d. polygenic inheritance.

9. Deliberately seeking environments that compliment one's heredity is called
   a. reaction range.
   b. niche-picking.
   c. nonshared environmental influences.
   d. polygenic inheritance.

10. The environmental forces that make siblings different from each other are called
    a. reaction range.
    b. niche-picking.
    c. nonshared environmental influences.
    d. polygenic inheritance.

Chapter 2
Quick Quiz Answers

1. **Chapter Module:** Mechanisms of Heredity
   Answer: b **Page(s):** 42 **Type:** Conceptual **Diff:** Moderate
   Rationale: Autosomes are the body chromosomes (first 22 pairs) while the 23rd pair determine the sex (sex chromosomes).

2. **Chapter Module:** Mechanisms of Heredity
   Answer: d **Page(s):** 43 **Type:** Factual **Diff:** Easy
   Rationale: A gene is a group of nucleotide bases that provides a specific set of biological instructions.

3. **Chapter Module:** Mechanisms of Heredity
   Answer: c **Page(s):** 45 **Type:** Applied **Diff:** Hard
   Rationale: Answer a would be Type A blood and b would be Type B blood, so c is the only correct answer.

4. **Chapter Module:** Mechanisms of Heredity
   Answer: c **Page(s):** 46-49 **Type:** Conceptual **Diff:** Moderate
   Rationale: Answers a and b are sex chromosome disorders, while d is an example of a dominant-recessive genetic disorder.

5. **Chapter Module:** Mechanisms of Heredity
   Answer: a **Page(s):** 48-49 **Type:** Applied **Diff:** Moderate
   Rationale: Girls with Turner's syndrome have one X chromosome.

6. **Chapter Module:** Heredity, Environment, and Development
   Answer: b **Page(s):** 50 **Type:** Factual **Diff:** Easy
   Rationale: Behavioral genetics is the branch of genetics that deals with the inheritance of behavioral and psychological traits.

7. **Chapter Module:** Heredity, Environment, and Development
   Answer: c **Page(s):** 51 **Type:** Applied **Diff:** Easy
   Rationale: Because one is a boy and one is a girl, they can't be identical, therefore they must be dizygotic or fraternal twins.

8. **Chapter Module:** Heredity, Environment, and Development
   Answer: a **Page(s):** 56-59 **Type:** Conceptual **Diff:** Moderate
   Rationale: Answers b – d are all possibilities but are definitely not the best representations of the concept described in the question.

9. **Chapter Module:** Heredity, Environment, and Development
   Answer: b **Page(s):** 58 **Type:** Factual **Diff:** Easy
   Rationale: Niche-picking is the process of deliberately seeking environments that fit one's heredity.

10. **Chapter Module:** Heredity, Environment, and Development
    Answer: c **Page(s):** 59 **Type:** Factual **Diff:** Easy
    Rationale: Although environmental forces are important, they usually affect each child in a unique way, which is known as nonshared environmental influences.

Chapter 2
Genetic Bases of Child Development

MULTIPLE CHOICE QUESTIONS

2.1 Jackie has sickle-cell anemia, a condition which is
a. caused by a virus.
b. caused by a bacterial infection.
c. inherited.
d. related to a lack of protein in the diet.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 41 **Type:** Applied **Diff:** Moderate
Rationale: Sickle-cell anemia is a genetic trait that is inherited.

2.2 Who is most likely to have sickle-cell anemia?
a. Tad, a European American
b. Jared, an African American
c. Miguel, an Hispanic American
d. Ed, an Asian American

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 41, 45 **Type:** Applied **Diff:** Moderate
Rationale: It primarily affects African Americans, although it could affect Hispanic Americans as well.

2.3 Each sperm and egg contains _____ chromosomes.
a. 23
b. 26
c. 46
d. a variable number of

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 42 **Type:** Factual **Diff:** Easy
Rationale: Each sperm and egg have half (23) the number of chromosomes so that when they combine, they make a total of 46.

2.4 A fertilized egg contains _____ pairs of chromosome(s).
a. 1
b. 22
c. 23
d. 46

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 42 **Type:** Factual **Diff:** Easy
Rationale: Once the egg is fertilized, it contains 23 pairs of chromosomes (46 chromosomes total).

2.5 *In vitro* fertilization is a procedure in which
a. an egg is fertilized by sperm in a laboratory dish and then placed in the mother's uterus.
b. sperm is injected into the mother's uterus to fertilize her egg.
c. a fertilized egg is extracted from one woman's uterus and then placed in another woman's uterus.
d. a surrogate mother is used to carry another couple's developing fetus.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 42 **Type:** Conceptual **Diff:** Moderate
Rationale: In vitro fertilization is a technique available to couples who cannot conceive a child through sexual intercourse and involves mixing sperm and egg together in a laboratory dish. Fertilized eggs are then placed into the woman's uterus.

2.6 *In vitro* fertilization
a. usually is accompanied by surrogate motherhood.
b. is successful about 80% of the time.

c. is less likely to result in the birth of twins or triplets.
d. sometimes involves the use of egg and sperm from donors.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 42 **Type:** Factual **Diff:** Moderate
Rationale: Answers a – c are all false, leaving only d as the correct answer.

2.7 Lilly and Kyle have been unable to conceive a baby through sexual intercourse, so they have decided to try in vitro fertilization. Which of the following is true about their situation?
a. Lilly and Kyle's attempts to have a baby through in vitro fertilization are very likely to be successful.
b. Lilly and Kyle are very likely to have to use a surrogate mother to carry the child.
c. Lilly and Kyle will have to use donor sperm.
d. If Lilly does become pregnant, she will have a higher than average chance of having twins or triplets.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 42 **Type:** Applied **Diff:** Hard
Rationale: Though a – c are all possibilities, they are not very likely or guaranteed, while d is a statement of fact.

2.8 The first 22 pairs of chromosomes
a. contain either X or Y chromosomes.
b. determine the sex of the individual.
c. are called autosomes.
d. do not vary in size.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 43 **Type:** Factual **Diff:** Easy
Rationale: The first 22 pairs of chromosomes are called autosomes; the chromosomes in each pair are about the same size.

2.9 Autosomal chromosomes
a. come in pairs containing one large and one small chromosome.
b. come in pairs of chromosomes that are about the same size.
c. determine the sex of a child.
d. have an X and a Y chromosome.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 43 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers c and d refer to sex chromosomes, a is false.

2.10 Sex chromosomes
a. do not come in pairs.
b. come in pairs of chromosomes that are about the same size.
c. determine the sex of the child.
d. are the first 22 pairs of chromosomes.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 43 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers a and d are false, b is only true for women, leaving c as the answer.

2.11 Kelly and Ruben just had a baby boy. If they could look at their baby's sex chromosomes, they would see
a. one X and one Y chromosome.
b. two Y chromosomes.
c. one Y chromosome only.
d. two X chromosomes.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 43 **Type:** Applied **Diff:** Easy
Rationale: A male has an XY chromosome combination.

