Name: _____ Class: _____ Date: _____ ID: A

Big Idea 1.C and 1.D Formatives

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. Monkeys of South and Central America have prehensile tails, meaning that their tails can be used to grasp objects. The tails of African and Asian monkeys are not prehensile. Which discipline is most likely to provide an explanation for how this difference in tails came about?
a. aerodynamics
b. biogeography
c. physiology
d. biochemistry
e. botany

____ 2. Within a few weeks of treatment with the drug 3TC, a patient's HIV population consists entirely of 3TC-resistant viruses. How can this result best be explained?
a. HIV has the ability to change its surface proteins and resist vaccines.
b. The patient must have become reinfected with 3TC-resistant viruses.
c. HIV began making drug-resistant versions of reverse transcriptase in response to the drug.
d. A few drug-resistant viruses were present at the start of treatment, and natural selection increased their frequency.
e. The drug caused the HIV RNA to change.

____ 3. The smallest biological unit that can evolve over time is
a. a cell.
b. an individual organism.
c. a population.
d. a species.
e. an ecosystem.

____ 4. In a large, sexually reproducing population, the frequency of an allele changes from 0.6 to 0.2. From this change, one can most logically assume that, in this environment,
a. the allele is neutral.
b. the allele mutates readily.
c. random processes have changed allelic frequencies.
d. there is no sexual selection.
e. the allele reduces fitness.

____ 5. Through time, the movement of people on Earth has steadily increased. This has altered the course of human evolution by increasing
a. nonrandom reproduction.
b. geographic isolation.
c. genetic drift.
d. mutations.
e. gene flow.

Use the information below to answer the following questions.

In the year 2500, five male space colonists and five female space colonists (all unrelated to each other) settle on an uninhabited Earthlike planet in the Andromeda galaxy. The colonists and their offspring randomly mate for generations. All ten of the original colonists had free earlobes, and two were heterozygous for that trait. The allele for free earlobes is dominant to the allele for attached earlobes.

____ 6. Which of these is closest to the allele frequency in the founding population?
a. 0.1 *a*, 0.9 *A*
b. 0.2 *a*, 0.8 *A*
c. 0.5 *a*, 0.5 *A*
d. 0.8 *a*, 0.2 *A*
e. 0.4 *a*, 0.6 *A*

____ 7. If one assumes that Hardy-Weinberg equilibrium applies to the population of colonists on this planet, about how many people will have attached earlobes when the planet's population reaches 10,000?
a. 100
b. 400
c. 800
d. 1,000
e. 10,000

Use the options below to answer the following questions. For each description of reproductive isolation, select the option that best describes it. Options may be used once, more than once, or not at all.

A. gametic
B. temporal
C. behavioral
D. habitat
E. mechanical

____ 8. two species of orchids with different floral anatomy
a. A
b. B
c. C
d. D
e. E

____ 9. two species of trout that breed in different seasons
a. A
b. B
c. C
d. D
e. E

____ 10. two species of meadowlarks with different mating songs
a. A
b. B
c. C
d. D
e. E

____ 11. mating fruit flies recognize the appearance, odor, tapping motions, and sounds of members of their own species, but not of other species
a. A
b. B
c. C
d. D
e. E

____ 12. the scarlet oak is adapted to moist bottomland, whereas the black oak is adapted to dry upland soils
a. A
b. B
c. C
d. D
e. E

The questions below are based on the following description:

Several closely related frog species of the genus *Rana* can be found in the forests of the southeastern United States. The species boundaries are maintained by reproductive barriers. In each case, match the various descriptions of frogs below with the appropriate reproductive barrier listed. Options may be used once, more than once, or not at all.

A. behavioral
B. gametic
C. habitat
D. temporal
E. mechanical

____ 13. Females of one species choose mates based on song quality; females of another species choose mates on the basis of size.
a. A
b. B
c. C
d. D
e. E

____ 14. Beetle pollinators of a particular plant are attracted to its flowers by their bright orange color. The beetles not only pollinate the flowers, but they mate while inside of the flowers. A mutant version of the plant with red flowers becomes more common with the passage of time. A particular variant of the beetle prefers the red flowers to the orange flowers. Over time, these two beetle variants diverge from each other to such an extent that interbreeding is no longer possible. What kind of speciation has occurred in this example, and what has driven it?
a. allopatric speciation, ecological isolation
b. sympatric speciation, habitat differentiation
c. allopatric speciation, behavioral isolation
d. sympatric speciation, sexual selection
e. sympatric speciation, allopolyploidy

____ 15. According to the concept of punctuated equilibrium, the "sudden" appearance of a new species in the fossil record means that
a. the species is now extinct.
b. speciation occurred instantaneously.
c. speciation occurred in one generation.
d. speciation occurred rapidly in geologic time.
e. the species will consequently have a relatively short existence, compared with other species.

The following questions refer to this hypothetical situation:

A female fly, full of fertilized eggs, is swept by high winds to an island far out to sea. She is the first fly to arrive on this island, and the only fly to arrive in this way. Thousands of years later, her numerous offspring occupy the island, but none of them resemble her. There are, instead, several species each of which eats only certain type of food. None of the species can fly, for their flight wings are absent, and their balancing organs (i.e., the halteres) are now used in courtship displays. The male members of each species bear modified halteres that are unique in appearance to their species. Females bear vestigial halteres. The ranges of all of the daughter species overlap.

