NAME: _____ DATE: _____ SECTION: _____

MCAS PREP PACKET – EVOLUTION AND BIODIVERSITY

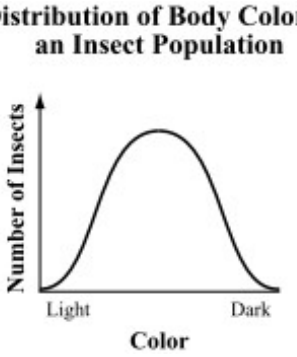
1. Which of the following observations **best** supports the conclusion that dolphins and sharks do not have a recent common ancestor?
   - **A.** Dolphins form social groups, but sharks are solitary.
   - **B.** Dolphins hunt during the day, but sharks are nocturnal.
   - **C.** The number of dolphin species is far less than the number of shark species.
   - **D.** The jawbone structure in dolphins is very different from the jawbone structure in sharks.

2. A species of ivy invades the beetles' current habitat and becomes the dominant form of vegetation. The color of the ivy's leaves is similar to the beetles' average color. Considering selective pressure on the beetles from predatory birds, which type of natural selection will **most likely** occur in this situation?
   - **A.** disruptive
   - **B.** stabilizing
   - **C.** directional toward dark body color
   - **D.** directional toward light body color

3. Suppose scientists observe a shift in the distribution of body colors in the beetle population over time. Which of the following observations **best** supports the conclusion that the population has evolved?
   - **A.** The reproductive rate for individual beetles has increased.
   - **B.** The size of the beetle population has increased significantly.
   - **C.** The sequences of body color genes are different among the individual beetles.
   - **D.** The frequencies of the alleles for body color in the beetle population have changed.

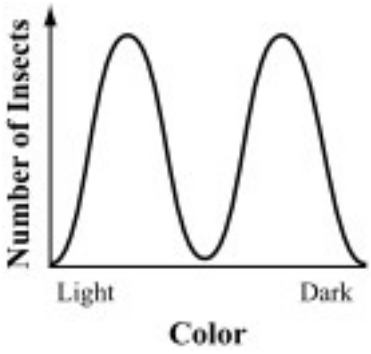
4. Which of the following situations will **most likely** lead to disruptive natural selection?
   - **A.** the introduction of a competing insect species that has a light body color
   - **B.** the preference of female beetles to mate with only dark-colored male beetles
   - **C.** the outbreak of plant diseases that either produce dark spots on leaves or cause leaves to lose their color
   - **D.** the removal of almost all the vegetation from the habitat, exposing the light-colored soil underneath the vegetation

5. Insects that are camouflaged in their environment are less likely to be eaten by birds. The graph below shows the distribution of body color in a population of an insect species.

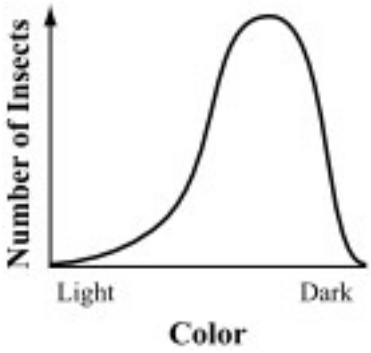


The insects live on trees. A black fungus begins to grow on the trees where the insects live.
Which of the following graphs shows the **most likely** distribution of body color in the insect population after several years of fungus growth?

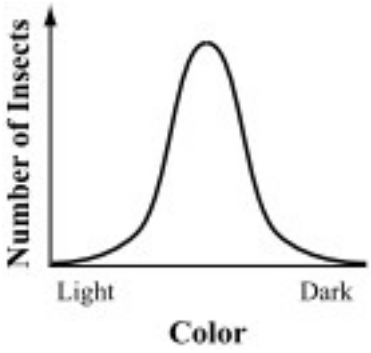
A.



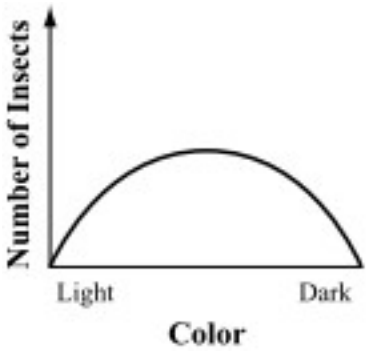
B.