2.12 Chromosomes consist of
a. eggs and sperm.
b. phenotypes.
c. alleles.
d. deoxyribonucleic acid.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 43 **Type:** Conceptual **Diff:** Moderate
Rationale: Each chromosome actually consists of one molecule of deoxyribonucleic acid (DNA).

2.13 Each group of nucleotide bases that provides a specific set of biochemical instructions is called a
a. phenotype.
b. gene.
c. chromosome pair.
d. recessive allele.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 43 **Type:** Factual **Diff:** Easy
Rationale: A gene is a group of nucleotide bases that provides a specific set of biochemical instructions.

2.14 Blueprints are to a completed house as _____ are to _____.
a. phenotypes; genotypes
b. genotypes; phenotypes
c. recessive genes; dominant genes
d. dominant genes; recessive genes

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 43 **Type:** Conceptual **Diff:** Hard
Rationale: The genotype is the plan (blueprints) while the phenotype represents the outward manifestation (house) of the plan.

2.15 Which of the following is the best example of a phenotype?
a. blue eyes
b. an allele for sickle-shaped cells
c. an XX chromosome pattern
d. codominant genes

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 43 **Type:** Applied **Diff:** Hard
Rationale: The phenotype refers to the outward expression of an individual's physical, behavioral, or psychological features, therefore blue eyes is the only possible answer.

2.16 The complete set of genes that makes up a person's heredity is called
a. an allele.
b. deoxyribonucleic acid.
c. a genotype.
d. a phenotype.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 43 **Type:** Factual **Diff:** Easy
Rationale: Genotype is the complete set of genes that makes up a person's heredity whereas phenotype is an individual's physical, behavioral, and psychological features.

2.17 Alleles
a. in a chromosome pair are always identical.
b. in a chromosome pair are always different.
c. in a chromosome pair are sometimes identical and sometimes different.
d. occur singly, not in pairs.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 43 **Type:** Factual **Diff:** Moderate
Rationale: Alleles can be homozygous (identical) or heterozygous (different).

2.18 When alleles in a chromosome pair are identical, they are said to be
a. recessive.
c. heterozygous.

b. dominant.
d. homozygous.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 43 **Type:** Conceptual **Diff:** Easy
Rationale: When the alleles in a pair of chromosomes are the same, they are homozygous, whereas when they differ, they are heterozygous.

2.19 Leslie is homozygous for hair type. Therefore, she must have
a. curly hair.
b. straight hair.
c. one allele for curly hair and one allele for straight hair.
d. either two alleles for curly hair or two alleles for straight hair.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 43 **Type:** Applied **Diff:** Moderate
Rationale: Answer c is heterozygous, a or b could both be right but could also be wrong, so d has to be the correct choice since it combines a and b and clarifies two of the same allele.

2.20 An individual who is heterozygous for eye color would have
a. two alleles for brown eyes.
b. one allele for brown eyes and one for blue eyes.
c. two alleles for blue eyes.
d. blue eyes.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 43 **Type:** Applied **Diff:** Hard
Rationale: Answers a and c are homozygous, as is d (since blue eyes are recessive and one would need two alleles for blue eyes in order to have them), therefore b is the only heterozygous possibility.

2.21 Lucas has one allele for normal blood cells and one allele for sickle-shaped cells. Lucas' blood cell alleles are
a. recessive.
b. dominant.
c. heterozygous.
d. homozygous.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 43-45 **Type:** Applied **Diff:** Moderate
Rationale: Because they are different, they are heterozygous.

2.22 The chemical instructions of a _____ allele in an allele pair will be followed while those of a _____ allele will be ignored.
a. heterozygous; homozygous
b. homozygous; heterozygous
c. recessive; dominant
d. dominant; recessive

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 43 **Type:** Factual **Diff:** Moderate
Rationale: Dominant alleles are always followed while recessive alleles (in a dominant-recessive pairing) are usually ignored (except in the case of codominance).

2.23 If the allele for brown eyes is dominant and the allele for blue eyes is recessive, which genotype produces a person with blue eyes?
a. A blue-eyed person is homozygous with two alleles for brown eyes.
b. A blue-eyed person is homozygous with two alleles for blue eyes.
c. A blue-eyed person is heterozygous with one allele for blue eyes and one allele for brown eyes.
d. The alleles for eye color are demonstrating codominance.

Chapter Module: Mechanisms of Heredity

Answer: b **Page(s):** 43-44 **Type:** Applied **Diff:** Moderate
Rationale: Answer b is the only plausible answer since a and c would produce brown eyes, and d violates the assumptions of the question.

2.24 Abner has a dominant allele for a full head of hair and a recessive allele for male pattern baldness. You would expect Abner to
a. be completely bald.
b. be partially bald.
c. have a full head of hair.
d. have thin hair.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 45 **Type:** Applied **Diff:** Moderate
Rationale: He would have a full head of hair because he would need two recessive alleles to be bald, and male pattern baldness is not a codominant trait.

2.25 Jolie has *sickle-cell trait*, a temporary, relatively mild form of sickle-cell anemia, but does not have full-blown sickle-cell anemia. Her condition is most likely the result of
a. incomplete dominance between one allele for normal blood cells and one for sickle-shaped cells.
b. two recessive alleles for sickle-shaped cells.
c. a dominant sickle-shaped cell allele and a recessive normal blood cell allele.
d. two dominant alleles for normal blood cells.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 45 **Type:** Applied **Diff:** Moderate
Rationale: If b was true, he would have sickle-cell anemia; if d was true, he would have normal blood, and c is false because normal blood cells are dominant, not recessive.

2.26 When one allele does not dominate another completely, it is a case of
a. recessive inheritance.
b. incomplete dominance.
c. phenotype.
d. polygenic inheritance.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 45 **Type:** Factual **Diff:** Easy
Rationale: In incomplete dominance, the phenotype that results often falls between the phenotype associated with either allele.

2.27 Sickle-cell anemia
a. occurs in individuals who have one allele for normal blood cells and one allele for sickle-shaped cells.
b. is not an inherited disorder.
c. is not a serious health problem because it is easily cured.
d. is becoming less common in successive generations of African Americans.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 45-46 **Type:** Factual **Diff:** Moderate
Rationale: Answer a refers to sickle-cell trait, b and c are false.

2.28 Recessive alleles are responsible for
a. Down syndrome.
b. Huntington's disease.
c. Klinefelter's syndrome.
d. phenylketonuria.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 47 **Type:** Factual **Diff:** Hard
Rationale: Answer a is caused by an extra 21st chromosome, b is caused by a dominant allele, and c is caused by an extra sex chromosome, therefore d is the correct answer.

2.29 Perry was born with phenylketonuria (PKU) which means that

a. she is mentally retarded and has an extra 21st chromosome.
b. phenylalanine can accumulate and poison her nervous system.
c. she will develop normally until middle adulthood, at which time her nervous system will begin to deteriorate.
d. she has a missing chromosome and will be severely retarded.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 47 **Type:** Applied **Diff:** Moderate
Rationale: Answer a describes Down syndrome, c describes Huntington's disease, and d could refer to any number of disorders.