____ 16. If these fly species lost the ability to fly independently of each other (the result of separate mutation events in each lineage), then the flightless condition in these species could be an example of
a. adaptive radiation.
b. species selection.
c. sexual selection.
d. allometric growth.
e. habitat differentiation.

____ 17. In each fly species, the entire body segment that gave rise to the original flight wings is missing. The mutation(s) that led to the flightless condition probably affected the ____ genes, making the initial mutants examples of ____.
a. thorax; complete metamorphosis
b. exoskeleton; exaptations
c. *Hox*; complete metamorphosis
d. thorax; exaptations
e. *Hox*; adaptive radiants

____ 18. If the males' halteres have species-specific size, shape, color, and use in courtship displays, and if the species' ranges overlap, then the speciation events may have been driven, at least in part, by which of the following?
a. autopolyploidy
b. allopolyploidy
c. species selection
d. sexual selection
e. habitat differentiation

____ 19. Which of the following has not yet been synthesized in laboratory experiments studying the origin of life?
a. liposomes
b. liposomes with selectively permeable membranes
c. oligopeptides and other oligomers
d. protobionts that use DNA to program protein synthesis
e. amino acids

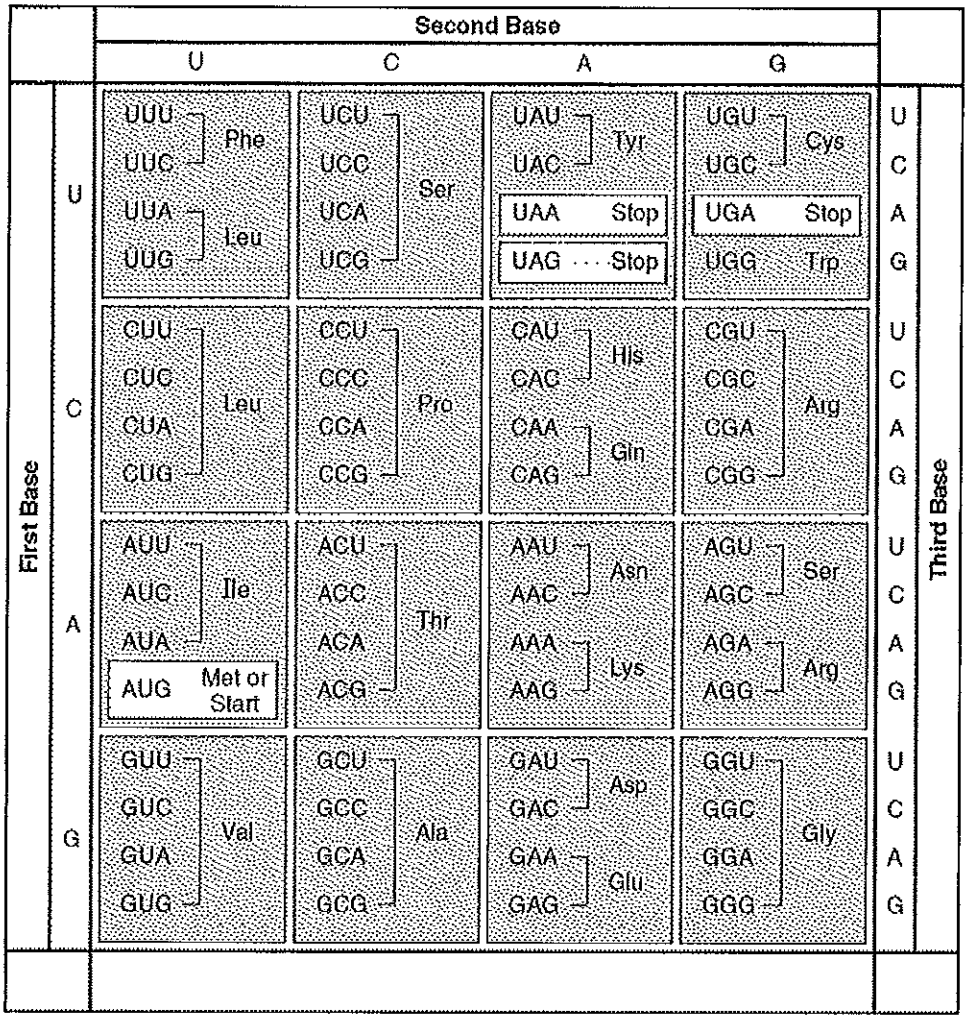
____ 20. What was the consequence of the release of oxygen gas by plant and bacterial photosynthesis? It
a. made life on land difficult for aerobic organisms.
b. changed the atmosphere from oxidizing to reducing.
c. made it easier to maintain reduced molecules.
d. made Earth an oxidizing environment.
e. prevented the formation of an ozone layer.

