1. A segment of a DNA strand has the following bases:

   TAC GAT

   What is the complementary strand of DNA?
   A    UAG CAU
   B    TAG CAT
   C    ATG CTA
   D    AUG CUA

2. Which relationship is most similar to the relationship below?

   tRNA : ribosome
   A    book : publisher
   B    truck : factory
   C    key : lock
   D    baker : pie

3. Before a cell goes through either mitosis or meiosis, which process must be carried out by the DNA in the nucleus?
   A    replication
   B    nondisjunction
   C    transcription
   D    translation

4. Sexual reproduction provides for what to occur?
   A    cloning
   B    budding
   C    genetic stability
   D    genetic variation

5. Which would most likely favor species survival in changing environmental conditions?
   A    genetic recombination
   B    energy involvement in gamete production
   C    length of life cycle
   D    number of offspring produced

6. Which term best describes the type of cell division in which parent cells produce daughter cells with the same number of chromosomes as the parent cells?
   A    mitosis
   B    meiosis
   C    spermatogenesis
   D    oogenesis
7. What is the primary cause of variation in the offspring of sexually reproducing organisms?
   A cytoplasmic division
   B environmental changes
   C mutation
   D recombination of alleles

8. Which is responsible for most genotypic and phenotypic variation among humans?
   A meiosis
   B budding
   C mitosis
   D regeneration

9. In genetics research, what is the purpose of a test cross?
   A to determine the phenotypes of the parents
   B to determine the genotypes of the parents
   C to determine whether or not two parents could produce viable offspring
   D to determine how many offspring can be produced by two parents

10. Several matings between the same male black guinea pig and female brown guinea pig produce a total of 12 brown and 14 black guinea pigs. If black is dominant and brown is recessive, what are the genotypes of the parents?
    A BB × bb
    B Bb × bb
    C BB × Bb
    D Bb × Bb

11. Most sex-linked, recessive traits—including hemophilia and color blindness—appear in males. This phenomenon is best explained by which statement?
    A Males have an X chromosome with dominant genes.
    B Most of the genes on the X and Y chromosomes of males are recessive.
    C In males, the recessive sex-linked genes appear only on the Y chromosome.
    D In males, the Y chromosome lacks the genes needed to mask the recessive genes on the X chromosome.
12. Huntington’s disease is a dominant trait. What are the chances that a child will develop Huntington’s disease if one parent is heterozygous and the other is normal?

A 0 out of 4  
B 1 out of 4  
C 2 out of 4  
D 3 out of 4

13. Some flowers show incomplete dominance. If RR = white and R’R’ = red, which phenotypic ratio would be expected in the offspring of two pink flowers?

A 1 red : 2 pink : 1 white  
B 0 red : 4 pink : 0 white  
C 3 red : 0 pink : 1 white  
D 4 red : 0 pink : 0 white

14. A couple has five children, all with blood type A. The mother’s blood type is O, and the father’s blood type is A. Based on this information, which describes the most probable genotype of the father?

A diploid  
B haploid  
C heterozygous  
D homozygous

15. A karyotype of a human female shows that she has only one sex chromosome. Which genotype would represent her genetic condition?

A XO  
B XXX  
C XY  
D XYY
16. The diagram below represents DNA fingerprints which are the result of gel electrophoresis done on several DNA samples found at a crime scene.

Gel Electrophoresis Results

<table>
<thead>
<tr>
<th>Crime Scene DNA</th>
<th>Suspect A</th>
<th>Suspect B</th>
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Which suspect is linked to the crime scene by this DNA analysis?
A  Suspect A  
B  Suspect B  
C  Suspect C  
D  Suspect D

17. A plant nursery only grew one type of tomato plant. All of their tomato plants died from the same disease. What was most likely true of the tomato plant population?
A  They had a lot of resistance to disease.  
B  They had a few plants that were resistant to the disease.  
C  They had too much variation in their genes.  
D  They had little variation in their genes.
18. Most individuals of a certain species of bird have medium-length tails, but tail length ranges within the species from very short to very long.