2.30 The disorder in which a person's nervous system degenerates during infancy is called
a. Tay-Sachs disease.
b. albinism.
c. cystic fibrosis.
d. Huntington's disease.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 47 **Type:** Factual **Diff:** Moderate
Rationale: Tay-Sachs disease is a disorder associated with recessive alleles in which the nervous system degenerates in infancy.

2.31 Jared was born with a disorder that causes his respiratory and digestive tracts to become clogged with mucus. Jared suffers from
a. Klinefelter's syndrome.
b. Tay-Sachs disease.
c. cystic fibrosis.
d. Turner's syndrome.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 47 **Type:** Applied **Diff:** Moderate
Rationale: Cystic fibrosis is characterized by excessive mucus clogging the respiratory and digestive tracts.

2.32 Inherited disorders
a. are more often caused by recessive alleles than by dominant alleles.
b. are more often caused by dominant alleles than by recessive alleles.
c. are due to dominant alleles about half the time.
d. do not usually seriously impair a child's development.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 46-47 **Type:** Factual **Diff:** Moderate
Rationale: Dominant alleles are not usually responsible for genetic disorders since people with the disorders usually die before they can reproduce, therefore recessive alleles are most frequently the cause.

2.33 Why are relatively few inherited disorders caused by dominant alleles?
a. Most disorders caused by dominant alleles lead to sterility, which means the dominant allele will not be passed on.
b. Genetic testing can more readily identify dominant rather than recessive alleles; genetic counseling has more successfully reduced the incidence of disorders caused by dominant alleles.
c. Every person with one of the dominant alleles will have the disorder, and people with most of these disorders do not usually live long enough to reproduce, so the allele will not be passed on.
d. Individuals carrying dominant alleles for a disorder are less likely to actually have the disorder than are individuals carrying a recessive allele for a disorder.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 46-47 **Type:** Conceptual **Diff:** Moderate
Rationale: Dominant alleles are not usually responsible for genetic disorders since people with the disorders usually die before they can reproduce, therefore recessive alleles are most frequently the cause.

2.34 _____ is one of the few serious inherited disorders caused by a dominant allele.
a. Sickle-cell anemia
b. Phenylketonuria
c. Turner's syndrome
d. Huntington's disease

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 47 **Type:** Factual **Diff:** Moderate
Rationale: Answers a and b are caused by recessive alleles, c is caused by a missing sex chromosome.

2.35 Huntington's disease is associated with
a. the absence of an important liver enzyme.
b. limited development of secondary sexual characteristics.
c. a progressive deterioration of the nervous system.
d. taller than normal height.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 47 **Type:** Factual **Diff:** Easy
Rationale: Answers a, b, and d have nothing to do with the disease, while c is a characteristic of it.

2.36 Tom has Huntington's disease. You would expect him to begin to show signs of nervous system deterioration
a. at birth.
b. during childhood.
c. during adolescence.
d. during middle adulthood.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 47 **Type:** Applied **Diff:** Moderate
Rationale: The course of Huntington's disease normally manifests itself in middle adulthood.

2.37 Wendy's development was normal through childhood and early adulthood. However, during her 40s she began to experience muscle spasms, depression, and personality changes. Which of the following disorders or diseases is most likely to be causing her symptoms?
a. phenylketonuria
b. Huntington's disease
c. Turner's syndrome
d. XXX syndrome

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 47 **Type:** Applied **Diff:** Moderate
Rationale: Answers a, c, and d would have manifested themselves at birth or soon after.

2.38 Huntington's disease involves progressive deterioration of the nervous system, which causes
a. muscle spasms, depression, and personality changes.
b. schizophrenia.
c. an accumulation of poisonous substances in the body.
d. sterility.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 47 **Type:** Factual **Diff:** Moderate
Rationale: With Huntington's disease nerve cells begin to deteriorate, which causes muscle spasms, depression, and significant changes in personality.

2.39 Inherited disorders
a. are most often caused by dominant alleles.
b. are relatively rare.
c. do not run in families.
d. are more common than disorders caused by the wrong number of chromosomes.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 47 **Type:** Factual **Diff:** Easy

Rationale: Answers a, c, and d are all false statements, leaving b as the only possibility.

2.40 The most appropriate time for a couple with concerns about their genetic background to seek genetic counseling is
a. before the woman gets pregnant.
b. when the woman gets pregnant.
c. when the couple already has a child with a genetic disorder.
d. when they are about to become grandparents.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 47-48 **Type:** Factual **Diff:** Easy
Rationale: Answer a is the only answer that makes sense from the standpoint of being able to do anything.

2.41 Debbie and Paul are thinking about starting a family, but are a little hesitant because there is a history of phenylketonuria in Debbie's family. What should Debbie and Paul do?
a. They should adopt a child if they want children. Anyone with a history of inherited disease in their family should not have children.
b. They should go ahead and try to start a family. If Debbie is a carrier of the disease, she is unlikely to be able to get pregnant.
c. They should go ahead and start trying. Phenylketonuria is not an inherited disease.
d. They should go to genetic counseling to determine what the odds are that they will pass on the disease.

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 47-48 **Type:** Applied **Diff:** Hard
Rationale: Answers b and c are false; a is an extreme response, leaving d as the only reasonable choice.

2.42 Cornelius and Janelle sought genetic counseling because of concern that they might have children with sickle-cell anemia. The counselor determined they each have one recessive allele for sickle-cells and one dominant allele for healthy blood cells. The counselor would tell them that they have a
a. 100% chance of having a child with sickle-cell anemia.
b. 25% chance of having a child with sickle-cell anemia and a 50% chance of having a child with sickle-cell trait.
c. 25% chance of having a child with sickle-cell trait and a 50% chance of having a child with sickle-cell anemia.
d. 75% chance of having a child with sickle-cell anemia.

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 45; 47-48 **Type:** Applied **Diff:** Hard
Rationale: The four possible combinations are a normal child (two dominant alleles), a child with sickle cell anemia (two recessive alleles) and two children with sickle-cell trait (one dominant and one recessive).

2.43 Genetic counseling typically involves
a. obtaining a detailed family history and performing tests to help couples with concerns about inherited disorders.
b. informing parents-to-be about how they can have a more intelligent child.
c. the government in making decisions for private citizens.
d. helping couples with fertility problems.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 47-48 **Type**: Conceptual **Diff:** Moderate
Rationale: Answers b and c are false, d could be true, but is not the primary purpose of genetic counseling.

2.44 _____ is an inherited disorder caused by an extra 21st chromosome that results in mental retardation.
a. Phenylketonuria
b. Huntington's disease
c. Down syndrome
d. Turner's syndrome

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 48 **Type:** Factual **Diff:** Easy
Rationale: Down syndrome is also known as Trisomy 21 because a person with the disorder has three 21st chromosomes instead of two.

2.45 Individuals with Down syndrome show which of the following characteristics?
a. mental retardation
b. aggression
c. an extra X chromosome
d. a lack of sexual development

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 48 **Type:** Factual **Diff:** Moderate
Rationale: All individuals with Down syndrome show some degree of mental retardation.

2.46 Extra, missing, or damaged chromosomes
a. do not usually disturb development.
b. sometimes disturb development.
c. always disturb development.
d. always cause spontaneous abortion.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 48 **Type:** Factual **Diff:** Moderate
Rationale: While the extent of the disturbance varies, it always happens.