C.



D.



6. Which of the following provides the **most convincing** evidence that two different animal species evolved from a common ancestor?

A. They live in similar environments.

B. They have similar adult body shapes.

C. They have similar methods of locomotion.

D. They show similar features in embryonic development.

7. Which of the following is **most** important in classifying two groups of bears into the same genus?

A. similar diets

B. similar genes

C. similar habitat

D. similar body size

8. A scientist is examining a fossilized insect that may be an ancestor of modern dragonflies. Which of the following should the scientist compare to **best** determine how closely related the fossilized insect is to modern dragonflies?

A. their diets

B. their habitats

C. their predators

D. their anatomies

9. Two groups of organisms are found living on opposite sides of an island. An active volcano prevents each group from traveling to the opposite side of the island. Scientists want to know if these two groups of organisms belong to the same species. The answer to which of the following questions would **most** help scientists determine whether the two groups belong to the same species?

A. Do the two groups eat the same kinds of food?

B. Are the two groups active at the same times each day?

C. Can the two groups interbreed to produce fertile offspring?

D. Do the two groups use similar anatomical structures for the same purpose?

10. Fossils typically provide evidence for evolution because

A. they are millions of years old.

B. they exist in all types of rocks.

C. they supply good samples of RNA.

D. they show patterns of biological change.

11. Fossils of snakes with hind limbs but no forelimbs have been discovered. Which of the following conclusions is**best** supported by this fossil evidence?

A. Snakes are likely to evolve limbs in the future.

B. Snakes are well adapted to live on land without limbs.

C. Snakes have evolved from an ancestral reptile with limbs.

D. Snakes are poor competitors compared to reptiles with limbs.

12. In the early 1900s, California citrus growers sprayed their trees with cyanide gas to kill scale insects. By 1914, some scale insects were surviving the spraying, and eventually the whole population showed resistance to cyanide.Which of the following statements **best** explains how resistance to cyanide spread in the scale insect population?

A. Insects with a resistance gene survived the first cyanide sprayings and passed the gene to their offspring.

B. Insects without a resistance gene underwent mutation upon contact with the cyanide to acquire resistance.

C. Predators put greater selection pressure on insects with a resistance gene than on insects without a resistance gene.

D. Parasites infecting the insect population carried the trait from insects with a resistance gene to insects without a resistance gene.

13. A group of mammals migrates away from the general population to a new habitat. Under which of the following conditions will this group **most likely** develop into a separate species?

A. The new habitat is geographically close to the old habitat.

B. The group returns to the general population each mating season.

C. The ratio of males to females in the group is different than in the general population.

D. The new habitat has conditions that differ significantly from those in the old habitat.

14. Turtles are classified in the order Testudines. Some turtles are aquatic and others are terrestrial. Aquatic turtles have webbed feet and short claws, but terrestrial turtles do not.Which of the following statements **best** explains why aquatic turtles and terrestrial turtles are classified in the same order but have such different feet?

A. Aquatic turtles evolved from fish, and terrestrial turtles evolved from reptiles.

B. Aquatic turtles and terrestrial turtles have similar body plans, but they grow at different rates.

C. Aquatic turtles interbred with different species, and terrestrial turtles bred only within their own species.

D. Aquatic turtles and terrestrial turtles evolved from a common ancestor, but they have adapted to different environments.

15. The information below describes the most specific levels of classification that the mushroom sea squirt, *Sycozoa gaimardi*, shares with four other organisms.

- The mushroom sea squirt is in the same class as the common sea grape.
- The mushroom sea squirt is in the same family as the blue spot ascidian.
- The mushroom sea squirt is in the same order as the white speck tunicate.
- The mushroom sea squirt is in the same phylum as the starry skate.

To which of the four organisms is the mushroom sea squirt most closely related?

A. common sea grape

B. blue spot ascidian

C. white speck tunicate

D. starry skate

16. Some lizards have an adaptation that allows their tails to break off with minimal damage to bones, nerves, blood vessels, and muscles. This type of lizard can then regrow the missing portion of the tail.Which of the following statements **best** explains why this adaptation is selected for in lizard populations?

