

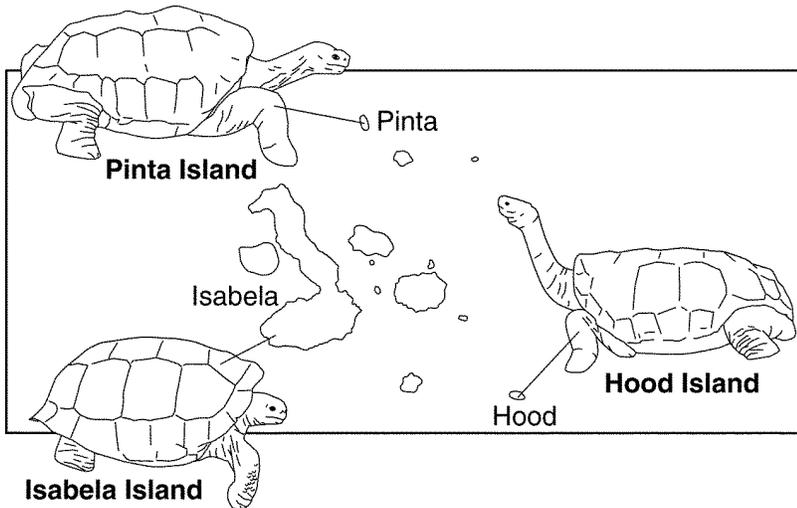
| Knowledge & Understanding | Application | Thinking & Investigation | Communication | Total |
|---------------------------|-------------|--------------------------|---------------|-------|
| /23 | /12 | /9 | /9 | /53 |

Part A: Multiple Choice (1 mark per question) (K/U)

- According to Darwin's theory of natural selection, the individuals that survive are those that have:
 - Characteristics that plant or animal breeders favour
 - The greatest number of offspring
 - Variations best suited for the environment
 - Characteristics their parents acquired by use and disuse.
- Charles Darwin called the ability of an organism to survive and reproduce in its environment
 - Diversity
 - Evolution
 - Fitness
 - Adaptation
- Which of the following statements is FALSE
 - A mutation is a change in the organism's DNA
 - All mutations are harmful
 - Evolution is the progression towards a perfect species
 - Mutations are rare events that can occur randomly or be the result of external factors
- Genetic drift occurs due to:
 - Random chance
 - Natural selection
 - Migration
 - Artificial selection
- Which of the following statements regarding natural selection is FALSE
 - Natural selection is the differential survival and reproduction of individuals with certain traits
 - Natural selection acts on phenotypes
 - Natural selection causes evolutionary change whenever there is genetic variation for traits affecting fitness
 - Natural selection is random
- Fitness in an evolutionary sense is measured in:
 - The number of viable offspring produced
 - Physical performance
 - Lifespan
 - Ability to survive
- A **necessary** factor for the formation of new species is:
 - Physical barriers separating two populations
 - Reproductive isolation
 - Different mating behaviours
 - Different mating times

8. Sexual selection will:
- Select for traits that enhance an individual's chance of mating
 - Increase the size of individuals
 - Result in individuals better adapted to the environment
 - Result in stabilizing selection

Answer questions #9-11 using the following diagram (Application)



9. What differences are apparent in the bodies of the three tortoise species shown above?
- Shells that differ in overall shape
 - Different neck lengths
 - Size of the opening for the neck
 - Different shell patterns
10. Vegetation on Hood Island is sparse and sometimes hard to reach. How might the vegetation have affected the evolution of the Hood Island tortoise shown above?
- Ancestral tortoises with long necks and shells that permitted greater neck movement obtained food more easily, survived longer, and produced more offspring than other tortoises.
 - Ancestral tortoises with short necks and shells that permitted greater neck movement obtained food more easily, survived longer, and produced more offspring than other tortoises.
 - Ancestral tortoises with long necks and shells that prevented greater neck movement obtained food more easily, survived longer, and produced more offspring than other tortoises.
 - None of the above
11. Considering the different body structures of the tortoises shown above, which tortoises (a population from Pinta Island, or a population from Isabela Island – might survive more successfully on Hood Island?
- Pinta Island
 - Isabela Island
 - Both have an equal chance of survival
12. Genetic drift is likely to be seen in a population:
- That has a high migration rate
 - That has a low mutation rate
 - In which natural selection is occurring
 - That is very small