2.47 Aletha and Frank are worried about their 1-year-old baby. His eyes are almond-shaped (unlike theirs), his head seems small, and his development is slower than average — he's just now starting to sit up by himself. Which of the following disorders would you suspect their baby has?
a. Huntington's disease
b. Klinefelter's syndrome
c. Turner's syndrome
d. Down syndrome

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 48 **Type:** Applied **Diff:** Moderate
Rationale: These are all symptoms of Down syndrome.

2.48 Children with Down syndrome typically have
a. advanced development.
b. normal development.
c. slower than normal development.
d. no development.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 48 **Type:** Conceptual **Diff:** Easy
Rationale: Down syndrome is always linked with some degree of mental retardation.

2.49 The extra 21st chromosome that causes Down syndrome is
a. usually provided by the egg.
b. usually provided by the sperm.
c. provided by the egg about half the time and by the sperm about half the time.
d. usually created sometime during prenatal development.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 48 **Type:** Factual **Diff:** Moderate
Rationale: Research indicates that it usually comes from the mother's egg.

2.50 The incidence of Down syndrome
a. increases as the mother gets older.
c. decreases as the father gets older.

b. decreases as the mother gets older.
d. is unrelated to parental age.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 49 **Type:** Factual **Diff:** Easy
Rationale: Women 35 and older have a greater chance of having a child with Down syndrome, and the risk increases with age.

2.51 Who has the greatest risk of having a child with Down syndrome?
a. 15-year-old Meredith
b. 22-year-old Katie
c. 36-year-old Lisa
d. 44-year-old Susan

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 49 **Type:** Applied **Diff:** Moderate
Rationale: While Lisa is at risk, Susan is at a greater risk because she is older.

2.52 The most common reason for fertilized eggs to spontaneously abort shortly after conception is
a. abnormal autosomal chromosomes.
b. abnormal sex chromosomes.
c. environmental teratogens.
d. maternal disease.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 49 **Type:** Factual **Diff:** Hard
Rationale: While all of these can cause a miscarriage, the most common reason is a.

2.53 There are no chromosomal disorders consisting solely of _____ chromosomes.
a. X
b. Y
c. autosomal
d. sex

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 49 **Type:** Factual **Diff:** Easy
Rationale: The X chromosome seems to be necessary for life, so there are no YY or YYY disorders.

2.54 Harold has Klinefelter's syndrome which is caused by a(n) _____ chromosome pattern.
a. XYY
b. XXY
c. Y
d. YY

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 49 **Type:** Applied **Diff:** Moderate
Rationale: Klinefelter's syndrome is characterized by males having an extra X chromosome (XXY).

2.55 Peter has Klinefelter's syndrome. He is likely to be
a. tall, passive, and have below-normal intelligence.
b. short and have difficulty with spatial relations.
c. of normal height and have delayed language development.
d. tall and of average or above average intelligence.

Chapter Module: Mechanisms of Heredity
Answer: a **Page(s):** 49 **Type:** Applied **Diff:** Moderate
Rationale: Answer a describes the most common symptoms of Klinefelter's syndrome.

2.56 Victor is tall and has below-normal intelligence. He has symptoms of
a. Turner's syndrome.
b. XXX syndrome.
c. XYY complement.
d. Y syndrome.

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 49 **Type:** Applied **Diff:** Moderate

Rationale: Answers a and b are syndromes associated with women while d is not possible.

2.57 An XYY complement of sex chromosomes is associated with which of the following characteristics?
a. problems perceiving spatial relations
b. short stature
c. below-normal intelligence
d. susceptibility to heart defects

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 49 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers a and b describe Turner's syndrome while d is linked more with Down syndrome.

2.58 Liz has Turner's syndrome. Which of the following characteristics would you expect her to have?
a. tall stature
b. short stature
c. delayed language development
d. delayed motor development

Chapter Module: Mechanisms of Heredity
Answer: b **Page(s):** 49 **Type:** Applied **Diff:** Moderate
Rationale: Turner's syndrome is characterized by short stature.

2.59 A female who is short, has limited development of secondary sex characteristics, and who has problems with spatial relations would have which of the following disorders?
a. Klinefelter's syndrome
b. XYY complement
c. Turner's syndrome
d. XXX syndrome

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 49 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers a and b are syndromes associated with males, while d is associated with normal height and delayed motor and language development.

2.60 Tina has XXX syndrome. Which of the following characteristics is she likely to have?
a. tall stature, difficulty with spatial relations
b. short stature, difficulty with spatial relations
c. tall stature, below-normal intelligence
d. normal height, delayed motor and language development

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 49 **Type:** Applied **Diff:** Moderate
Rationale: XXX syndrome is not associated with any of the symptoms described in a – c.

2.61 A female who has normal stature, but delayed language, and motor development could have which of the following disorders?
a. Klinefelter's syndrome
b. XYY complement
c. Turner's syndrome
d. XXX syndrome

Chapter Module: Mechanisms of Heredity
Answer: d **Page(s):** 49 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers a and b are disorders associated with males, while c is characterized by short stature and difficulty with spatial relations.

2.62 Which of the following chromosomal disorders does NOT involve abnormal sex chromosomes?
a. Turner's syndrome
b. XXX syndrome
c. Down syndrome
d. Klinefelter's syndrome

Chapter Module: Mechanisms of Heredity
Answer: c **Page(s):** 49 **Type:** Conceptual **Diff:** Moderate
Rationale: Down syndrome is an autosomal disorder.

2.63 The branch of genetics that addresses the inheritance of behavioral and psychological traits is referred to as
a. evocative genetics.
b. active genetics.
c. behavioral genetics.
d. polygenic genetics.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 50 **Type:** Factual **Diff:** Easy
Rationale: Behavioral genetics deals with inheritance of behavioral and psychological traits.

2.64 Polygenic inheritance
a. reflects the influence of a single gene.
b. determines "either-or" traits, such as eye color.
c. cannot be studied because its influence is too broad.
d. influences behavioral and psychological traits such as intelligence.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 50 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers a – c are false, d is the only true statement.

2.65 Most behavioral and psychological characteristics follow a(n) _____ pattern of genetic inheritance.
a. dominant-recessive
b. incomplete dominance
c. sex-linked
d. polygenic

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 50 **Type:** Factual **Diff:** Moderate
Rationale: Complex traits, such as behavioral and psychological characteristics, are usually influenced by many genes (polygenic).

2.66 Personality is
a. determined by a single gene.
b. a polygenic trait.
c. determined by the sex chromosomes.
d. not influenced by genetic factors.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 50-51 **Type:** Conceptual **Diff:** Easy
Rationale: Complex traits, such as personality, are usually influenced by many genes (polygenic).

2.67 When phenotypes are caused by the combined effect of many separate genes, the pattern of inheritance is referred to as
a. polygenic inheritance.
b. dominant-recessive.
c. codominant.
d. sex-linked inheritance.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 50 **Type:** Conceptual **Diff:** Moderate
Rationale: Behavioral characteristics often reflect polygenetic inheritance in which a phenotype depends on the combined actions of many genes.