A. Lizards with this adaptation are better at climbing trees.

B. Lizards with this adaptation are more likely to escape from predators.

C. Lizards with this adaptation can use their tails as lures to attract more food.

D. Lizards with this adaptation can camouflage themselves more easily in vegetation.

17. Which of the following is the **best** scientific evidence that mammals evolved from reptiles?

A. similarities in the diets of extinct reptiles and modern mammals

B. similarities in the average lifespans of modern reptiles and modern mammals

C. fossils of ancient reptiles and mammals that appear together in the same layers of rock

D. fossils that show gradual changes in skull shape from reptile-like organisms to mammal-like organisms

18. A species of newt produces a toxin that can kill predators. Scientists have observed that some garter snakes can feed on the newts because they have a natural resistance to the toxin.In areas where populations of newts and garter snakes interact, which of the following predictions is **best**supported by evolutionary theory?

A. The garter snakes with resistance to the toxin will successfully reproduce and pass the trait on to their offspring.

B. The garter snakes without resistance to the toxin will acquire resistance by increasing the rate at which they feed on the newts.

C. The newts that produce low levels of toxin will also develop camouflage adaptations that allow them to hide from the garter snakes.

D. The newts will stop making the toxin rather than continue to use energy to make a toxin that is ineffective against the garter snakes.

19. Madagascar is an island located off the east coast of Africa, as shown on the map below.

Madagascar has a unique animal community. Lemurs are one of the animal groups that have diversified extensively on Madagascar. Lemurs are primates, which is an order of mammals that also includes monkeys and apes. Lemur species vary widely in habitat, diet, size, and color. Lemurs only live on the island of Madagascar. However, fossil evidence shows that lemur ancestors existed on Africa's mainland. Scientists hypothesize that lemur ancestors reached Madagascar by floating across the Mozambique Channel on matted clumps of vegetation.

Four different lemur species are shown in figures 1–4 below.

Copyright © Konrad Wothe/Minden Pictures
Figure 1. Mouse lemur
Length: 12.5 cm
Habitat: Rain forest and deciduous forest

Copyright © Frans La nting/Minden Pictures
Figure 2. Verreaux's sifaka
Length: 45 cm–55 cm
Habitat: Spiny deciduous forest and evergreen forest

Copyright © Gerry Ellis/Minden Pictures
Figure 3. Ring-tailed lemur
Length: 38 cm–46 cm
Habitat: Deciduous forest and scrub forest

Copyright © Frans Lanting/Minden Pictures
Figure 4. Red-bellied lemur
Length: 36 cm–54 cm
Habitat: Rain forest

The lemurs shown in figures 1–4 all have prominent body features, such as eyes, fingers, legs, tails, and coats.

Choose **three** of the lemurs in the figures.
Using the figures, identify one prominent, visible feature for **each** of the lemur species you chose. Then describe a likely scenario in which natural selection favored the evolution of this feature. Be sure to discuss a different feature for each lemur.

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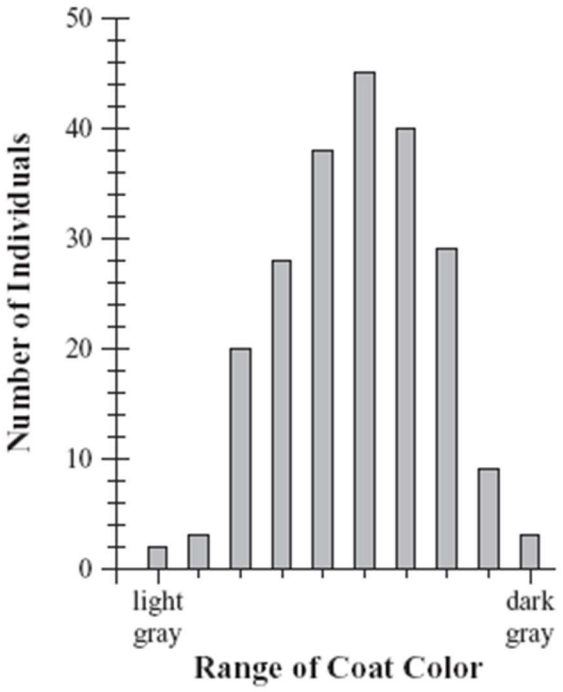
SCORE POINT 4:

a. The three lemur species I choose are the Mouse Lemur, the Red-bellied lemur, and the Ring-tailed lemur.
b. The mouse lemur has very large eyes as one of it's prominent features. I would expect that lemurs with large eyes were able to spot predators easily, while those with small eyes could not, therefore they were killed and the lemurs with the large eyes survived to pass on their DNA to future generations. The Red-bellied lemur has small, hook-like paws that can easily hook around small tree branches. I would imagine that perhaps lemurs in the past who had this feature were able to climb trees and get their food easier, and maybe they could also escape from predators by climbing up the trees. Lemurs who did not have this feature most likely died off due to their disadvantage. The Ring-tailed lemur has a long tail with stripes around it. This tail must have been more attractive to mates, so those who had this tail reproduced successfully and passed this characteristic on.

20. The graph below relates the number of gray squirrels in a small population to their coat colors.



This squirrel population has been separated from other squirrel populations by a new highway and several construction sites. The main predators of these squirrels are cats and hawks.

a. Assume that dark gray squirrels are very visible in this new environment. What is likely to happen to the distribution of coat color in this squirrel population over several generations? Sketch a graph in your Student Answer Booklet to show the predicted distribution, and explain your answer.

b. Assume that dark gray squirrels are very visible on the ground, and light gray squirrels are very visible in the trees. Explain what is likely to happen to the distribution of coat color in the squirrel population over several generations. You may sketch a graph in your Student Answer Booklet as part of your explanation.

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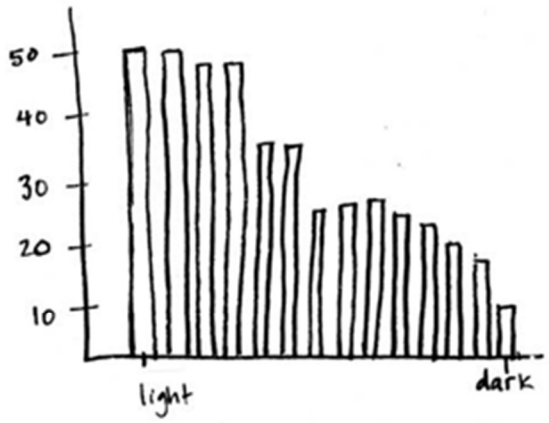
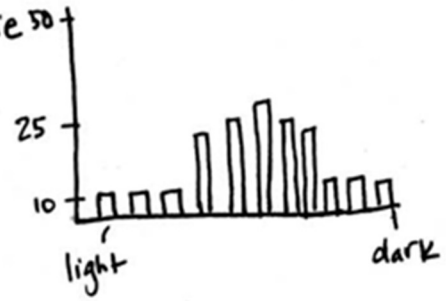
SCORE POINT 4:

A.



If dark squirrles are very visible on ground then they could be eaten by both cats and squirrles. This will make the amont of blackish squirrles go down.

B. The squirrles will most likely die if they can be seen easily. So the mid color ones will survive more.



21. The illustrations below show a South American finch and some of the species of finches found on the Galápagos Islands. The map shows the relationship of the Galápagos Islands to the west coast of South America.

There are 13 species of finches found on the Galápagos Islands. These finches have a wide variety of food sources and beak shapes. There is one genetically similar species of finch found on the South American mainland. This finch eats small seeds.

Use the map and the bird illustrations to identify and explain **two** ways that these finches provide evidence that supports the theory of evolution

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SCORE POINT 4:

Darwin's finches in the Galapagos Islands are perfect examples of evolution. One way in which these finches support the theory of evolution is the variation in beak size among the finches. Finches that prey on small insects have adapted and evolved to have small pointed beaks useful for eating insects. Finches that feed on cactus flowers, fruits, and nectar have slightly larger beaks in order to penetrate into cactus fruit and cactus epidermis. Finches that eat large seeds have adapted to have large beaks capable of crushing seeds easily.

Another way in which the finches provide evidence that supports evolution is their relation to the South American finch. Because they are genetically similar, it shows that they all descended from a common ancestor. Some finches flew 1,000 km to the Galapagos Islands and continued to evolve to suit their environment, experiencing divergent evolution.