13. Gene flow often results in
- Populations that move to better environments
 - A reduction of the allele frequency difference between populations
 - Adaptive microevolution
 - An increase in sampling error in the formation of the next generation
14. Which of the following best describes the role of beneficial mutations?
- They improve the appearance of the individuals.
 - They give individuals a better chance of survival.
 - They increase the size of individuals.
 - They make individuals smarter.
15. Principles of uniformitarianism include which of the following?
- All animals share the same DNA.
 - Earth is continually being changed by new forces over time.
 - Natural laws are dynamic and change over time.
 - Geological change is slow and gradual.
16. Which of the following statements is incorrect?
- Lamarck proposed that individuals could pass on traits that they acquired during their lifetime to their offspring.
 - Lyell revolutionized geology suggesting that geological change is slow and gradual.
 - Cuvier's studies on fossils revealed that complex fossils are found only in the oldest rocks.
 - Darwin's theory of natural selection explains that the environment favors some individuals over others.
17. What is biogeography?
- The study of fossil organisms in order to learn about earlier forms of life
 - The observed geographic patterns of the distribution of species
 - The idea that global catastrophes have caused the widespread extinctions of species
 - The idea that Earth and all living things have been created in their present forms and are unchangeable
18. Vestigial features include:
- The gills of a fish
 - The larynx of a giraffe
 - Goose bumps on a wolf
 - The hip bones of a snake
19. The increased oxygen-carrying capacity of the blood of native Tibetans is an example of:
- Directional selection
 - Stabilizing selection
 - Disruptive selection
 - All of the above
20. Which of the following is most likely to occur when a small number of individuals establish a new population?
- Hardy-Weinberg principle
 - Genetic bottleneck
 - Founder effect

d. Mechanical isolation

21. Prezygotic mechanisms of reproductive isolation include:

- a. Ecological isolation
- b. Hybrid infertility
- c. Zygotic mortality
- d. None of the above

22. Convergent evolution is exhibited most clearly by which of the following animal pairs?

- a. Whales and elephants
- b. Sharks and dolphins
- c. Flying squirrels and porcupines
- d. Lions and tigers

23. The study of abiogenesis is an effort to explain:

- a. Why the dinosaurs became extinct
- b. How life began
- c. When life began
- d. Why the extinction rate is increasing

Part B: Short Answers

24. How are speciation and microevolution different? (4 marks) (Communication)

Speciation, by which a new species evolves from a parent species, is part of macroevolution and the increase in biological diversity. Microevolution is the process by which changes occur within the gene pool of a population as a result of either chance events or natural selection. If the makeup of the gene pool changes enough, microevolution may lead to speciation

25. What is artificial selection, and why is it called “artificial”? (2 marks) (K/U)

Artificial selection is directed breeding in which individuals that exhibit a particular trait are chosen as parents of the next generation. Artificial selection is used to produce new breeds or varieties of plants and animals. It is called “artificial” because it occurs in captivity rather than in a natural setting, and humans choose which specific animals or plants are bred.

26. The evolution of Drug-Resistance HIV. Within a few weeks of treatment with drug X, a patient's HIV population consists entirely of X-resistant HIV. Explain how this rapid evolution of drug resistance is an example of natural selection. (4 marks) (Application)

Treatment with the drug X prevents most HIV from reproducing. X-resistant HIV are still able to reproduce. Those that don't reproduce, die and those that do, populate the host. Eventually this results in 100% of the HIV in the host being X-resistant. Because viruses have such a short life span we can see this as an example of how organisms evolve to survive in their habitats over time.