If a new predator arrived that preferred birds with medium-length tails, which graph describes the most likely result?

A

B

C

D
19. A paleontologist is comparing the fossilized remains of two primates. Both animals had a prehensile tail. What can be concluded from this evidence?

A They were not related.
B They lived on the ground.
C They evolved from a common ancestor.
D They had bipedal locomotion.

20. Variation within species was important to the development of Darwin’s theory of evolution. Which statement does individual variation help explain?

A Resources become limited over long periods of time.
B Populations often increase rapidly and without warning.
C Competition is fierce among members of different species.
D Some organisms survive and reproduce better than others.

21. Variety within a species is most likely to result from which situation?

A severe weather conditions that might occur, such as hurricanes or blizzards
B adaptation to local environmental characteristics by isolated populations of the species
C the extinction of competing species over a broad range of habitats
D sex-specific coloring differences

22. Which could be considered biochemical evidence of an evolutionary relationship?

A absence of vestigial structures
B presence of embryonic gill slits
C similar anatomical structures
D presence of identical proteins
23. Which is the **best** evidence of an evolutionary relationship between two organisms?

A. similarity in behavior  
B. similarity in DNA  
C. similarity in habitat  
D. similarity in niche

**End of Goal 3 Sample Items**

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9  **Objective:**  3.03
Interpret and predict patterns of inheritance.
   a. dominant, recessive and intermediate traits.
   b. Multiple alleles.
   c. Polygenic inheritance.
   d. Sex-linked traits.
   e. Independent assortment.
   f. Test cross.
   g. Pedigrees.
   h. Punnett squares.
**Thinking Skill:** Applying  
**Correct Answer:**  B

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**Thinking Skill:** Generating  
**Correct Answer:**  B

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**Thinking Skill:** Evaluating  
**Correct Answer:**  D

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Thinking Skill: Applying  
Correct Answer: C

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Thinking Skill: Generating  
Correct Answer: A

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Thinking Skill: Analyzing  
Correct Answer: D

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h. Punnett squares.

Thinking Skill: Applying  
Correct Answer: A
16 **Objective: 3.04**  
Assess the impact of advances in genomics on individuals and society.  
a. Human genome project.  
b. Applications of biotechnology.  
**Thinking Skill:** Analyzing  
**Correct Answer:** C

17 **Objective: 3.05**  
Examine the development of the theory of evolution by natural selection including:  
a. Development of the theory.  
b. The origin and history of life and Fossil and biochemical evidence.  
c. Mechanisms of evolution.  
d. Applications (pesticide and antibiotic resistance).  
**Thinking Skill:** Generating  
**Correct Answer:** D

18 **Objective: 3.05**  
Examine the development of the theory of evolution by natural selection including:  
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**Thinking Skill:** Analyzing  
**Correct Answer:** A

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c. Mechanisms of evolution.  
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**Thinking Skill:** Analyzing  
**Correct Answer:** C

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d. Applications (pesticide and antibiotic resistance).  
**Thinking Skill:** Analyzing  
**Correct Answer:** D

21 **Objective: 3.05**  
Examine the development of the theory of evolution by natural selection including:  
a. Development of the theory.  
b. The origin and history of life and Fossil and biochemical evidence.
c. Mechanisms of evolution.
d. Applications (pesticide and antibiotic resistance).

Thinking Skill: Analyzing

Correct Answer: B

22 Objective: 3.05
Examine the development of the theory of evolution by natural selection including:
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b. The origin and history of life and Fossil and biochemical evidence.
c. Mechanisms of evolution.
d. Applications (pesticide and antibiotic resistance).

Thinking Skill: Analyzing

Correct Answer: D

23 Objective: 3.05
Examine the development of the theory of evolution by natural selection including:
a. Development of the theory.
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d. Applications (pesticide and antibiotic resistance).

Thinking Skill: Knowledge

Correct Answer: B