____ 21. What is the correct sequence of these events, from earliest to most recent, in the evolution of life on Earth?
1. origin of mitochondria
2. origin of multicellular eukaryotes
3. origin of chloroplasts
4. origin of cyanobacteria
5. origin of fungal-plant symbioses

a. 4, 3, 2, 1, 5
b. 4, 1, 2, 3, 5
c. 4, 1, 3, 2, 5
d. 4, 3, 1, 5, 2
e. 3, 4, 1, 2, 5

____ 22. Many physicians administer antibiotics to patients at the first sign of any disease symptoms. Why can this practice cause more problems for these patients, and for others not yet infected?
a. The antibiotic administered may kill viruses that had been keeping the bacteria in check.
b. Antibiotics may cause other side effects in patients.
c. Overuse of antibiotics can select for antibiotic-resistant strains of bacteria.
d. Particular patients may be allergic to the antibiotic.
e. Antibiotics may interfere with the ability to identify the bacteria present.

Use the table of condons below to answer the following questions.



First Base	Second Base: U	Second Base: C	Second Base: A	Second Base: G	Third Base
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	U
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AAU Asn	AGU Ser	U
	AUC Ile	ACC Thr	AAC Asn	AGC Ser	C
	AUA Ile	ACA Thr	AAA Lys	AGA Arg	A
	AUG Met or Start	ACG Thr	AAG Lys	AGG Arg	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	U
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

____ 23. A peptide has the sequence NH2-phe-pro-lys-gly-phe-pro-COOH. Which of the following sequences in the coding strand of the DNA codes for this peptide?

a. 3' UUU-CCC-AAA-GGG-UUU-CCC
b. 3' AUG-AAA-GGG-TTT-CCC-AAA-GGG
c. 5' TTT-CCC-AAA-GGG-TTT-CCC
d. 5' GGG-AAA-TTT-AAA-CCC-ACT-GGG
e. 5' ACT-TAC-CAT-AAA-CAT-TAC-UGA

____ 24. A codon

a. consists of two nucleotides.
b. may code for the same amino acid as another codon.
c. consists of discrete amino acid regions.
d. catalyzes RNA synthesis.
e. is found in all eukaryotes, but not in prokaryotes.

____ 25. Which of the following are transcribed from DNA?
a. protein
b. exons
c. rRNA
d. B and C only
e. A, B, and C

____ 26. Estimates of current rates of extinction
a. indicate that we have reached a state of unstable equilibrium in which speciation and extinction rates are approximately equal.
b. suggest that one-half of all animal and plant species may be gone by the year 2100.
c. indicate that rates may be 1,000 times higher than at any other time in the last 100,000 years.
d. B and C only
e. A, B, and C

____ 27. Which of the following most directly relates to the current biodiversity crisis?
a. increased atmospheric carbon dioxide
b. ozone depletion
c. overexploitation of species
d. habitat destruction
e. zoned reserves

____ 28. Which of the following conditions is the *most* likely indicator of a population in an extinction vortex?
a. The population is divided into smaller populations.
b. The species is rare.
c. The effective population size of the species falls below 500.
d. Genetic measurements indicate a continuing loss of genetic variation.
e. The population is no longer connected by corridors.

Big Idea 1.C and 1.D Formatives
Answer Section

MULTIPLE CHOICE

1.	ANS: B	PTS: 1	TOP: Concept 22.3
2.	ANS: D	PTS: 1	
3.	ANS: C	PTS: 1	
4.	ANS: E	PTS: 1	TOP: Concept 23.2 | Concept 23.3
5.	ANS: E	PTS: 1	TOP: Concept 23.3
6.	ANS: A	PTS: 1	TOP: Concept 23.2
7.	ANS: A	PTS: 1	TOP: Concept 23.2
8.	ANS: E	PTS: 1	TOP: Concept 24.1
9.	ANS: B	PTS: 1	TOP: Concept 24.1
10.	ANS: C	PTS: 1	TOP: Concept 24.1
11.	ANS: C	PTS: 1	TOP: Concept 24.1
12.	ANS: D	PTS: 1	TOP: Concept 24.1
13.	ANS: A	PTS: 1	TOP: Concept 24.1
14.	ANS: B	PTS: 1	TOP: Concept 24.2
15.	ANS: D	PTS: 1	TOP: Concept 24.2
16.	ANS: B	PTS: 1	TOP: Concept 24.2 | Concept 24.3
17.	ANS: C	PTS: 1	TOP: Concept 24.2 | Concept 24.3
18.	ANS: D	PTS: 1	TOP: Concept 24.2 | Concept 24.3
19.	ANS: D	PTS: 1	TOP: Concept 26.1
20.	ANS: D	PTS: 1	TOP: Concept 26.3
21.	ANS: C	PTS: 1	TOP: Concept 26.4
22.	ANS: C	PTS: 1	TOP: Concept 27.5
23.	ANS: C	PTS: 1	TOP: Concept 17.1
24.	ANS: B	PTS: 1	TOP: Concept 17.1
25.	ANS: D	PTS: 1	TOP: Concept 17.2
26.	ANS: C	PTS: 1	TOP: Overview
27.	ANS: D	PTS: 1	TOP: Concept 55.1
28.	ANS: D	PTS: 1	TOP: Concept 55.2