Chapter 02
Population Genetics

Multiple Choice Questions

1. The first person to publish a theory that species change over time was
A. Plato
B. Lamarck
C. Darwin
D. Wallace
E. Mendel

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

2. Charles Robert Darwin
A. had a thorough understanding of genetics.
B. sailed on a three year survey around the world.
C. examined fossil beds in China.
D. formulated a theory of natural selection.
E. knew little of geological change.

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

3. Malthus proposed that because the earth was not overrun by humans they must be limited by
A. food shortage, disease, war.
B. natural selection.
C. survival of the fittest.
D. evolution.
E. Adaptation.

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

4. Over long periods of time, natural selection leads to
A. mutation.
B. adaptation.
C. hybridization.
D. dominance.
E. true breeding lines.

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

5. In polluted areas _____ forms of peppered moths are _____ conspicuous to birds on _____ tree trunks.
A. normal; more; lichen-covered
B. melanic; less; lichen-covered
C. melanic; less; dark-colored
D. melanic; more; dark-colored
E. all the above statements are false

Bloom's Level: 2. Understand
Learning Outcome: 02.01
Topic: Evolutionary Ecology

6. An individual with two identical copies of a gene is said to be
A. homozygous
B. heterozygous
C. dominant
D. recessive
E. segregated

Bloom's Level: 2. Understand
Learning Outcome: 02.01
Topic: Evolutionary Ecology

7. What is NOT one of the nucleotide bases that make-up double-stranded DNA base pairs?
A. Adenine
B. Proline
C. Thymine
D. Guanine
E. Cytosine

Bloom's Level: 1. Remember
Learning Outcome: 02.02
Topic: Evolutionary Ecology

8. When a chromosome breaks in two places and the middle segment turns around and refuses with the same pieces, we call this a(n)
A. Duplication
B. Transversion
C. Deletion
D. Inversion
E. Translocation

Bloom's Level: 1. Remember
Learning Outcome: 02.02
Topic: Evolutionary Ecology

9. The Hardy-Weinberg equation states that $p^2 + 2pq + q^2 = 1$; the genotype frequency of heterozygotes is represented by
A. p^2
B. 2pq
C. q^2
D. $p^2 + q^2$
E. $p^2 + 2pq$

Bloom's Level: 2. Understand
Learning Outcome: 02.03
Topic: Evolutionary Ecology

10. In a population of 100 four-o'clock flowers there are 40 red-flowered plants (C^RC^R), 38 pink-flowered plants (C^RC^W), and 22 white-flowered plants (C^WC^W). What is the frequency of the C^W allele in this population?
A. 0.41 or 41%
B. 0.6 or 60%
C. 0.4 or 40%
D. 0.09 or 9%
E. 0.52 or 52%

Bloom's Level: 4. Analyze
Learning Outcome: 02.03
Topic: Evolutionary Ecology

11. The percentage of individuals exhibiting a recessive disease in a population is 0.04, which is 4% based on a Hardy-Weinberg equilibrium. What percentage of individuals would be expected to be heterozygous carriers?
A. 48
B. 40
C. 60
D. 24
E. 4

Bloom's Level: 1. Remember
Learning Outcome: 02.03
Topic: Evolutionary Ecology

12. In the Hardy-Weinberg equation, the letters *p* and *q* represent
A. frequencies of alleles in a population.
B. the number of individuals of different phenotypes in a population.
C. the number of individuals of different genotypes in a population.
D. the frequencies of individuals of different genotypes in a population.
E. the square of individuals of different genotypes in a population.

Bloom's Level: 4. Analyze
Learning Outcome: 02.03
Topic: Evolutionary Ecology

13. Below is a list of phenomenon that can occur in a population, which of these would violate the conditions for the Hardy-Weinberg equation?
A. The population is large.
B. Mating is nonrandom.
C. Migration does not occur between different populations.
D. Natural selection is not occurring.
E. No new mutations arise.

Bloom's Level: 1. Remember
Learning Outcome: 02.03
Topic: Evolutionary Ecology

14. If a population does not satisfy the Hardy-Weinberg equilibrium model, what may you assume about that population?
A. Evolutionary mechanisms are effecting the population.
B. Evolution is not occurring.
C. No new mutations are occurring, only nonrandom mating.
D. No migration is occurring.
E. Evolutionary mechanisms are affecting the population and evolution is occurring.