2.68 Your professor mentions in a lecture that activity level follows a polygenic pattern of inheritance. You, having already read Chapter 2 in your textbook, realize this means that
a. activity level is a recessive trait.
b. a single gene determines activity level.
c. there is no evidence of a genetic influence on activity level.
d. activity level is determined by the combination of many genes.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 50 **Type:** Applied **Diff:** Moderate
Rationale: Polygenic means many (poly) genes (genic).

2.69 Twins that come from a single fertilized egg that splits in two are called
a. dizygotic twins.
b. monozygotic twins.
c. fraternal twins.
d. homozygous.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 51-52 **Type:** Conceptual **Diff:** Easy
Rationale: Monozygotic means one (mono) zygote or one fertilized egg that splits in two.

2.70 Mindy and Mandy are dizygotic twins. Therefore, they
a. came from two separate eggs.
b. have the same genes.
c. have no shared genes.
d. cannot be used in a twin study.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 51-52 **Type:** Applied **Diff:** Easy
Rationale: Dizygotic means two (di) zygotes or two separate eggs.

2.71 Which pair has the most genes in common?
a. mother and daughter
b. identical twins
c. fraternal twins
d. brother and sister

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 51 **Type:** Conceptual **Diff:** Moderate
Rationale: Identical twins have identical genotypes — 100% genes in common.

2.72 _____ twins are to identical twins as _____ twins are to fraternal twins.
a. Homozygous; heterozygous
b. Heterozygous; homozygous
c. Dizygotic; monozygotic
d. Monozygotic; dizygotic

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 51-52 **Type:** Conceptual **Diff:** Moderate
Rationale: Monozygotic twins are identical, while dizygotic twins are fraternal.

2.73 Twin studies
a. cannot be used to study polygenic traits such as intelligence.
b. are based on the assumption that monozygotic twins are not more similar genetically than dizygotic twins.
c. are based on the assumption that heredity influences a trait if identical twins are more alike than fraternal twins.
d. often underestimate the influence of heredity because identical twins may have more similar environments than fraternal twins.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 52-55 **Type:** Conceptual **Diff:** Moderate
Rationale: Since identical twins share 100% of their genes they should be more similar than fraternal twins (who only share 50% of their genes) on traits where heredity is important.

2.74 Dr. Tutu uses a twin study to determine the influence of heredity on emotionality. If emotionality is influenced by heredity, he will find that the level of emotionality is more similar in
a. sibling pairs than in identical twins.
b. fraternal twins than in sibling pairs.
c. fraternal twins than in identical twins.
d. identical twins than in fraternal twins.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 52 **Type:** Applied **Diff:** Hard
Rationale: Since identical twins share 100% of their genes, they should be more similar than fraternal twins (who only share 50% of their genes) on traits where heredity is important.

2.75 In 2010, Dale, Harlaar, Haworth, and Plomin completed a twin study in which they found evidence suggesting an important role for heredity in the ease with which adolescents learn a second language. Given this,

a. skill in foreign language was more similar among fraternal twins than among identical twins.
b. skill in foreign language was more similar among identical twins than among fraternal twins.
c. skill in foreign language was equal among fraternal and identical twins.
d. skill in foreign language cannot be evaluated using a twin study.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 52-53 **Type:** Conceptual **Diff:** Hard
Rationale: Since identical twins share 100% of their genes they should be more similar than fraternal twins (who only share 50% of their genes) on traits where heredity is important.

2.76 Dr. Banta conducts an adoption study to estimate the heritability of intelligence. If intelligence is primarily influenced by the environment, he will find that

a. adopted children's intelligence level is more similar to that of their biological parents than that of their adoptive parents.
b. adopted children's intelligence level is more similar to that of their adoptive parents than that of their biological parents.
c. adopted children's intelligence level is unrelated to that of either their biological or adoptive parents.
d. he cannot determine heritability with an adoption study, therefore he will need to do a twin study.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 53-54 **Type:** Applied **Diff:** Hard
Rationale: Since adopted children share no genes with their adoptive parents, but do share genes with their biological parents, they should have more in common with their adoptive parents on traits where environment is more important than heredity.

2.77 Adoption studies tend to study mothers more often than fathers because

a. mothers tend to have a stronger genetic influence on their children than fathers do.
b. mothers tend to have a stronger environmental influence on their children than fathers do.
c. fathers generally have less genetic and environmental influence on their children's development than mothers do.
d. it is harder to get information about the fathers than about the mothers.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 53 **Type:** Conceptual **Diff:** Moderate
Rationale: Whereas it is clear who the biological mother is, this is not always true for the biological father, who may be unknown or unavailable.

2.78 If a trait is strongly influenced by genetic factors, you would expect to find that

a. adopted children resemble their biological parents more than their adoptive parents on that trait.
b. adopted children resemble their adoptive parents more than their biological parents on that trait.
c. dizygotic twins would be more similar on that trait than monozygotic twins would be.
d. dizygotic twins would be more similar on that trait than siblings would be.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 53-54 **Type:** Conceptual **Diff:** Moderate
Rationale: Since adopted children share no genes with their adoptive parents, but do share genes with their biological parents, they should have more in common with their biological parents on traits where heredity is important.

2.79 In adoption studies

a. the results may be biased because biological and adoptive parents may be similar.
b. adoptive parents are assumed to provide genetic influence.
c. biological parents are assumed to provide environmental influence.
d. the greater similarity of adoptees to biological than to adoptive parents on a trait would indicate that the trait is influenced by the environment.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 53-54 **Type:** Conceptual **Diff:** Moderate
Rationale: Answers b and d are false; c is rarely true, whereas there is evidence that adoptive and biological parents are more similar than initially suspected.

2.80 Adoption studies may be flawed because
a. adopted children are more likely than nonadopted children to have genetic disorders.
b. the results of adoption studies usually conflict with results of twin studies.
c. agencies may try to place adoptees in environments similar to those of their biological parents.
d. parents treat adopted children differently from biological children.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 54-55 **Type:** Conceptual **Diff:** Moderate
Rationale: Research indicates that c is true.

2.81 A potential flaw of twin studies is that
a. monozygotic twins do not always have identical genes.
b. dizygotic twins do not have identical genes.
c. parents may treat identical twins more similarly than they treat fraternal twins.
d. parents may treat fraternal twins more similarly than they treat identical twins.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 54-55 **Type:** Conceptual **Diff:** Moderate
Rationale: Because identical twins look more similar, they may be treated more similarly.

2.82 The problems associated with twin studies and adoption studies
a. are not serious enough to cause concern.
b. can be minimized by using both kinds of studies to see if they yield similar results.
c. can be minimized by using only one kind of study, so potential flaws are not multiplied.
d. are insurmountable.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 55 **Type:** Conceptual **Diff:** Moderate
Rationale: When both types of studies are used, results have more reliability and validity.

