

SCIENCE TEST

35 Minutes—40 Questions

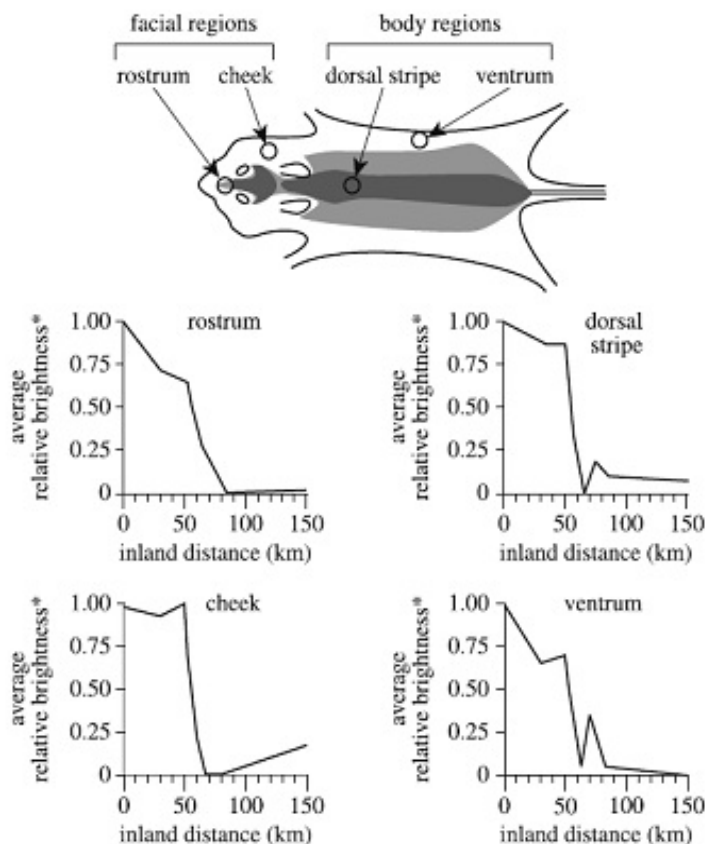
DIRECTIONS: There are several passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

In a study of fur pigmentation in deer mice, *Peromyscus polionotus*, scientists compared the brightness of the fur of mice from populations located different distances directly inland from a coastal site. Figure 1 shows

the 2 facial regions and the 2 body regions at which the fur of each mouse was evaluated (on a scale from 0 to 1.00) with respect to its brightness. Figure 1 also shows how, for each of the 4 regions, average relative brightness varied with inland distance.



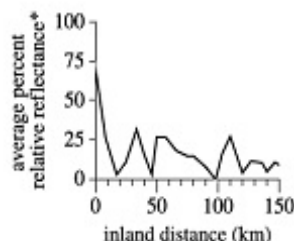
*For each facial or body region, the darkest fur pigmentation was assigned a brightness value of 0, and the lightest fur pigmentation was assigned a brightness value of 1.00.

Figure 1

GO ON TO THE NEXT PAGE.



Figure 2 shows how the average brightness of surface soil samples, given as the average percent relative reflectance, varied with inland distance.



*compared to a standard that was assigned 100% reflectance

Figure 2

Figures 1 and 2 adapted from Lynne M. Mullen and Hopi E. Hoekstra. "Natural Selection Along an Environmental Gradient: A Classic Cline in Mouse Pigmentation." ©2008 by The Author(s).

- Based on Figure 2, on average, where was the brightest surface soil found?
 - At the coastal site
 - 50 km inland
 - 100 km inland
 - 150 km inland
- According to Figure 1, the average relative brightness of the dorsal stripe was 0.25 at an inland distance that was closest to which of the following?
 - 20 km
 - 40 km
 - 60 km
 - 80 km
- According to Figure 1, the greatest change in the average relative brightness of the fur on the rostrum occurred between which of the following inland distances?
 - 0 km and 25 km
 - 25 km and 50 km
 - 50 km and 75 km
 - 100 km and 125 km
- Based on Figure 1, on average, was the fur pigmentation on the ventrum of *P. polionotus* lighter or darker 150 km inland than it was at the coastal site?
 - Lighter, because the average relative brightness 150 km inland was greater.
 - Lighter, because the average relative brightness 150 km inland was less.
 - Darker, because the average relative brightness 150 km inland was greater.
 - Darker, because the average relative brightness 150 km inland was less.
- Which of the following statements best explains the geographic variation in the fur pigmentation of *P. polionotus*? At any given inland distance, the more closely the fur pigmentation of a *P. polionotus* mouse matches the soil, the:
 - less likely the mouse will be found by a predator, and thus the less likely it will pass its fur pigmentation traits to its offspring.
 - less likely the mouse will be found by a predator, and thus the more likely it will pass its fur pigmentation traits to its offspring.
 - more likely the mouse will be found by a predator, and thus the less likely it will pass its fur pigmentation traits to its offspring.
 - more likely the mouse will be found by a predator, and thus the more likely it will pass its fur pigmentation traits to its offspring.
- Based on Figure 2, on average, was the surface soil at the coastal site lighter or darker than the standard that was used for the comparison?
 - Lighter; the average percent relative reflectance of the soil at the coastal site was 100%.
 - Lighter; the average percent relative reflectance of the soil at the coastal site was less than 100%.
 - Darker; the average percent relative reflectance of the soil at the coastal site was 100%.
 - Darker; the average percent relative reflectance of the soil at the coastal site was less than 100%.