Bloom's Level: 5. Evaluate
Learning Outcome: 02.03
Topic: Evolutionary Ecology

15. If a population is not in Hardy-Weinberg equilibrium, this implies that
A. the population is going extinct.
B. the population is very ancient.
C. one or more of the conditions required for equilibrium are being violated.
D. the population is abnormal.
E. one or more of the conditions required for equilibrium are being violated and the population is evolving.

Bloom's Level: 1. Remember
Learning Outcome: 02.03
Topic: Evolutionary Ecology

16. A large effective population size is important so that a species
A. can maintain an adequate range.
B. does not change its trophic relationship.
C. will not lose large amounts of genetic diversity in the near future.
D. can minimize edge effects.
E. can remain endemic to a small area.

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

17. In which plant mating system would genetic variability decline slowest?
A. self fertilization.
B. mating with brothers or sisters.
C. mating with cousins.
D. mating with second cousins.
E. mating with unrelated individuals.

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

18. A recent genetic analysis has shown that at one point, as few as _____ Florida panthers were alive.
A. 6
B. 20
C. 40
D. 80
E. 120

Bloom's Level: 5. Evaluate
Learning Outcome: 02.04
Topic: Evolutionary Ecology

19. The decline in the numbers of greater prairie chickens in Illinois in the late 20th century was a striking example of
A. genetic drift.
B. inbreeding.
C. an extinction vortex.
D. a and b
E. b and c

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

20. Inbreeding and small population size of a threatened species can combine to form a downward spiral from which a species cannot easily recover. This is known as a(n)
A. extinction vortex
B. random change of allele frequencies.
C. random mutation.
D. accelerated evolution of new traits.
E. Bottleneck effect.

Bloom's Level: 2. Understand
Learning Outcome: 02.01
Topic: Evolutionary Ecology

21. Studies on the Glanville fritillary butterfly in Finland showed that just one generation of brother-sister mating causes
A. increased number of eggs to be laid.
B. increased hatching of eggs.
C. reduced caterpillar survival.
D. increased caterpillar parasitism.
E. increased genetic variability.

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

22. Robert Lacey showed that in a population of 120 individuals, at least _____ immigrant(s) every generation would be sufficient to counter genetic drift.
A. 0.1
B. 0.5
C. 1
D. 2
E. 5

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

23. Elephant seals have a smaller effective population size than real population size due to the effects of
A. inbreeding.
B. genetic drift.
C. a harem mating structure.
D. an extinction vortex.
E. All of these

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology

True / False Questions

24. The best explanation for species distributions is that each region supports the fauna and flora best adapted to it.
FALSE

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

25. The inheritance of acquired characteristics suggests that a person who became strong through lifting weights would pass this trait on to his or her children.
TRUE

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

26. Alfred Russel Wallace was a co-discoverer of evolutionary theory.
TRUE

Bloom's Level: 2. Understand
Learning Outcome: 02.01
Topic: Evolutionary Ecology

Matching Questions

27. Match the type of chromosome mutation with its effect.

1. Duplication	loss of part of the chromosome	**2**
2. Deletion	added amount of some genes	**1**
3. Inversion	chromosome breakage, re-positioning and re-fusing	**3**
4. Translocation	the exchange of segments between two non-homologous chromosomes	**4**

Bloom's Level: 1. Remember
Learning Outcome: 02.02
Topic: Evolutionary Ecology

28. Match the scientist with their discovery

1. Darwin	natural selection	**1**
2. Mendel	theory of population growth	**3**
3. Malthus	transformism	**4**
4. Lamarck	inheritance	**2**

Bloom's Level: 1. Remember
Learning Outcome: 02.01
Topic: Evolutionary Ecology

29. Match the continents with their fauna

1. South America	sloths, anteaters, armadillos, monkeys with prehensile tails	**1**
2. Australia	zebra, giraffes, lions, baboons, okapi, aardvark	**3**
3. Africa	bats, Tasmanian devil, wombat, duck-billed platypus, echidna	**2**

Bloom's Level: 2. Understand
Learning Outcome: 02.04
Topic: Evolutionary Ecology

30. Match the following names with their definitions.

1. Allee effect	mating between closely related individuals	**4**
2. Effective population size	random changes in allele frequencies over time	**3**
3. Genetic drift	the number of individuals that contribute genes to future populations	**2**
4. Inbreeding	the likelihood that, in a small population, some individuals will fail to mate successfully	**1**

Bloom's Level: 1. Remember
Learning Outcome: 02.04
Topic: Evolutionary Ecology