2.83 Results of twin and adoption studies suggest that genetics strongly influence
a. intelligence, but do not strongly influence psychological disorders or personality.
b. intelligence and psychological disorders, but do not strongly influence personality.
c. personality and psychological disorders, but do not strongly influence intelligence.
d. intelligence, psychological disorders, and personality.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 55 **Type:** Factual **Diff:** Moderate
Rationale: All three seem to have a strong genetic (heritable) component.

2.84 Sadie is depressed. You would be most likely to find that
a. Sadie's identical twin is depressed.
b. Sadie's adoptive mother is depressed.
c. Sadie's brother is depressed.
d. no one else in Sadie's family is depressed.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 55 **Type:** Applied **Diff:** Easy
Rationale: There would be a 50% chance of Sadie's identical twin being depressed

2.85 In Plomin's study of the effects of heredity on intelligence

a. adopted children's intelligence was more similar to their adoptive parents' skills and they became more similar as the children grew older.
b. adopted children's intelligence was more similar to their biological parents' skills, but they became less similar as the children grew older.
c. adopted children's intelligence was more similar to their adoptive parents' skills, but they became less similar as the children grew older.
d. adopted children's intelligence was more similar to their biological parents' skills and they became more similar as the children grew older.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 54 **Type:** Factual **Diff:** Moderate
Rationale: Adopted children's intelligence was unrelated to their adoptive parents' skills, but was related to their biological parents' skills, and this relation grew stronger as the children grew older.

2.86 Whose opinion is best supported by the results of twin and adoption studies?
a. Aaron, who assumes heredity is solely responsible for behavioral development.
b. Baron, who believes heredity has a substantial, but not total influence on behavioral development.
c. Karen, who asserts that heredity has virtually no influence on development.
d. Sharon, who asserts that twin and adoption studies are too flawed to yield accurate information about the influence of genetics on development.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 56 **Type:** Applied **Diff:** Moderate
Rationale: Heredity seems to have a substantial influence on development, although environment is certainly important and interacts dynamically with heredity.

2.87 Benji has the genotype for phenylketonuria. Which of the following statements is true?
a. Benji will be mentally retarded.
b. Benji's phenylketonuria is not likely to surface until he reaches middle age.
c. If Benji avoids consuming phenylalanine, he will have normal intelligence.
d. Benji has a high likelihood of having an older mother.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 57 **Type:** Applied **Diff:** Hard
Rationale: Answer a might be true, but doesn't have to be if his diet is monitored, b and d are false. This demonstrates that a genotype can lead to many different phenotypes, depending on the specific environment in which the genotype is expressed.

2.88 Phenylketonuria (PKU) is an example of
a. the interaction between genes and environment.
b. a disorder caused by a dominant allele.
c. a chromosomal abnormality caused by an extra chromosome.
d. a disorder whose effects cannot be changed by the environment.

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 56 **Type:** Conceptual **Diff:** Hard
Rationale: You need both the genotype for PKU and the environment (consumption of phenylalanine) in order to manifest the disease.

2.89 The continuous interplay between genes and multiple levels of the environment (from cells to culture) that drives development is known as _____.
a. epigenesis. c. heritability.
b. codominance. d. niche-icking.

Chapter Module: Heredity, Environment, and Development

Answer: a **Page(s):** 57 **Type:** Factual **Diff**: Moderate
Rationale: There is constant interaction between genetic instructions and the nature of the immediate cellular environment, which can be influenced by a host of much broader environmental factors.

2.90 Intelligence has a heritability coefficient of about .5 which means
a. about 50% of an individual's intelligence is due to heredity.
b. about 50% of the differences in intelligence between people is due to heredity.
c. about 50% of an individual's intelligence is due to environmental factors.
d. about 50% of the differences in intelligence between people is unable to be measured.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 57 **Type:** Applied **Diff:** Moderate
Rationale: Heritability coefficients, which estimate the extent to which differences between people reflect heredity, apply to groups of people, not a single person.

2.91 Which situation will lead to the largest heritability coefficient for reading disability?
a. well-educated parents providing academically stimulating environments that foster children's reading ability
b. less-educated parents providing academically stimulating environments that foster children's reading ability
c. well-educated parents providing environments that do not foster children's reading ability
d. less-educated parents providing environments that do not foster children's reading ability

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 58 **Type:** Applied **Diff:** Hard
Rationale: Heritability coefficients, which estimate the extent to which differences between people reflect heredity, only apply to a specific group of people living in a specific environment.

2.92 An example of niche-picking is
a. parents enrolling their active child in many structured, sedentary activities in hopes that he will calm down.
b. parents enrolling their active child in many athletic activities in hopes that he will burn off some steam.
c. an active child choosing to participate in many athletic events.
d. an uncoordinated child choosing to participate in athletic events in hopes of becoming more coordinated.

Chapter Module: Heredity, Environment, and Development
Answer: c **Page(s):** 58 **Type:** Applied **Diff:** Moderate
Rationale: Answer c is the only example of niche-picking, where the owner of the genotype makes the active choice of the environment that supports the genotype.

2.93 Who provides the best example of niche-picking?
a. musically-talented Mosi who chooses to spend his free time listening to music and practicing his guitar
b. natural singer Vanessa who is often asked to sing by her family and friends
c. tone-deaf Toneesha whose choir director asks her to simply mouth the words, rather than sing during performances
d. piano prodigy Philip who not only inherited musical talent from his symphony-playing parents, but was encouraged by his parents to begin playing a musical instrument at an early age

Chapter Module: Heredity, Environment, and Development
Answer: a **Page(s):** 58 **Type:** Applied **Diff:** Moderate
Rationale: Answer a is the only example of niche-picking, where the owner of the genotype makes the active choice of the environment that supports the genotype.

2.94 Niche-picking refers to
a. one genotype leading to a range of phenotypes, depending on the environment.
b. children deliberately seeking environments that fit their heredity.
c. children's heredity eliciting different reactions from the environment.
d. parents both passing on their genes to their children and providing an environment for their children.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 58 **Type:** Conceptual **Diff:** Easy
Rationale: Niche-picking is the process of deliberately seeking environments that fit one's heredity.

2.95 Caris is very artistically talented and chooses to spend much of her time drawing and painting. This is a good example of
a. a passive gene-environment relation.
b. an evocative gene-environment relation.
c. a reaction range.
d. niche-picking.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 57 **Type:** Applied **Diff:** Moderate
Rationale: Niche-picking is where children deliberately seek environments that fit their heredity.

2.96 The forces within a family that make children different from one another are referred to as
a. an evocative gene-environment relation.
b. passive gene-environment relation.
c. incomplete dominance.
d. nonshared environmental influences.

Chapter Module: Heredity, Environment, and Development
Answer: d **Page(s):** 58 **Type:** Conceptual **Diff:** Easy
Rationale: Nonshared environmental influences are the environmental forces that make siblings different from one another.

2.97 The fact that children with genes for average intelligence can actually develop either below-average, average, or above-average intelligence depending on their experiences best illustrates which of the following themes of development?
a. Early development is related to later development, but not perfectly.
b. Development is always jointly influenced by heredity and environment.
c. Children help determine their own environment.
d. Development in different domains is connected.

