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 $BB \times bb$

    B $Bb \times bb$

    C $BB \times Bb$

    D $Bb \times Bb$

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

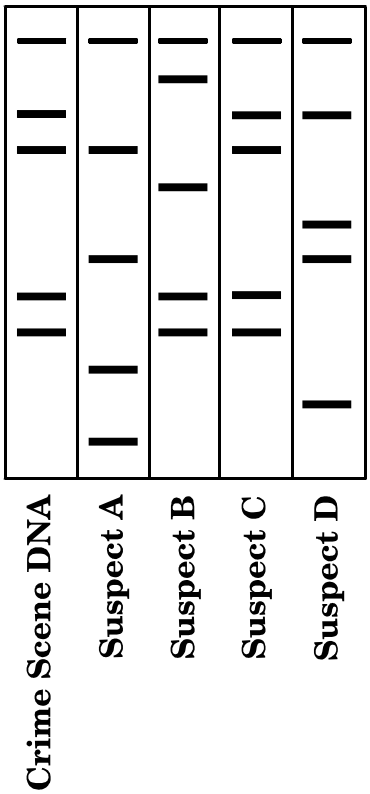
B XXX

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



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.

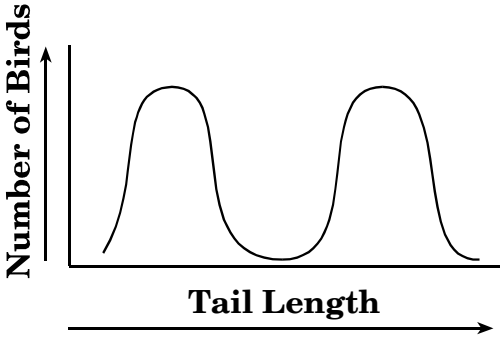
D They had little variation in their genes.

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.

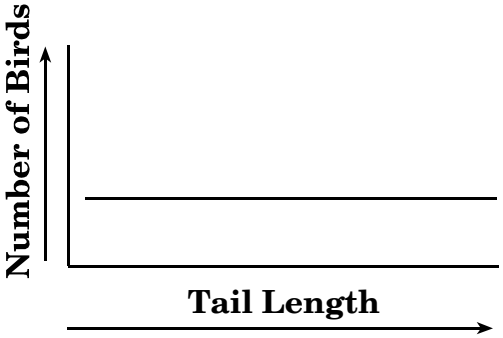
Short Tail | Medium Tail | Long Tail

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

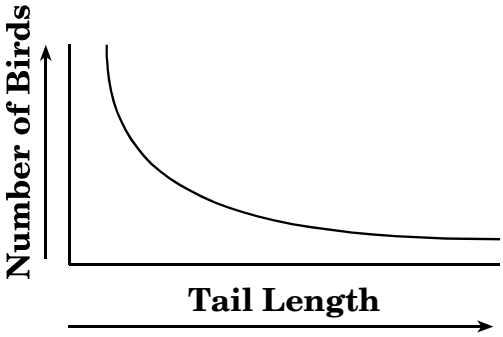
A



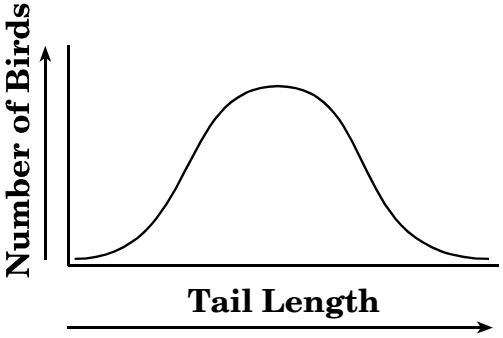
B



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

EOC Biology Goal 3
Sample Items Key Report

1 **Objective: 3.01**
Analyze the molecular basis of heredity including:
a. DNA replication.
b. Protein synthesis (transcription, translation).
c. Protein Synthesis.
c. Protein Synthesis.
Thinking Skill: Applying **Correct Answer:** C

2 **Objective: 3.01**
Analyze the molecular basis of heredity including:
a. DNA replication.
b. Protein synthesis (transcription, translation).
c. Protein Synthesis.
c. Protein Synthesis.
Thinking Skill: Analyzing **Correct Answer:** B

3 **Objective: 3.01**
Analyze the molecular basis of heredity including:
a. DNA replication.
b. Protein synthesis (transcription, translation).
c. Protein Synthesis.
c. Protein Synthesis.
Thinking Skill: Knowledge **Correct Answer:** A

4 **Objective: 3.02**
Compare and contrast the characteristics of asexual and sexual reproduction.
Thinking Skill: Knowledge **Correct Answer:** D

5 **Objective: 3.02**
Compare and contrast the characteristics of asexual and sexual reproduction.
Thinking Skill: Evaluating **Correct Answer:** A

6 **Objective: 3.02**
Compare and contrast the characteristics of asexual and sexual reproduction.
Thinking Skill: Knowledge **Correct Answer:** A

7 **Objective: 3.02**
Compare and contrast the characteristics of asexual and sexual reproduction.
Thinking Skill: Knowledge **Correct Answer:** D

8 **Objective: 3.02**
Compare and contrast the characteristics of asexual and sexual reproduction.
Thinking Skill: Knowledge **Correct Answer:** A

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

10 **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: Generating **Correct Answer:** B

11 **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: Evaluating **Correct Answer:** D

12 **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:** C

13 **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: Generating **Correct Answer:** A

14 **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: Analyzing **Correct Answer:** D

15 **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:** 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:
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:** A

19 **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:** C

20 **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:** 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:
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:** D

23 **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: Knowledge **Correct Answer:** B