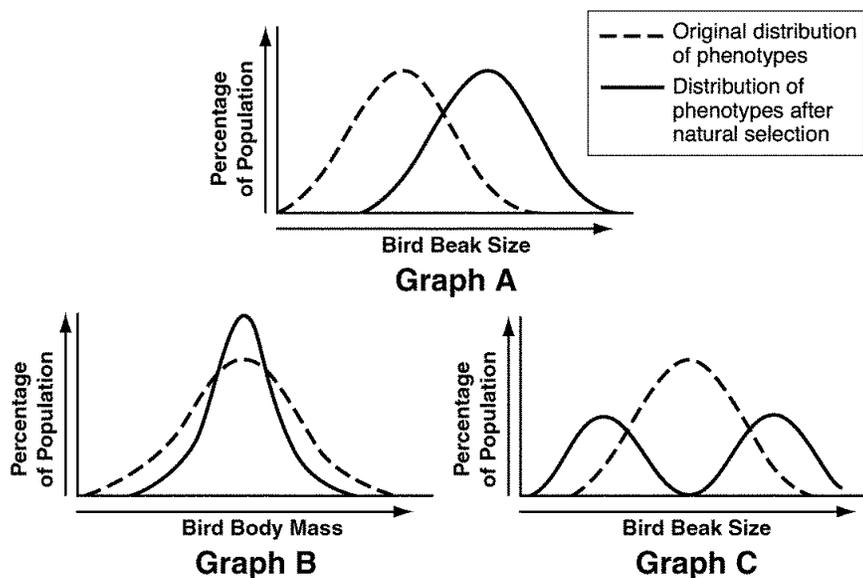
27. Plant breeders have bred many plants to make it easier to transport them from one location to another. That is one reason you now see fruits and vegetables from around the world in your grocery store. What sorts of traits do you think the plant breeders look for to allow transportation of food across great distances? List three. (3 marks) (T/I)

Large fruit, resistant to physical stress, long ripening time, resistant to cold temperatures and refrigeration, resistant to infection

28. Why is it rare to find fossils that include soft body parts, such as organs? (1 mark) (T/I)

The soft body parts quickly decompose and are not likely to be preserved. Hard body parts, such as shells, bones and teeth are likely to be found in the fossil record.

29.



a) According to each of the three above graphs, what has happened in each situation? (3 marks) (Application)

Graph A: there is a shift in the average beak size from smaller to larger beaks in the population

Graph B: stabilizing selection has occurred in the population's body mass

Graph C: Disruptive selection as occurred in the population's beak size

b) What factors or conditions may have led to the change shown in graph A? Present a likely scenario. (3 marks) (T/I)

One possible scenario is maybe that in recent years, precipitation levels in the habitat of the bird population have decreased, leading a decrease in the amount of food/vegetation in the area. Trees will also be producing seeds with harder shells, which will favor birds with larger beaks to be able to crack them open

30. Some animals have evolved protective coloration. Examine the image below.



a) What does this pattern represent? (1 mark) (K/U)

It is an example of mimicry. The pattern represents the eyes of a much larger organism.

b) Why does natural selection favor the evolution of this pattern (2 marks) (T/I)

This form of mimicry (having the appearance of a larger organism) scares away and fends off predators, thus increasing the survival rate of this organism.

31. An athlete breaks her leg. Years later she has a child who walks with a limp. Is this an example of evolution? Explain your answer. (2 marks) (Application)

No, a broken leg is temporary, has no genetic influence and will not be passed on to offspring.

32. Construct a cladogram using the information provided in the table below. (5 marks) (Communication)

| Organism | Specialized Shearing Teeth | Amniotic Egg | Hair | Retractable Claws |
|----------|----------------------------|--------------|------|-------------------|
| Dog | √ | √ | √ | X |
| Lizard | X | √ | X | X |
| Cat | √ | √ | √ | √ |
| Frog | X | X | X | X |
| Kangaroo | X | √ | √ | X |

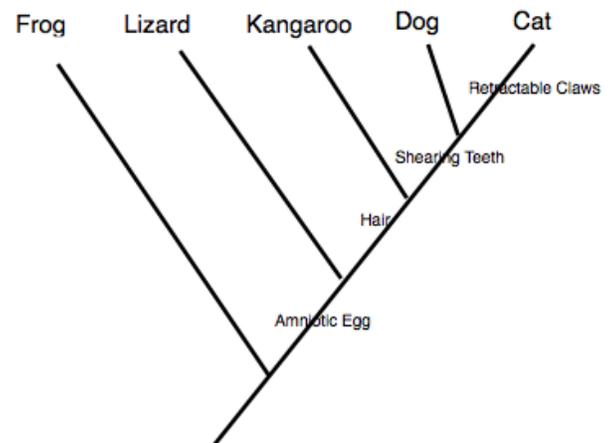


Figure 1 Answer