Chapter Module: Heredity, Environment, and Development
Answer: b **Page(s):** 56 **Type:** Conceptual **Diff:** Hard
Rationale: All are true, but b is the only answer that is illustrated by the example. The consequences of genetic instructions depend on the environment in which those instructions develop.

TRUE/FALSE QUESTIONS

2.98 Each sperm and egg contains 46 chromosomes.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 42 **Type:** Factual **Diff:** Easy
Rationale: Each sperm and egg contains 23 chromosomes.

2.99 *In vitro fertilization* involves combining the sperm and egg in a laboratory dish.

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 42 **Type:** Factual **Diff:** Easy
Rationale: *In vitro fertilization* involves mixing sperm and egg together in a laboratory dish and then placing several fertilized eggs in a woman's uterus.

2.100 About 80% of *in vitro fertilization* attempts succeed.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 42 **Type:** Factual **Diff:** Moderate

Rationale: About 1/3 of *in vitro fertilization* attempts succeed.

2.101 The autosomes determine the sex of the child.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 43 **Type:** Factual **Diff:** Moderate
Rationale: The sex chromosomes determine the sex of the child.

2.102 The first pair of chromosomes determines the sex of the child.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 43 **Type:** Factual **Diff:** Moderate
Rationale: The 23rd pair determines the sex of the child.

2.103 Chromosomes consist of deoxyribonucleic acid (DNA).

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 43 **Type:** Factual **Diff:** Easy
Rationale: Each chromosome consists of one molecule of DNA.

2.104 A homozygous individual has two alleles that are the same.

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 43 **Type:** Factual **Diff:** Moderate
Rationale: This is a statement of fact.

2.105 If an allele for a disorder is dominant, then every person who receives the allele will have the disorder.

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 45 **Type:** Conceptual **Diff:** Moderate
Rationale: When one allele is dominant, its chemical instructions are followed.

2.106 Individuals with the sickle-cell allele are more resistant to malaria.

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 47 **Type:** Conceptual **Diff:** Moderate
Rationale: Africans with sickle-cell alleles are less likely to die from malaria, which means the sickle-cell allele is passed along to the next generation.

2.107 Huntington's disease is a fatal disease caused by a recessive allele.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 47 **Type:** Conceptual **Diff:** Moderate
Rationale: Huntington's disease is a fatal disease characterized by progressive degeneration of the nervous system, which is caused by a dominant allele found on chromosome 4.

2.108 The presence of abnormal autosomes is a major cause for spontaneous abortions during the period of the zygote.

Chapter Module: Mechanisms of Heredity
Answer: True **Page(s):** 49 **Type:** Conceptual **Diff**: Moderate
Rationale: Nearly half of all fertilized eggs abort spontaneously within 2 weeks, primarily because of abnormal autosomes.

2.109 The extra 21st chromosome that is found with Down syndrome usually comes from the father's sperm.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 47 **Type:** Conceptual **Diff:** Moderate
Rationale: The extra 21st chromosome is usually provided by the mother's egg.

2.110 The risk of having a baby with Down syndrome decreases as the mother gets older.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 49 **Type:** Conceptual **Diff:** Easy
Rationale: The risk increases as the mother gets older.

2.111 The presence of a Y chromosome appears to be necessary for life.

Chapter Module: Mechanisms of Heredity
Answer: False **Page(s):** 49 **Type:** Factual **Diff:** Moderate
Rationale: The X chromosome appears to be necessary for life.

2.112 The traits controlled by single genes usually represent "either-or" phenotypes, while traits controlled by many genes typically represent an entire range of different outcomes.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 50 **Type:** Conceptual **Diff:** Moderate
Rationale: Traits controlled by single genes usually represent "either-or" phenotypes. That is, the genotypes are usually associated with two (or sometimes three) well-defined phenotypes.

2.113 Most behavioral and psychological traits are polygenic traits.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 50 **Type:** Conceptual **Diff:** Hard
Rationale: Many behavioral and psychological characteristics reflect the combined activity of many separate genes, a pattern known as polygenic inheritance.

2.114 In twin studies, it is assumed that heredity influences a characteristic if fraternal twins are more alike than identical twins.

Chapter Module: Heredity, Environment, and Development
Answer: False **Page(s):** 52 **Type:** Conceptual **Diff:** Moderate
Rationale: This would be true if identical twins were more alike than fraternal twins.

2.115 In adoption studies, if a behavior has genetic roots, adopted children should behave more like their biological parents than their adoptive parents.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 53 **Type:** Conceptual **Diff:** Easy
Rationale: If a behavior has genetic roots, then adopted children's behavior should resemble their biological parents even though they have never met them.

2.116 One problem with twin studies is that the experiences of identical twins may be more similar than the experiences of fraternal twins, so that heredity appears to have a greater influence.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 55 **Type:** Conceptual **Diff**: Moderate
Rationale: Parents and other people may treat identical twins more similarly than fraternal twins. This would make identical twins more similar than fraternal twins.

2.117 The behavioral consequences of genetic instructions depend on the environment in which those interactions develop.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 57 **Type:** Conceptual **Diff:** Moderate
Rationale: A genotype can lead to many different phenotypes depending on the specific environment in which the genotype is expressed.

2.118 Teenage girls begin to menstruate at a younger age if they've had a stressful childhood. This is an example of epigenesist.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 57 **Type:** Conceptual **Diff:** Moderate
Rationale: Epigenesis is the continuous interplay between genes and multiple levels of the environment that drives development.

2.119 A heritability coefficient estimates the extent to which differences within an individual reflect heredity.

Chapter Module: Heredity, Environment, and Development
Answer: False **Page(s):** 57 **Type:** Conceptual **Diff:** Moderate
Rationale: Heritability coefficients apply to groups of people, not to a single person.

2.120 Heredity and environment interact dynamically throughout development.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 57-58 **Type:** Conceptual **Diff:** Easy
Rationale: Genes and environments constantly influence each other throughout a child's life.

2.121 The environment has no impact on when genes are activated — they follow a predictable and predetermined schedule based on maturation.

Chapter Module: Heredity, Environment, and Development
Answer: False **Page(s):** 57-58 **Type:** Conceptual **Diff:** Moderate
Rationale: Genes and environment constantly influence each other, and the environment can determine when genes are "turned on."

2.122 Experiences determine which phenotypes emerge, and genotypes influence the nature of experiences.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 57-58 **Type:** Conceptual **Diff:** Moderate
Rationale: Niche-picking is a prime example of the interactions between nature, nurture, and development.

2.123 Although environmental factors are important, they usually affect each child in a unique way, which makes siblings differ.

Chapter Module: Heredity, Environment, and Development
Answer: True **Page(s):** 57-58 **Type:** Conceptual **Diff:** Easy
Rationale: Environmental influences typically make children within a family different. This is known as nonshared environmental influences.

SHORT ANSWER QUESTIONS

2.124 Explain basic concepts of single gene inheritance using the terms *alleles, chromosomes, homozygous, heterozygous, dominant, and recessive*.

Chapter Module: Mechanisms of Heredity
Page(s): 43-45 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will include the following key points:

- Genes come in different forms called alleles.
- The alleles in a pair of chromosomes are sometimes the same, which makes them homozygous.
- The alleles in a pair of chromosomes sometimes differ, which makes them heterozygous.
- If a person is homozygous for a trait, such as eye color, the genotype produces the phenotype.
- If a person is heterozygous for a trait, the phenotype produced depends on which allele is dominant.
- If one allele is dominant, its chemical instructions are followed whereas those of the other, the recessive allele, are ignored.

2.125 Name and briefly describe some common disorders associated with recessive alleles.

Chapter Module: Mechanisms of Heredity
Page(s): 47 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will include the following key points:

- *Albinism*: skin lacks melanin, which causes visual problems and extreme sensitivity to light.
- *Cystic fibrosis*: excess mucus clogs digestive and respiratory tracts.
- *Phenylketonuria (PKU)*: Phenylalanine, an amino acid, accumulates in the body and damages the nervous system, causing mental retardation.
- *Tay-Sachs disease*: The nervous system degenerates in infancy, causing deafness, blindness, mental retardation, and, during the preschool years, death.

2.126 Explain the general properties of the paths from genes to behavior.

Chapter Module: Heredity, Environment, and Development
Page(s): 56-59 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will include the following key points:

- The behavioral consequences of genetic instructions depend on the environment in which those instructions develop.
- Heredity and environment interact dynamically throughout development.
    - *Epigenesis:* the continuous interplay between genes and multiple levels of the environment (from cells to culture) that drives development.
- Genes can influence the kind of environment to which a child is exposed.
    - *Niche-picking*: the process of deliberately seeking environments that fit one's heredity.
- Environmental influences typically make children within a family different.
    - *Nonshared environmental influences*: the environmental forces that make siblings different from one another.

ESSAY QUESTIONS

2.127 Your friends Shania and Ricky are expecting a baby. Both Shania and Ricky are farsighted and have cheek dimples. Shania and Ricky have said that they hope that their baby won't need to wear glasses or have cheek dimples because they both hate their glasses and dimples. What can you tell them about genetic inheritance and the likelihood that they will get their wish?

Chapter Module: Mechanisms of Heredity
Page(s): 42-45 **Type:** Applied **Diff:** Hard
Answer: A good answer will be similar to the following:
You can tell Shania and Ricky that both farsightedness and cheek dimples are dominant traits. That means that an individual who is heterozygous with one dominant allele and one recessive allele will still show the dominant trait. Given that both Shania and Ricky show the dominant traits, they both

must have at least one allele for the dominant trait, so the likelihood that their baby will NOT have the dominant traits of farsightedness and cheek dimples is small.

2.128 Describe Down syndrome. What it is, its causes, and its symptoms? What are the odds of having a child with Down syndrome?

Chapter Module: Mechanisms of Heredity
Page(s): 48-49 **Type:** Factual **Diff:** Moderate
Answer: A good answer will be similar to the following:

- Down syndrome is a genetic disorder that is caused by an extra 21st chromosome that is usually provided by the egg.
- Symptoms:
  - almond-shaped eyes
  - a fold over the eyelid
  - smaller than normal head, neck, and nose
  - delayed mental and behavioral development
  - mental retardation
- Odds that a woman will bear a child with Down syndrome increases markedly as she gets older. The increased risk may be because a woman's eggs have been in her ovaries since her own prenatal development.
  - For a woman in her late 20s — the risk is about 1 in 1,000.
  - For a woman in her early 40s — the risk is about 1 in 50.

2.129 Name and describe one disorder caused by an abnormal number of sex chromosomes that affects only males. In addition, name and describe one disorder caused by an abnormal number of sex chromosomes that affects only females.

Chapter Module: Mechanisms of Heredity
Page(s): 49 **Type:** Factual **Diff:** Moderate
Answer: A good answer will include the following key points:

- *Klinefelter's syndrome* (XXY chromosome pattern): characteristics include tall stature, small testicles, sterile, and below-normal intelligence. Males only. OR
- *XYY complement*: characteristics include tall stature and, sometimes, below-normal intelligence. Males only. OR
- *Turner's syndrome* (Xo): characteristics are short stature, limited development of secondary sex characteristics, and problems perceiving spatial relations. Females only. OR
- *XXX syndrome:* characteristics are normal stature, but delayed motor and language development. Females only.

2.130 Explain how (a) twin studies, and (b) adoption studies are used to determine the influence of heredity on a trait and discuss a potential flaw of each type of study.

Chapter Module: Heredity, Environment, and Development
Page(s): 51 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will be similar to the following:

- *Twin studies* compare identical and fraternal twins to determine the influence of heredity. Identical or monozygotic twins come from a single fertilized egg that splits in two, and they have the same genes. Fraternal or dizygotic twins come from two separate eggs fertilized by two separate sperm and share, on average, about half their genes — just like regular siblings. In a twin study, if identical twins are more alike than fraternal twins on a particular trait or behavior, it suggests that heredity influences that trait or behavior. *Potential flaw*: Parents and other people may treat identical twins more similarly than they treat fraternal twins. This would make identical twins more similar than fraternal twins in their experiences, as well as in their genes.

- In *adoption studies*, adopted children are compared to their adoptive parents and their biological parents. Adoptive parents have provided the child's environment. Biological parents provided the child's genes. If children are more similar to their biological parents than to their adoptive parents on a particular trait or behavior, it suggests that genes influence that trait or behavior. *Potential flaw*: Adoption agencies may try to place children in homes like those of their biological parents. This can bias adoption studies because biological and adoptive parents end up being similar.

2.131 Heredity and environment interact dynamically throughout development. We know that a genotype is expressed differently when it is exposed to a different environment. We also know that the environment can trigger genetic expression. Explain this constant connection between nature and nurture. Be sure to give examples and discuss epigenesist in your explanation.

Chapter Module: Heredity, Environment, and Development
Page(s): 55-56 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will be similar to the following:
A genotype leads to a phenotype, but only if the environment cooperates in the usual manner. For example, PKU can only be expressed when children inherit a recessive gene on the long arm of chromosome 12 from both parents. If parents know their infant has the genotype for the disease, infants are placed on a diet that limits phenylalanine and the disease does not appear. In addition, children's experiences can help to determine when and how genes are activated. For example, teenage girls begin to menstruate at a younger age if they've had a stressful childhood. There is a constant interaction between genetic instructions and the nature of the immediate cellular environmental factors, which is known as epigenesist.

2.132 You and a friend were talking about the role of heredity and environment on child development. You tell your friends that "nature" can help determine the kind of "nurturing" that a child receives. Explain and give an example (since your friend looks really confused). Be sure to discuss niche-picking in your explanation.

Chapter Module: Heredity, Environment, and Development
Page(s): 58-59 **Type:** Conceptual **Diff:** Moderate
Answer: A good answer will be similar to the following:
Genes can influence the kind of environment to which a child is exposed. A child's genotype can lead people to respond to the child in a specific way. For example, a child who is bright (due in part to genes) may receive lots of attention from teachers whereas a child who is not so bright (again, due in part to genes) may be overlooked by teachers. In addition, a child who is bright may seek out environments which strengthen his or her own intellectual development. This process of seeking out environments that fit one's heredity is called niche-picking.